Developing an Evidence-Based Intervention to Improve Influenza Vaccination Rate Among Care Homes Staff

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Abstract

Background

Influenza poses a significant health risk to older people in care homes, who are particularly vulnerable to severe complications. Vaccination is an effective way to prevent influenza outbreaks in care homes. However, influenza vaccination rates among care home staff remain low. To address this public health issue, this thesis, as part of the FluCare study, explores the development and evaluation of an intervention designed to improve influenza vaccination uptake among care home staff.

Methods

This thesis includes three studies, all conducted within the context of the FluCare study. The first study was a systematic review conducted to identify barriers and enablers affecting influenza vaccine uptake among care home staff. The second study was a survey of local authorities (LAs) to identify current practices and interventions used to improve influenza vaccination rates among care home staff. The third study involved interviews with vaccine providers to identify the barriers and enablers related to implementing in-care home influenza vaccination clinics for care home staff.

Results

The systematic review identified key barriers and enablers to influenza vaccine uptake, such as doubts about the effectiveness of the vaccine, concerns about side effects, and lack of accessibility to the influenza vaccine. Enablers included free onsite vaccination, management encouragement, and reminder systems. These findings informed the FluCare intervention by highlighting the need to address both individual and organizational barriers.

The cross-sectional survey of local authorities showed that most interventions aimed at enhancing influenza vaccination among care home staff focused on education (91.4%) and improving access to the influenza vaccine (63.8%), with fewer local authorities offering incentives to care homes or staff. Regression analysis suggested that certain interventions may be associated with higher vaccination rates, including informing staff about vaccination goals and policies ($p = 0.063$), sending email or text reminders ($p = 0.080$), and the availability of interventions to enhance access to the vaccine ($p = 0.065$).

The interviews with vaccine providers identified barriers and enablers to delivering in-care home vaccination clinics. Key barriers included late timing of the clinics, lack of staff awareness about the clinics, and poor communication and coordination with care home managers. Key enablers included financial incentives for vaccine providers and effective communication and coordination with care home managers.

Conclusion

This thesis identifies the barriers and enablers to influenza vaccine uptake and the implementation of vaccination clinics in care homes, establishing a baseline for Behaviour Change Techniques (BCTs) to effectively enhance influenza vaccine uptake and improve the implementation of vaccination clinics within care homes. The findings emphasize the need for continuous evaluation to refine interventions. The thesis also highlights areas warranting further investigation, such as identifying and selecting the most appropriate BCTs with key stakeholders to improve the implementation and adoption of vaccination clinics.

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Glossary

APEASE - Affordability, Practicability, Effectiveness/cost-effectiveness, Acceptability, Safety, and Equity
BCTs - Behaviour Change Techniques
CASP - Critical Appraisal Skills Programme
CCG - Clinical Commissioning Group
CDC - Centers for Disease Control and Prevention
CFIR - Consolidated Framework for Implementation Research
CH - Care Home
CI - Confidence Interval
COPD - Chronic Obstructive Pulmonary Disease
CEBMa - Centre for Evidence-Based Management
FOI - Freedom of Information
GP - General Practitioner
HCW - Healthcare Worker
LA - Local Authority
LAIV - Live Attenuated Influenza Vaccine
MRC - Medical Research Council
NHS - National Health Service
NGT - Nominal Group Technique
NIHR - National Institute for Health Research
PIS - Participant Information Sheet
PPI - Patient and Public Involvement
PPE - Personal Protective Equipment
PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PROSPERO - Prospectively Registered Systematic Reviews
RCT - Randomized Controlled Trial
RR - Relative Risk
SPSS - Statistical Package for the Social Sciences
TDF - Theoretical Domains Framework
UEA - University of East Anglia
VPP - Vaccine Promotion Program
VP - Vaccine Provider
WHO - World Health Organization

Initials

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Publications and conferences

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Conferences publications

17th Vaccine Congress 2023: A systematic review of barriers and enablers associated with uptake of influenza vaccine among care home staff
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Chapter 1: introduction

1.1 Overview

This chapter provides an overview of influenza and its impact on public health, particularly for older people in care homes, who face a high risk of severe complications from influenza infection. The chapter begins by discussing the nature of influenza and the important role of vaccination in preventing outbreaks. It also focuses on the importance of vaccinating care home staff and highlights barriers associated with influenza vaccine uptake, such as lack of accessibility and misconceptions about the vaccine.

The chapter introduces theoretical frameworks, such as the Theoretical Domains Framework (TDF), which provide a theoretical structure for identifying factors that influence influenza vaccine uptake. Additionally, it outlines many interventions to improve influenza vaccine uptake among care home staff. The chapter also discusses the role of community pharmacists in vaccination. Finally, the stages of the FluCare study are briefly summarized, and the chapter concludes by outlining how the Medical Research Council (MRC) guidance and the Theoretical Domains Framework (TDF) were integrated to underpin the development and evaluation of the intervention.

1.2 Influenza background

Influenza is an acute respiratory infectious disease caused by the influenza virus. There are four types of influenza virus: type A, type B, type C and type D[1]. Influenza type A and B are the main cause of seasonal outbreaks and the most common types to infect or cause illness in people[2]. In the United Kingdom, in the 2021 to 2022 influenza season, the most dominant influenza type was type A subtype (H3N2) while influenza type B was present at low levels[3]. Influenza type C can cause mild illness and is less likely to be detected in humans[2]. Influenza type D not known to infect people[2].

The most common symptoms of uncomplicated influenza are fever, sore throat, nasal congestion, headache, fatigue, muscle and joint pain. Influenza can cause serious illness requiring hospital admission, presenting with signs of lower respiratory tract infection (viral pneumonia or bacterial pneumonia) such as hypoxemia and dyspnoea[4]. A systematic review found that influenza bacterial coinfection is often common and could reach 65% in hospitalized patients with influenza[5], with a mortality rate of about 10% [6]. However, influenza can be asymptomatic, with 66.9% of infected individuals showing symptoms[7]. Asymptomatic people can still transmit the influenza virus to others, increasing the possibility of its spread.

Influenza is a highly contagious virus and causes a serious public health problem because of its rapid transmission. The World Health Organization (WHO) estimates the occurrence of influenza annually to be 5%–10% in adults and 20%–30% in children[8]. Influenza is one of the leading causes of hospitalization, morbidity and mortality, especially among people over the age of sixty-five[9]. According to WHO, seasonal influenza epidemics causes 3-5 million cases of severe illness, and 250,000-500,000 annual deaths[1]. A study estimated annual influenza-associated deaths to be 290,000–650,000 (4·0–8·8 deaths per 100,000 individuals annually), with people over 75 years experiencing the highest death rate at 51.3–99.4 per 100,000 individuals[10]. Between week 40 of 2022 and week 15 of 2023, the estimated number of hospital admissions due to confirmed influenza in England, including those in acute NHS trusts and critical care units, was 49,300 (95% CI: 48,200 to 50,300), of which 1,681 confirmed influenza admissions were in critical care[11]. During this period, a total of 454 influenza infection outbreaks were reported in closed settings including care homes, hospitals, educational settings and prisons[11]. It is important to note that these figures may have been

influenced by the effects of the COVID-19 pandemic. In the United States, from 1 October 2019 to 4 April 2020, the Centers for Disease Control and Prevention (CDC) estimates 410,000–740,000 influenza hospital admissions, 18,000,000–26,000,000 medical visits and 24,000–62,000 influenza deaths[12]. This period overlapped with the early stages of the COVID-19 pandemic, which may have impacted the reporting and interpretation of influenza-related outcomes.

Influenza is usually self-limiting and requiring rest and intake of plenty of fluid. However, antivirals are indicated for people who are at high risk of influenza complications. The neuraminidase inhibitors (NAIs) oseltamivir and zanamivir are recommended in the treatment of influenza within 48 hours of the onset of infection[13]. However, uncertainties persist regarding the effectiveness of treatment in high-risk populations, such as care home residents[14].

1.2.1 Influenza vaccine

Vaccines have been available for more than 60 years, and they are the safest and most effective way to reduce morbidity and mortality across the world[1]. Vaccines are ranked as one of the top ten public health achievements in the last decade[15]. According to WHO, two to three million deaths are prevented every year by immunisation[16]. The annual influenza vaccination, often called the "flu shot", is intended to protect against the influenza virus. By stimulating the production of antibodies that fight the virus, the vaccination lowers the chance of contracting influenza. Each year, the influenza vaccine is developed to protect against the strains of the virus that are expected to be the most common during the upcoming influenza season[17].

There are several types of influenza vaccines available, including live attenuated influenza vaccines (LAIV), recombinant influenza vaccines (RIV), and inactivated influenza vaccines (IIV). Recombinant vaccines are administered via injection and are made using genetic engineering without any live viruses. Inactivated vaccines, also given by injection, contain viruses that have been inactivated. On the other hand, live attenuated vaccines are usually taken as a nasal spray and use a weakened version of the virus to stimulate the immune system[18].

The composition of the influenza vaccine is reviewed and updated annually to closely match the strains of the virus that are circulating. This process is guided by global surveillance data and recommendations from the World Health Organization (WHO) and other health authorities[17]. The influenza vaccine is recommended every year because the influenza virus is constantly changing, and annual vaccination ensures ongoing protection. The effectiveness of the influenza vaccine can vary depending on how well the vaccine strains match the viruses circulating that year. However, even in years when the match is not perfect, the vaccine still offers important benefits. It can reduce the severity of illness and help prevent serious complications, such as pneumonia, hospitalizations, and death.

Influenza vaccination is recommended for people over the age of six months, with particular emphasis on high-risk groups. These groups include young children, older people, pregnant women, and individuals with chronic health conditions such as asthma, diabetes, and heart disease. Healthcare workers and social care workers are also strongly encouraged to receive the vaccine to protect themselves and those they care for[19].

The influenza vaccine is known to be very safe. Most side effects are mild and temporary, such as soreness at the injection site and mild fatigue. Serious adverse reactions are rare[20]. Ongoing monitoring and research continue to ensure the safety and effectiveness of influenza vaccines.

1.2.2 Value of vaccination to individuals

The effectiveness and safety of the seasonal influenza vaccine have been proven[21]. WHO highly recommends annual vaccinations for those people at high risk. The influenza vaccination has been reported by WHO to prevent 70%–90% of laboratory-confirmed influenza cases in healthy adults[22]. A systematic review found that the influenza vaccine has an efficacy of 83% in children aged six months to seven years, and 67% in adults aged 18 to 65 years[23].

The influenza vaccine can reduce the severity of the illness for those who catch the virus even after being vaccinated. The influenza vaccine has been reported in many studies to be the most effective way to reduce influenza-related morbidity and mortality, especially for

pregnant women, children, elderly, individuals with chronic medical conditions, and healthcare workers.

The influenza vaccine was found to be 63% effective against critical influenza illness, significantly reducing the risk of severe disease that required intensive medical care[24]. In the United States, the influenza vaccine is 75% effective against life-threatening influenza illness, which includes severe outcomes such as death, the need for invasive mechanical ventilation, vasopressors, cardiopulmonary resuscitation, dialysis, or extracorporeal membrane oxygenation[24]. Moreover, a study showed that in hospitalized patients with confirmed influenza, those who were vaccinated had a 59% lower chance of being admitted to the intensive care unit compared to unvaccinated patients. Furthermore, vaccinated patients in the intensive care unit had a significantly shorter hospital stay, with an average reduction of about 4.1 days, indicating a quicker recovery and a reduced burden on healthcare resources[25].

Additionally, a systematic review has shown that vaccinated adults hospitalized with influenza have a 26% lower chance of needing intensive care unit admission compared to those who were not vaccinated. The influenza vaccine is also linked to a 31% lower risk of death from influenza in adults[26]. Another study found that the influenza vaccine was 82% effective in preventing Intensive care unit admissions due to influenza[25]. Moreover, another systematic review found that adults who get the influenza vaccine are 41% less likely to be hospitalized for influenza compared to those who are not vaccinated[27]. In the same review, the age-specific effectiveness varied, with adults aged 18-64 years showing a higher vaccine effectiveness of 51% (95% CI: 44-58), while adults aged 65 years and older had a slightly lower vaccine effectiveness of 37% (95% CI: 30-44)[27].

In elderly populations, the influenza vaccine has been shown to prevent 46% of pneumonia cases, 45% of hospital admissions, 42% of deaths from pneumonia or influenza, and 23% of influenza-like illnesses among care home residents. Additionally, a study showed that the efficacy of live attenuated influenza vaccine (LAIV) for people over 70 years is 57%[28]. Furthermore, 26% of hospital admissions for influenza and pneumonia have been prevented in elderly people living in the community [29]. A review also showed that the influenza vaccination might reduce the occurrence of influenza in the elderly by half[30].

The influenza vaccine is an important preventive tool for people with certain chronic health conditions. For those with heart disease, a systematic review found that the influenza vaccine significantly reduces the risk of major adverse cardiovascular events among high-risk patients. It lowers the likelihood of such events compared to those who are not vaccinated, particularly for patients with a recent history of acute coronary syndrome[31]. Additionally, the vaccine offers long-term benefits for chronic obstructive pulmonary disease (COPD) patients by reducing the number of COPD exacerbations, hospitalizations, and outpatient visits, and is associated with decreased all-cause and respiratory mortality in these patients[32]. In people with diabetes, the influenza vaccine significantly reduces hospital admissions for influenza, pneumonia, and diabetic events during influenza epidemics, with vaccinated individuals having a 79% lower risk of hospitalization compared to those who were not vaccinated[33]. In old people with chronic lung disease, the influenza vaccine was also associated with a 52% reduction in hospitalizations for pneumonia and influenza during the influenza seasons, a 70% reduction in the risk of death from all causes during these seasons, and fewer outpatient visits for pneumonia and all respiratory conditions compared to unvaccinated individuals[34].

In children, getting vaccinated reduced the odds of developing a fever by 45% compared to the unvaccinated children[26]. Furthermore, the influenza vaccine has been shown to be significantly effective in reducing the risk of severe and life-threatening influenza illness in children, as well as lowering the chances of intensive care unit admission[35]. Moreover, the influenza vaccine was linked to a 41% reduction in influenza-related hospitalizations among children and a 51% reduction in influenza-related emergency department visits, demonstrating its effectiveness in preventing moderate to severe illnesses that require emergency care[36].

In pregnant women, the influenza vaccine significantly reduced the risk of laboratory-confirmed influenza illness by approximately half[37]. Additionally, the influenza vaccine was found to be 40% effective in preventing laboratory-confirmed influenza hospitalizations[38]. These findings underscore the importance of vaccination during pregnancy for protecting both the mother and the unborn child.

In summary, the evidence shows that influenza vaccination is a critical public health measure that significantly reduces the risk of severe illness, hospitalisation, and death across a range of vulnerable and high-risk populations.

1.2.3 Economic Impact and Cost-Effectiveness of Influenza Vaccination

Seasonal influenza has a significant impact on the economy, making it is essential for stakeholders and policy makers to address. Influenza vaccination has proven to be cost-effective across all age groups. Specifically, a systematic review found that the influenza vaccination was cost-effective in many studies for the elderly European population [39]. The review highlights that the costs of implementing vaccination programs are offset by savings from reduced healthcare expenses due to fewer influenza cases and complications. Additionally, it's estimated that influenza vaccination saves the European Union €332 million annually[40]. In the United States, a study estimated that the influenza vaccination prevented 7.2 million influenza cases, 90,000 hospital admissions and 3.1 million medically attended cases during the 2013/14 season[41]. The same study also estimated that if 70% of the population was vaccinated, there would be an additional 5.9 million illnesses, and 42,000 hospital admissions prevented.

The overall economic burden of influenza in the United States is $11.2 billion, including $3.2 billion in direct costs, which cover over the counter medicine, outpatient visits, hospitalizations, and emergency department visits, and $8 billion in indirect costs, which reflect lost productivity due to absenteeism from paid employment and premature death[42]. Notably, another study estimated that €1.59 billion in hospitalization costs could be avoided if the vaccination rate were 100% among at-risk individuals in France, Germany, Italy, Spain, and the UK[43].

1.3 Barriers to influenza vaccine uptake

The barriers associated with influenza vaccines are complex and subject to many factors. Educational level and knowledge, age and socioeconomic status varied widely among health care workers, and these factors may affect the acceptance of vaccination. A study found that vaccination rate was high among physicians, workers > 50 years of age, those with a high salary (>$40,000) and those employed for more than 10 years[44]. A qualitative review

categorised the barriers that may reduce the vaccine uptake in health care workers into three main areas:

1) Beliefs about influenza and its serious complications that may affect health care workers or patients.
2) Beliefs about the influenza vaccine (effectiveness and side-effects).
3) Ethical issues and organisational policies in health care facilities[45].

Many quantitative reviews showed similarities in barriers associated with low vaccination uptake in health care workers[46–49]. However, no reviews have specifically identified barriers among care home staff. The findings from the quantitative studies are aligned with what qualitative studies have shown. In the quantitative reviews, the primary causes for low vaccination rate in health care workers related mainly to two reasons:

1) Individual barriers (e.g., beliefs and perception about vaccines and influenza).
2) Policy and organisational barriers (e.g., absence of vaccination policies, a lack of access).

1.3.1 Individual barriers:

Individual barriers related to personal attitude, beliefs or knowledge toward vaccines or influenza, i.e., perceptual barriers. Lack of vaccination uptake is associated primarily with concerns about the side-effects and safety of vaccines[50]. A study showed that 49% of 1,149 health care workers were not vaccinated because of fear of vaccines' side-effects[51]. Other research showed that 44.1% and 21.5% of health care workers have a fear of short and long term side-effects, respectively[52]. Health care workers' concerns about the side-effects of vaccination categorised as the main reason for not accepting vaccines[47]. In the UK a study conducted in Liverpool showed that 28.9% of health care workers refused the influenza vaccine because of a lack of awareness or doubts about the necessity of the vaccine[53]. Lack of awareness about influenza and its risk is also a significant reason for lack of vaccine uptake. A study showed that 43.2% of health care workers believe that they are at no risk of influenza[54]. Also, a lack of certainty about vaccine efficacy is considered a perceptual barrier. A survey conducted in Switzerland showed that 32% of physicians expressed doubt about the effectiveness of influenza vaccines[55]. False impression about influenza risks and

misconceptions about vaccines are major barriers to vaccination uptake among health care workers.

1.3.2 Policies and organisational barriers:

Although influenza vaccination is recommended for all healthcare workers, healthcare facilities in the United Kingdom still struggle to raise vaccination rates among their staff, including those working in care homes[56]. Lack of access to the vaccines, lack of availability, absence of vaccination policies and educational programs are some of the organisational barriers to improving the vaccination rate among care home staff[57]. However, most existing systematic reviews on vaccination barriers focuses on healthcare workers in hospitals and other clinical settings[46–49], with no reviews explicitly examining barriers to influenza vaccine uptake among care home staff.

The systematic reviews on healthcare workers have identified key organisational barriers such as lack of access to vaccines, time constraints, and absence of vaccination policies[46–49]. For example, a study found that 38% of healthcare workers cited lack of time as a reason for not getting vaccinated, while 22% reported difficulties accessing vaccination services[58]. In the United Kingdom, research showed that 857 out of 3,967 (22%) healthcare workers referred to lack of time as a major barrier, while 13% were unaware that a vaccine was available[59]. Additionally, hospital-based healthcare workers may benefit from institutional policies, on-site vaccination programs, and employer-led incentives, which are less frequently available in care home settings[60]. Similar organisational and policy challenges have been observed internationally. In Canada, compulsory influenza vaccination policies have raised legal concerns under the Canadian Charter of Rights and Freedoms, leading to tensions with employment law[61]. In the United States, mandatory influenza vaccination programmes for healthcare workers faced ethical arguments against its use because it is not the only program to achieve high vaccination rate, and the evidence on influenza vaccination of health care workers is not conclusive[62].

In contrast, care home staff may face unique challenges that are not captured in studies focused on general healthcare workers. Unlike hospitals, where vaccination programs are often embedded in workplace policies, care homes may lack structured vaccination policies, leadership support, or logistical resources to facilitate on-site vaccinations[60]. Many care

homes also rely on external providers (such as community pharmacies or GPs) to deliver vaccinations, which may introduce additional barriers related to scheduling, coordination, and staff availability.

Despite these differences, there is a notable gap in the literature examining barriers specific to care home staff. While some research has acknowledged that low vaccine uptake in care homes is a persistent issue[60], the specific policies, access barriers, and institutional challenges in these settings remain underexplored. Notably, while several systematic reviews have investigated barriers among healthcare workers more broadly—particularly those in hospital settings—there are no systematic reviews focused specifically on care home staff. As a result, many strategies aimed at improving vaccination uptake in care homes are based on evidence from hospital-based healthcare workers, which may not fully address the unique organisational and logistical challenges faced in care home settings.

Addressing this gap is critical for developing effective interventions to improve the vaccination rate among care home staff. Policymakers and healthcare providers need evidence-based guidance on how to design and implement vaccination programs specifically suited to care homes. A better understanding of the unique individual and organisational challenges faced by care homes and care home staff will help in developing targeted interventions that improve access, reduce logistical barriers, and enhance vaccine uptake in these settings. To date, there is no systematic review that explicitly focuses on influenza vaccination barriers and enablers for care home staff. Most available evidence comes from studies on general healthcare workers which may not fully reflect the context of care homes. Therefore, a systematic review specifically examining the evidence related to care home staff is needed to clearly identify their distinct challenges and guide appropriate policy and practice**.**

1.4 Care homes

The World Health Organization predicts that the global population of people aged 60 and over will double by 2050, increasing from 1 billion in 2020 to 2.1 billion in 2050[63]. In Europe, more than 20% of the population is 65 years or older [64]. The UK population is considered ageing, in 2021, about 11 millions of population in the UK aged 65 or older, accounting for 18.6% of the

population[65]. By 2050 in the UK, there are expected to be 19 million people aged over 65 years[66].

Care homes can be defined as communal residential facilities where individuals who require daily assistance receive regular care and support from staff[67]. The demand for care home services is influenced by health issues related to aging, and socio-cultural elements like housing availability, family structure, and the preferences of older people[68]. The growing elderly population, particularly those over 80 with multiple chronic illnesses, has caused a notable increase in the need for care homes in developed countries, and this demand is expected to rise even more in the future.

In the UK, there are two main types of care homes: residential homes and nursing homes. Residential homes offer accommodation and personal care, including activities of daily living such as washing, dressing, and medication management. Nursing homes provide the same personal care as residential homes but also offer medical care from one or more qualified nurses on duty[69]. There are approximately 16,700 care homes in the UK. Of these, about 70% are residential care homes (10,617), while nursing homes are 30% (4,235)[70,71]. More than 339,000 people are living in care homes across the UK, and more than 82% (278,946) of them are aged 65 year and over[65]. However, there are specialized care homes that provide extra services for residents with special needs. Table 1 described the different types of care home in the UK. In the United Kingdome and Canada, these establishments are referred to as “care homes”, whereas in the United States, they are known as “care facilities” or “long-term care facilities”, and in Australia, they are called “aged care homes”.

Table 1: Summary of care home types in the United Kingdom.

Care home type	Services Offered
Standard Care Homes	These facilities provide assistance with daily personal care activities such as bathing, dressing, medication management, and toileting. They may also organize social activities and day trips for their residents.
Nursing Homes	Also referred to as "care homes with nursing," these facilities offer the same personal care services as standard care homes but additionally provide 24-hour support from qualified nurses.
Dementia Care Homes	These specialized homes are designed to create a comfortable and secure environment for individuals with dementia. They often have nursing staff who are specially trained in dementia care.
Dual-Registered Care Homes	These facilities accommodate residents needing both personal care and nursing care. This flexibility ensures that residents who initially require only personal care can continue to live in the same home if their needs escalate to requiring nursing care.

With the global elderly population increasing and life expectancy in the western world steadily rising, the number of individuals residing in care homes is also expected to grow[72]. However, it's important to recognize that this increase in life expectancy does not necessarily mean an increase in healthy life expectancy. Consequently, some elderly individuals may need more help with daily activities or medical care than others. Estimates indicate that by 2043, the number of care home places required will need to more than double to meet the needs of the aging population[72].

1.4.1 Care home staff

As the elderly population in the Western world grows and requires more long-term care, there will be a greater need for professional caregivers[72]. The UK Health and Social Care Act 2008 emphasizes the importance of having sufficient, qualified, and skilled staff to meet care and treatment needs effectively[73]. To achieve this, providers should implement a systematic

method to determine the necessary staffing levels and skill sets, with continuous reviews and adjustments based on the evolving needs of service users. An induction program is essential to prepare staff for their roles, complemented by ongoing training and supervision to maintain competence. Regular performance appraisals and opportunities for professional development are also recommended for maintaining and enhancing staff abilities. Additionally, providers must facilitate staff in obtaining additional relevant qualifications and ensure compliance with professional regulatory requirements. Furthermore, there should be systems in place to support staff with revalidation and adherence to professional standards, promoting continuous improvement in the quality of care provided.

The UK's adult social care workforce, particularly in care homes, is facing considerable challenges. In England alone, about 1.52 million individuals are employed in adult social care[74], with around 650,000 people working in care homes[75]. Staffing levels in this sector have fluctuated, recently showing a slight recovery after a period of decline[70]. However, turnover rates remain high, with 34.9% in care homes with nursing and 27.4% in care homes without nursing in 2022/23. On a positive note, international recruitment has somewhat alleviated this, with overseas recruits having a lower turnover rate of 16.5%[70,71].

Care homes are struggling with various workforce issues, such as high vacancy rates, which peaked at 10.6% in 2021/22 and have since dropped to 9.9% in 2022/23[70]. Other challenges include chronic underfunding, recruitment and retention difficulties, and a heavy reliance on zero-hours contracts (on call work), where 54% of the workforce in this sector is employed on such terms[75]. The sector is also characterised by low wages, limited career advancement opportunities, and high workload demands[74]. Despite recent government measures like placing care workers on the Shortage Occupation List (list of documented shortage of skilled workers) and creating a national workforce pathway, there are ongoing concerns about the long-term capability of the workforce, especially with potential changes to immigration policies[74].

1.4.2 Influenza in Care homes

Residents of care homes are regularly in close contact with staff and one another, creating conditions where viruses such as influenza can spread easily through direct contact. A systematic review showed that healthcare workers are 3.4 times more likely to get infected

with influenza compared to unvaccinated adults working in non-healthcare settings[76]. The same review showed that the incidence rate of influenza among unvaccinated health care workers per season is 18.69%, whereas it is 6.49% among the vaccinated health care workers[76]. This increased risk means that influenza can easily be transmitted from staff to residents, potentially leading to outbreaks within the care home. Care homes residents are the most vulnerable to influenza due to their overall frailty, immune function deteriorating, nutritional deficiencies and the possibility of transfer influenza from the staff and visitors [77]. That explains why the coronavirus excessively hit the care homes' residents. In England, between week 40 of 2022 and week 15 of 2023, there were a total of 6,049 acute respiratory infection incidents reported in closed settings. Of these, 5,006 incidents (82.8%) occurred in care homes, with the majority due to SARS-CoV-2 (2,525 incidents) and influenza (413 incidents)[11]. A review of 206 studies from 19 countries found that 49 (23%) of these studies reported influenza outbreaks in care homes caused by the influenza virus[78]. In the 2022-2023 influenza season in England, influenza was estimated to cause over 14,000 deaths across all ages, including more than 12,000 deaths among those aged 65 years and older[11].

Care home residents usually have at least one risk condition, which increases their risk of hospitalization or death. A study showed that the exposure of care home residents to influenza increase their risk of hospitalization (RR: 1.24 [1.05; 1.47]) and increase the risk of death of respiratory origin (RR: 2.77 [1.55; 4.91]) compared to unexposed residents [79]. Additionally, a retrospective cohort study in 381 nursing homes estimated that influenza contributed to 7.6% of hospitalization in residents without comorbid condition and 4.8% of hospitalization in residents with comorbid conditions [80]. The study also estimated that influenza was responsible for 3.8% of deaths in residents without comorbid conditions and 3.4% in those with comorbid conditions.

As the population of the elderly grows, influenza outbreaks in care homes are a significant concern both in terms of mortality and morbidity of residents while also placing added pressure on already overloaded health services. In order to prevent and control influenza in care homes, a multifaceted approach is required. While vaccination of residents and staff and antiviral policies are important, good administrative leadership, epidemic planning and ongoing staff training are also essential[14].

1.4.3 Value of vaccination of care home staff

The WHO recommends that at least 75% of healthcare workers who have close contact with the elderly should be vaccinated[81]. In the United Kingdom, the goal for the 2023/24 influenza season was to vaccinate over 75% of healthcare and social care workers, emphasizing the importance of protecting staff and reducing transmission to vulnerable individuals. Furthermore, the UK Health Security Agency recommends that employers offer the influenza vaccine to all social care workers who work directly with clinically vulnerable individuals[82]. In the United Kingdom, all health care workers are eligible for free influenza vaccination via their registered GP practice or pharmacy, and it is recommended to all care home staff[83]. However, in England, as of February 2024, only 9.9% of care home staff had received influenza vaccine for the 2023/24 season[56], which is notably low. A study in the United States showed that the vaccination rate in care home staff is lower than those of other health care facilities[60]. In the 2009/10 influenza season, vaccination coverage among care home staff was 54% compared to 71.7% in hospitals[84]. As mentioned earlier in this chapter, influenza is a highly contagious disease that can significantly increase morbidity and mortality among those living in aged care homes. Given the associated risks, prioritizing influenza vaccination programs for workers in these settings is essential.

Reducing mortality and hospital admissions caused by influenza-like illnesses in care home residents could be achieved by vaccinating care home staff, and there are many studies showing evidence for this. For example, a randomized controlled trial showed the vaccination of health care staff was related to a decline in patient mortality from 22.4% to 13.6% in hospitals offered influenza vaccine[85]. Furthermore, a cluster randomized controlled trial carried out in 2003/04 and 2004/05 for seasonal influenza, where the 2003/04 vaccination rate in intervention care homes was 48.2% compared with 5.9% in control homes, the reduction of deaths, hospital admissions with influenza-like illness, GP consultation for influenza-like illness, cases of influenza-like illness in 2003/04 was 5%, 2%, 7% and 9% respectively[86].

Additionally, a study conducted in 12 long term care hospitals in Glasgow, vaccination of health care workers showed a reduction of patient mortality from 17% to 10% and reduction of flu-like illnesses in the hospitals offered vaccination for the health care workers[87].

Moreover, another study found that the vaccination of health care workers reduces all-cause mortality by 20% and 31% in influenza-like illnesses in residents[88]. Increased staff vaccine coverage was linked to fewer cases of influenza like illness and the number of influenza outbreaks in long term care facilities[89]. In addition to health benefits, staff influenza vaccination has ensured work stability by reducing staff sickness absence and related job interruption[90]. Vaccinating care homes staff is one approach to preventing influenza from spreading to care homes residents and the effect of staff vaccination in care homes increased when residents were also vaccinated[91].

1.5 Interventions to improve influenza vaccination in Care homes

The studies on interventions to improve influenza vaccination in care homes demonstrate a variety of strategies and their efficacy in different contexts. There were only three randomized control trials conducted to improve vaccination rates for care home staff. In Hong Kong, a comprehensive three-phase mixed-method study aimed to enhance vaccination uptake among staff in residential care homes for the elderly. This involved initial qualitative focus groups with healthcare workers to understand the factors influencing vaccine acceptance or refusal. Based on these, a multimodal Vaccine Promotion Program (VPP) was developed, which included interactive health talks, reminders, a telephone consultation service, and promotional visits. The program's effectiveness was assessed through a cluster-randomized controlled trial among care homes with staff vaccination rates below 50%. The study found that belief in vaccine efficacy, years of service, staff group, and the provision of direct care were significant predictors of vaccine acceptance. Post-intervention results showed a significant increase in staff vaccination rates, from 39.4% to 59.6% in the intervention group[92].

In a similar effort, the VESTA study in French geriatric healthcare settings focused on increasing staff vaccination rates through a multicenter, cluster-randomized trial. This study involved two programs. The first program, an educational campaign, aimed to provide scientific information to alleviate fears and promote altruism among health care workers but did not significantly increase vaccination rates (34% in the intervention group versus 32% in the control group). Learning from this, the second program was developed, which included educational materials, rubber bracelets, and posters indicating that the department had

reached >50% of vaccination rate. This approach proved more successful, raising vaccination rates to 44% in the intervention group compared to 27% in the control group, especially among those who had not been previously vaccinated[93].

Another study conducted in France, evaluated the effectiveness of an intervention campaign in nursing homes, based on the World Health Organization's multimodal strategy[94]. This campaign included free vaccinations, on-site immunization sessions, educational materials, and institutional commitment forms. The intervention group saw an increase in vaccination rates from 27.6% to 33.7%, while the control group experienced a decrease from 24.2% to 22.9%. The intervention was particularly effective for non-nursing staff, underscoring the importance of tailored approaches that consider the diverse roles within care homes[95].

A systematic review by Bechini et al. explored interventions to improve influenza vaccination rates among care home staff[96]. The review analyzed 27 studies, categorizing interventions into three types: improving access to vaccination, removing individual barriers, and implementing policy or leadership measures. Interventions to improve access to vaccination included making vaccines available at multiple work locations, offering vaccinations during both day and night shifts, maintaining availability throughout the influenza season, organizing vaccination kick-off events, and offering the vaccines at no or low cost. Interventions to eliminate individual barriers focused on addressing personal attitudes towards vaccination. This was done by holding educational seminars, distributing informative materials, offering incentives such as treats or raffle tickets for vaccinated workers, and providing additional education to those who initially declined the vaccine. The review found that while educational campaigns alone were often insufficient, combining them with other interventions could effectively increase vaccination rates. Policy and leadership interventions involved introducing policies that mandated vaccination, recommended influenza vaccine, required the completion of declination forms, or set vaccination rates as a quality improvement target. Among these, mandatory vaccination policies were found to be the most effective single intervention. The review concluded that no single intervention was generally effective. However, combining multiple interventions led to the most significant improvements in vaccination rates. The authors also emphasized the importance of tailoring interventions to address specific barriers and needs within each facility to enhance their effectiveness[96].

1.5.1 Effectiveness of interventions to improve influenza vaccination rate

There were two systematic reviews analysed the effectiveness of interventions on vaccination rate among health care workers and included staff from care homes[97,98]. The first review assessed various interventions examining mandatory vaccination policies, improved access, awareness campaigns, education, and incentives[98]. The most effective strategy was mandatory vaccination with strict consequences, such as termination or restricted patient contact for those who refused the vaccine, which significantly lowered the likelihood of staff remaining unvaccinated (RRunvacc = 0.18, 95% CI: 0.08–0.45). Soft mandates, like requiring health care workers to sign declination forms if they refused vaccination, were also effective but lower (RRunvacc = 0.64, 95% CI: 0.45–0.92). Increasing the ease of access to free vaccines vaccines, extended hours, and on-site services also proved effective (RRunvacc = 0.88, 95% CI: 0.78–1.00). Awareness campaigns involving posters, and reminders significantly improved vaccination rates (RRunvacc = 0.83, 95% CI: 0.71–0.97). On the other hand, financial or material incentives did not significantly boost vaccination rates (RRunvacc = 0.89, 95% CI: 0.77–1.03). Educational interventions like presentations and lectures showed no significant effect on overall vaccination coverage (RRunvacc = 0.96, 95% CI: 0.84–1.10), however they might still benefit certain health care workers groups.

A systematic review by Lam et. al. aimed to identify effective interventions to increase seasonal influenza vaccination rates among staff in hospital and nonhospital sittings including care homes[97]. The review found that campaigns focusing solely on education or promotion had minimal impact on vaccination rates, with only a few studies showing significant improvements. Strategies to enhance access, such as mobile vaccine carts and extended clinic hours, were effective, particularly when combined with educational efforts. Interventions involving mandatory policies, like declination forms and mask mandates for unvaccinated staff, were among the most effective interventions, significantly improving vaccination rates, as one included study noting an increase from 33% to 52% after implementing a mask mandate. The most successful campaigns included multiple components, such as combining education, improved access, and legislative measures, leading to higher vaccination rates. In non-hospital settings, campaigns with more diverse components were more effective than single-intervention campaigns. The two systematic reviews recommended comprehensive

approaches that combine multiple interventions to improve vaccination rate for health care workers.

1.6 Influenza Vaccination Policies and Initiative in UK Care Homes

The UK Health Security Agency advises that all frontline social care workers should get the influenza vaccine to protect both themselves and those they care for. In England, employers are expected to facilitate access to the influenza vaccine. If an employer does not provide an influenza vaccination program, social care workers might still qualify for a free influenza vaccine under the NHS complementary scheme. This policy includes all frontline workers employed by registered residential care or nursing homes that do not have employer-led occupational health schemes[99]. In the UK, the Department of Health & Social Care mandated a COVID-19 vaccine for care home staff in 2021. This mandate resulted in a 92.1% vaccination rate among care home staff[100]. The influenza vaccination is not mandated and the vaccination rate among care home staff remains low and non-mandatory interventions to increase this are still required.

To further enhance vaccination efforts, the Community Pharmacy Seasonal Influenza Advanced Service Framework was updated in 2020. This update allows community pharmacies to vaccinate both residents and staff in residential care and nursing homes during a single visit[101]. This change aims to improve vaccination rates and provide better protection for care home residents. GP practices also have the capability to vaccinate residents and staff of care homes registered with their practice on-site[101].

Starting from 1 September 2021, pharmacy contractors received a fee of £9.58 for each adult influenza vaccination administered[102]. This fee includes a contribution to cover training and clinical waste costs associated with the vaccination. Additionally, NHS England has allocated an extra £15.4 million to cover additional costs for the extended influenza program, with £12.2 million designated for GP practices and Clinical Commissioning Groups costs, and £3.2 million for community pharmacies[103,104]. To qualify for reimbursement, hired venues must be suitable for providing pharmaceutical services, comply with COVID-19 infection prevention standards, and facilitate at least 20 vaccinations. Community pharmacies can claim up to £200 for venue hire and an additional one-time payment of £200 for cold storage[103]. However,

claims for costs already covered by other funding sources, such as routine vaccination consumables, PPE, and communications, will not be authorized[103,104].

NHS England has also developed a detailed toolkit designed to support care homes in improving influenza vaccine uptake[57]. This toolkit emphasizes the importance of influenza vaccination for both residents and staff, highlighting the health benefits and protective effects for those most vulnerable. It provides care home employers with clear guidance on their responsibilities to ensure staff vaccination, in alignment with health and safety regulations. The toolkit addresses common challenges to improving vaccination rates, suggesting practical measures like appointing an influenza champion, improving record-keeping, and enhancing communication with primary care providers. It also includes visual aids, such as the 'fluometer,' to track and display vaccination rates[57]. Additionally, the toolkit offers a range of useful resources, including links to educational content, promotional videos, and posters, to support care homes in their vaccination campaigns and promote a coordinated approach to influenza prevention[57,105].

1.7 Role of pharmacist in vaccination

The role of community pharmacists in immunisation varies across the world from those who only supply and dispense vaccines and advocate immunisations to those who play a significant role in providing education around vaccines and administrating them[106,107]. Due to the community pharmacists' accessibility and distribution, they can play an active role in public health and easing pressure on general practitioners[108]. In many countries, community pharmacies are the first place to seek health advice. In addition, community pharmacies are located in both rural and urban areas, even in the medically underserved areas. In the United States, a study showed that one-third of influenza vaccines are administered by community pharmacists in located medically underserved areas, and up to 77.1% of influenza vaccines administered in states with high populations are in medically underserved areas [109].

Pharmacists are one of the most trusted and accessible health care professionals in many countries around the world[106]. Training programmes and undergraduate qualifications ensure the ability of pharmacists to administer vaccines safely and effectively [110]. Involving pharmacists in vaccination programmes varies in countries around the world. Based on a

survey distributed to 137 International Pharmaceutical Federation member organisations, an estimated 940 million people living in 45 countries can access 193,000 community pharmacies[106]. In this study also, it is estimated that pharmacist-led vaccination services have the ability to reach 655 million of the global population.

During the COVID-19 pandemic, community pharmacists played a crucial role in vaccination efforts, using their accessibility and trusted positions within communities to facilitate widespread immunization. In the UK, over 1,500 community pharmacies actively participated in the vaccination campaign, providing the vaccine to patients and healthcare workers. According to NHS England, by January 2022, community pharmacy-led vaccination sites had administered over 22 million COVID-19 vaccines in the previous year[111]. By the end of 2023, pharmacies had delivered more than 40 million COVID-19 vaccines, accounting for a quarter of all vaccinations given during the pandemic. These efforts underscore the significant contribution of community pharmacies to the national vaccination campaign[112].

In the United Kingdom, 'pharmacists' initiative' in 2013/14 allowed pharmacists to administer seasonal influenza vaccine in community pharmacies [113]. Community Pharmacy Seasonal Influenza Vaccination program was repeated in 2016/17 after the success of increasing the vaccine uptake by 240,259 in 2015/16 compared to previous years [114]. In Wales, community pharmacists contributed by 5.7% in increasing the vaccination rate, and 57.8% of service users were 65 and over [115]. A study conducted in the Isle of Wight showed that 9.7% of all patients vaccinated (2837/29395) get the vaccines through community pharmacies, and 8.2% of service users, this was the first time they had ever been vaccinated against influenza [116]. In addition, service users satisfaction with pharmacy service was high [116]. In a survey in West Yorkshire, community pharmacists were found to expand the scope of vaccines; 51.1% (4112/8046) of people who used the service were over 65 and 16.8% of the service users have never had influenza vaccination before [117].

In the United States, pharmacists started administering vaccines to the public in community pharmacies in 1996[107]. In 2010, all states allowed pharmacists to provide influenza vaccines [118]. In addition, up to 25% of zoster vaccines were delivered by pharmacists in 2010 [119]. After physicians' offices, community pharmacies are the second most utilised place for giving the

influenza vaccine[107]. The number of influenza vaccines provided by community pharmacists increased from 3.2 million in 2007 to 20.9 in 2013 [118].

In Canada, the pharmacists' scope of practice was expanded to include vaccine administration in 2007 in Alberta province, and in 2015 this scope was allowed in eight provinces [120]. In 2012, Ontario pharmacists were allowed to administer vaccines in the community pharmacies [121]. 247,000 vaccines were delivered in the first year and during the 2013/14 influenza season, the community pharmacists administrated more than 765,000 influenza vaccines [122].

In Australia, community pharmacists began vaccination services in 2014. In a two year period, The Queensland Pharmacist Immunisation Pilot (QPIP) provided vaccines for more than 35,000 adults[106].

A systematic review and meta-analysis showed that pharmacists can significantly improve vaccination outcomes by serving in two key roles: as educators and as administrators [123]. In their role as educators, pharmacists provide vaccine related information and counselling to patients, which helps raise awareness and encourages vaccination. This role alone has been shown to significantly increase the number of people who choose to get vaccinated (RR 2.96, 95% CI 1.02, 8.59)[123]. As administrators, pharmacists not only educate but also directly administer vaccines, making it convenient for patients to receive the vaccine in the pharmacy. This direct involvement further improves vaccination rates (RR 2.64, 95% CI 1.81, 3.86), as it combines education with immediate access to the vaccine[123].

Another systematic review demonstrated that pharmacist-led immunization programs have a substantial impact on influenza immunization rates (RR 2.23, P <0.001)[124]. According to previous studies, the primary reason for visiting a pharmacy for influenza vaccine are ease and accessibility. This underscores the important role of pharmacists in vaccination efforts and the need to expand their involvement to improve public health outcomes. Their accessibility and trusted position within communities make them essential contributors to increasing vaccination coverage.

1.7.1 Role of pharmacists in vaccination in care homes

Many studies show that the involvement of pharmacists in health care teams within care homes has improved the quality of life for residents[125]. A study showed the involvement of pharmacists in the vaccination of high-risk patients in hospitals improved vaccination rates[126]. A study conducted in the United States showed that the pharmacy administration and control of health care workers vaccination program in 14 long term care facilities increased the vaccination rate among the staff. The program included education posters, emphasizing vaccination of all workers, no cost vaccination, providing vaccine during all shifts, reminding e-mails, training programs, tracking vaccination rate and declination forms. All long term care facilities reached 60% vaccination rate, eight of them achieved an 80%, and 3 exceeded 90% vaccination rate[127]. A study conducted in Japan showed that promoting people aged 65 and above to get influenza vaccine by community pharmacists increased the vaccination rate by 16.7%, potentially reducing influenza-related hospital admissions[128].

In care homes, pharmacists play a significant role in a medication review and participate in multidisciplinary teams and educate care home staff about medication use to improve the quality use of medicines, and that has a positive impact on residents' life quality and reducing health care costs[129]. A systematic review included 52 studies published in 2019 to provide an overview of pharmacists services in nursing homes, but despite the availability of studies reviewing pharmacists services in nursing homes, only a few studies have looked at vaccination service in these settings[130]. One study found that establishing on site vaccination service in care homes increased the vaccination rate from 65% to 83% among residents and high satisfaction from staff and residents[131]. In addition, the vaccination service proved an economic benefit for the pharmacy[131]. In Australia, a pilot study was conducted to examine the feasibility of including pharmacists in aged care homes and to describe the activities conducted by pharmacists in aged care homes. One of the activities performed by the pharmacist was vaccination. The total hours spent on vaccination for residents and staff was 4.2 out of 335 hours documented by the pharmacist, and the influenza vaccination rate among staff increased from 46.5% in 2016 to 69.2% in 2017[132]. Influenza vaccines had been provided to 20 (37%) of aged care home staff. From the previous study, pharmacists showed an ability to conduct vaccination for the aged care staff and residents. Pharmacists in care

homes are capable of promoting the vaccination rate among staff and residents in collaboration with other health care teams.

Further research is needed to explore the role of community pharmacies in promoting vaccination in care homes. While most studied interventions have demonstrated short-term effectiveness, the sustainability of their impact on vaccination rates over the long term remains unclear. Therefore, long-term studies are necessary to evaluate the ongoing effectiveness and sustainability of these interventions[14].

Summary:

In the previous sections, the thesis explored the significance of influenza vaccination, particularly in the context of care homes, where residents are highly vulnerable due to age, frailty, and the close contact environment. Despite clear evidence that vaccination can reduce morbidity and mortality, vaccination uptake among care home staff remains low, as outlined in many studies and reports. Several factors contribute to this, including individual and organizational barriers. Furthermore, interventions targeting health professionals, especially care home staff, have shown mixed success, with some focusing on improving access while others have aimed at overcoming misconceptions through education. Yet, none have comprehensively addressed the range of individual and organizational barriers that hinder vaccination uptake among care home staff.

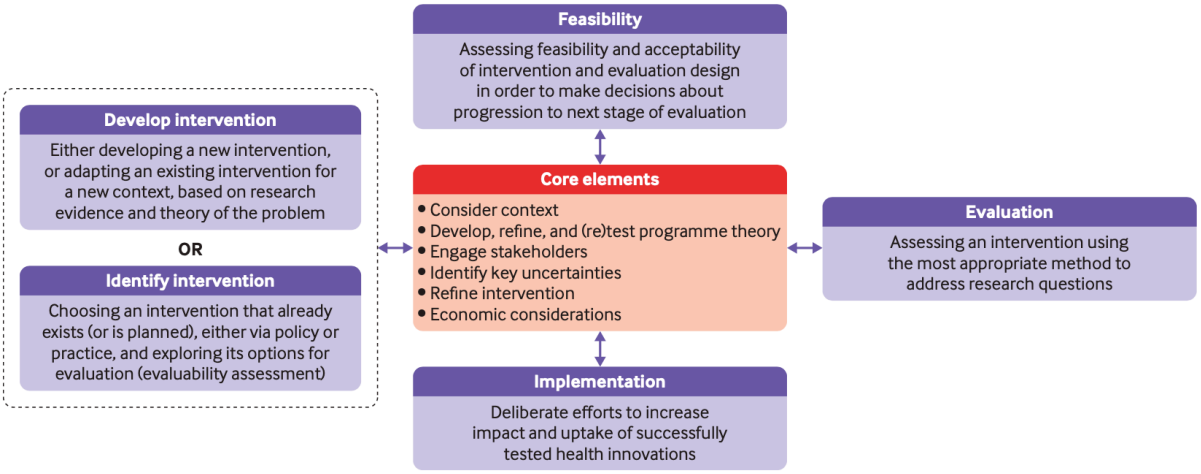
The following sections outline the role of theories and frameworks in developing and evaluating behaviour change interventions, including the Medical Research Council (MRC) guidance and implementation science, and their roles in achieving the aim of this thesis. The next section discusses the FluCare study, which was designed to overcome the barriers to vaccination among care home staff, using a multi-component approach that incorporates tailored interventions to address both individual and organisational challenges.

1.8 The Role of Theories and Frameworks in developing and evaluating complex interventions

Behaviour change interventions are commonly used to encourage individuals and organizations to adopt targeted behaviours, including changes in practices within healthcare settings[133]. The behaviour change interventions focus on addressing the key barriers and facilitators, or determinants of behaviour[134].

The Medical Research Council (MRC) released guidance on developing and evaluating complex health interventions[135]. This guidance emphasizes the importance of early-phase development, particularly the use of theoretical frameworks and the need to tailor complex interventions to specific contexts. The guidance offers valuable direction for researchers and policymakers in designing and evaluating healthcare interventions. Key stages of the MRC guidance on developing and evaluating complex interventions are surmised in figure 1.

Figure 1: Medical Research Council Framework for developing and evaluating complex interventions[135].



The healthcare systems with fixed budgets have increasingly focused on implementation challenges to optimize healthcare spending, leading to the growth of implementation science[136]. The implementation science is the scientific study focused on methods to systematically integrate research findings and evidence-based practices into regular practice, with the aim of enhancing the quality and effectiveness of health services[136]. In addition, implementation science emerged from the need to address the challenges of applying research findings to promote more evidence-based practices in healthcare and other

professional fields. A lack of theory or framework in the development and evaluation of studies obstructs researchers' ability to understand and explain the reasons behind the success or failure of implementation of practice. This limits the potential to identify important factors that predict implementation success and develop more effective strategies for achieving successful outcomes[137]. A meta-analysis has shown a strong positive correlation between successful behaviour change and the implementation of theory-based interventions[138].

There are many theories and frameworks that overlap, making it challenging to identify the most appropriate ones. Choosing the right theories demands specialized knowledge in the relevant disciplines. However, while the MRC guidance encourages the use of theory, it does not provide researchers with specific advice on how to choose or apply the appropriate theoretical frameworks[139]. Therefore, it is essential to explore the theoretical approaches in implementation research to identify those that are most suitable for the studies in this thesis.

1.8.1 Classic theories used in implementation science

The classic theories are originated from fields such as psychology, sociology, and organizational theory, and have been adapted for use in implementation science. These theories are useful for understanding the processes behind how change happens, but they do not necessarily aim to actively bring about change[137]. A theory is typically defined as a collection of analytical principles or statements intended to organize how we observe, understand, and explain the world around us. It generally includes definitions of key variables, the context in which the theory is applicable, the relationships between these variables, and the predictions that arise from these relationships[137].

In implementation science, a major focus is on behaviour, because changing behaviour is often critical for interventions to work effectively. Whether it involves influencing individual actions, organizational practices, or broader community norms, modifying behaviour is key to achieving and sustaining positive outcomes in health interventions[136,137]. This is why behaviour and behaviour change theories are especially valuable. They help researchers and practitioners design interventions that effectively target the specific behaviours that need to shift to make the intervention a success.

However, for those new to the field, differentiating between implementation science theories can be challenging, but when applied as intended, these theories can provide multiple levels of benefits[140]. A scoping review identified 159 theories, models, and frameworks related to the prevention and management of cancer or chronic diseases[141]. Other scoping review of behaviour and behaviour change theories identified 82 different theories, which can present a significant challenge for intervention designers[142].

When researchers attempt to select the most appropriate theory or theories to apply to a specific behaviour of interest, they often face four challenges[134]. First, the large number of available theories can be challenging, making it difficult to determine which theory is the most suitable for the research. Second, many of these theories have overlapping constructs, which can create confusion and complicate the process of distinguishing between them. This overlap can lead to uncertainty about which constructs are truly relevant to the behaviour being studied. Another common challenge is the lack of clear guidance or a standard method for selecting and applying theories in behaviour change research. Without a structured approach, researchers might struggle to identify which theory best supports their work, which can ultimately affect the quality and effectiveness of intervention development. Furthermore, while theories help explain the mechanisms behind behaviour change, they often do not provide specific guidance on selecting the right intervention strategies to target the behaviour[137]. This highlights the need for a more systematic process to help researchers navigate the complex task of selecting theories in behaviour change studies[134].

1.8.2 Determinant frameworks

Determinant frameworks in implementation science are valuable tools that help identify and understand the factors that can impact the success of implementing evidence-based practices. These frameworks guide researchers in recognizing the elements that can either support or hinder the implementation process[137]. They include key categories, such as organizational support, financial resources, social relationships, leadership, and other contextual factors important for successful implementation[137]. Such frameworks are essential because they allow researchers to systematically address the various challenges that may occur during the implementation[137]. By organizing and describing these determinants, the frameworks offer a structured way to assess the complex interactions between an

intervention and its environment, helping to adjust the intervention to ensure it is effective and sustainable across different settings. A scoping review of frameworks focusing on contextual factors in implementation found 17 different determinant frameworks, which can make it challenging for researchers in selecting the most suitable framework for their specific research needs[143].

1.8.2.1 The Consolidated Framework for Implementation Research

The Consolidated Framework for Implementation Research (CFIR), developed by Damschroder et al. in 2009, is one of the most widely used frameworks in implementation science. This framework offers a structured approach for understanding the factors that influence the implementation of interventions across diverse settings[144]. CFIR organizes these factors into five main domains, which help researchers systematically address the complexities involved in implementation efforts.

The first domain, *Intervention Characteristics*, looks at how features of the intervention itself—like its strength of evidence, adaptability, and complexity—can impact its uptake[144]. Interventions that are straightforward and clearly beneficial are generally easier to adopt. The *Outer Setting* focuses on external influences, such as patient needs, regulations, and external incentives[144]. Factors like government policies, financial rewards, and peer expectations can play an important role in determining whether an intervention succeeds. The *Inner Setting* considers factors within an organization, like leadership, culture, and resource availability. In this domain, success often depends on how engaged the team is, the quality of communication, and how prepared the organization is to adopt new practices[144]. The domain of *Characteristics of Individuals* focuses in on the attitudes, knowledge, and beliefs of the people implementing the intervention[144]. How ready individuals are for change, their confidence in the intervention, and understanding of its benefits all contribute to successful implementation. Finally, the *Implementation Process* outlines the key steps for successful implementation, including planning, stakeholder engagement, and continuous evaluation[144]. A structured process with ongoing feedback is essential for ensuring the intervention is implemented as intended.

One of CFIR's strengths is its comprehensive and adaptable design, making it suitable across many contexts, interventions, and healthcare settings[145].This flexibility allows researchers to

use it as a guiding tool that can be tailored to specific needs, making it highly applicable in public health and healthcare interventions. CFIR's focuses on both internal and external organizational factors also provides a view of how these elements interact to affect implementation success[145].

However, CFIR's comprehensive nature can also be a drawback. Its broad scope means it involves numerous variables, which can make it both resource-intensive and time-consuming to apply in full. For researchers with limited resources or tight deadlines, assessing all the CFIR domains can be challenging. Additionally, while CFIR is effective for guiding the early stages of adoption, some critics feel it places less focus on long-term sustainability—an essential aspect for ensuring an intervention's ongoing success.

1.8.2.2 Theoretical Domains Framework

The Theoretical Domains Framework (TDF) is a comprehensive framework developed to integrate and simplify various psychological theories and constructs relevant to understanding behaviour change, particularly in the context of implementing evidence-based practice[146,147]. It was developed by a group of health psychology theorists and implementation researchers. The TDF combines 33 theories, and 128 key constructs related to behaviour change, which were identified in the literature and brought together into a single framework[146,147]. The TDF was developed because of the large number of theories and constructs in social and behavioural sciences, which often led to critical theories being missed, and the lack of a clear rationale for selecting theories, making it difficult to apply them effectively in implementation research[146]. The goal was to provide a structured, accessible framework that could help researchers and practitioners identify key determinants of behaviour and design effective interventions to promote behaviour change in healthcare settings.

The Theoretical Domains Framework (TDF) was developed through a structured process involving six stages[146]:

1. **Identifying Theories and Theoretical Constructs:** Experts in health psychology gathered psychological theories and constructs related to behaviour change, especially for implementing evidence-based practices, creating a comprehensive list.

2. **Simplifying into Theoretical Domains:** The team then grouped related constructs into broader, manageable domains, making the framework easy for both psychologists and non-psychologists by simplifying overlapping constructs.
3. **Evaluating the Importance of Theoretical Domains:** The theory group prioritized the domains most relevant to understanding and influencing behaviour in healthcare, focusing on those that could best support behaviour change.
4. **Interdisciplinary Evaluation:** A multidisciplinary team of health services researchers reviewed the domains, giving feedback on their practical value in implementation research, which led to further refinement.
5. **Validating the Domain List:** Another group of health psychologists validated the domain list to ensure that it accurately represented the key theoretical ideas, strengthening its reliability and relevance.
6. **Piloting Interview Questions:** The final stage involved creating and testing interview questions based on these theoretical domains. These questions were designed to explore behaviour change processes needed for implementing evidence-based practices, tested through role plays and field interviews to refine them further.

This structured development process ensured that the TDF was both theoretically sound and practically applicable, making it a valuable tool for studying and promoting behaviour change in healthcare settings. The resulting framework consisted of 12 theoretical domains. These domains include knowledge, skills, social/professional role and identity, beliefs about capabilities, beliefs about consequences, motivation and goals, memory, attention, and decision processes, environmental context and resources, social influences, emotion, behavioural regulation, and the nature of the behaviour[146,147].

In 2012, The TDF was revised and validated by an independent group of behavioural experts to determine the most effective structure and content for the framework[148]. The validated version of the TDF showed similar structure and content to the original, with minor adjustments resulting in 14 domains including 84 theoretical constructs[148], each theoretical domain reflects a factor that influences behaviour. The TDF domains are presented in table 2.

Table 2: Summary of Theoretical Domain Frameworks (TDF) and their description (reproduced from Michie et al. 2014)

Domain Definition	**Theoretical constructs represented within each domain**
Knowledge An awareness of the existence of something	Knowledge (including knowledge of condition / scientific rationale); procedural knowledge; knowledge of task environment
Skills An ability or proficiency acquired through practice	Skills; skills development; competence; ability; interpersonal skills; practice; skill assessment
Memory, attention and decision processes The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives	Memory; attention; attention control; decision making; cognitive overload / tiredness
Behavioural regulation Anything aimed at managing or changing objectively observed or measured actions	Self-monitoring; breaking habit; action planning
Social/professional role and identity A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting	Professional identity; professional role; social identity; identity; professional boundaries; professional confidence; group identity; leadership; organisational commitment
Beliefs about capabilities Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use	Self-confidence; perceived competence; self-efficacy; perceived behavioural control; beliefs; self-esteem; empowerment; professional confidence
Optimism The confidence that things will happen for the best or that desired goals will be attained	Optimism; pessimism; unrealistic optimism; identity
Beliefs about consequences Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation)	Beliefs; outcome expectancies; characteristics of outcome expectancies; anticipated regret; consequents
Intentions A conscious decision to perform a behaviour or a resolve to act in a certain way	Stability of intentions; stages of change model; transtheoretical model and stages of change
Goals Mental representations of outcomes or end states that an individual wants to achieve	Goals (distal / proximal) ; goal priority; goal / target setting; goals (autonomous / controlled); action planning; implementation intention

Table 2: Summary of Theoretical Domain Frameworks (TDF) and their description (reproduced from Michie et al. 2014) (Continued)

Domain Definition	**Theoretical constructs represented within each domain**
Reinforcement Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus	Rewards (proximal / distal, valued / not valued, probable / improbable); incentives; punishment; consequents; reinforcement; contingencies; sanctions
Emotion A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event	Fear; anxiety; affect; stress; depression; positive / negative affect; burn-out
Environmental context and resources Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour	Environmental stressors ; resources / material resources ; organisational culture / climate ; salient events / critical incidents; person x environment interaction; barriers and facilitators
Social influences Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours	Social pressure; social norms; group conformity; social comparisons; group norms; social support; power; intergroup conflict; alienation; group identity; modelling

The TDF has been widely used by research teams across various healthcare systems and countries to explore implementation challenges and support the design of behaviour change interventions[134,148,149]. Additionally, the TDF domains help structure the process of gathering evidence to understand behaviours within a specific context. This understanding of behavior is essential for identifying what changes are needed.

The TDF has been used widely across different settings and research designs, including interviews, surveys, and systematic reviews[134,147,149]. Its flexibility has made it a valuable tool in many fields and contexts, helping to explore and address behaviours among both health care workers and the public. For example, researchers have used the TDF to investigate barriers and enablers for deprescribing benzodiazepines in older adults[150]. It has also been applied in a systematic review to explore factors influencing attendance at diabetic retinopathy screening[151]. By mapping findings to the TDF domains, these studies would be

able to identify key behavioral and contextual factors that can inform the development of effective interventions.

The TDF is a framework rather than a theory, meaning it does not explain the relationships between its determinants. Instead, it serves as a tool to explore the cognitive, emotional, social, and environmental factors that influence behaviour[134]. One of its key strengths is its foundation in a wide range of psychological theories and constructs (33 theories, and 128 constructs), providing a structured and detailed approach to understanding behaviours. This makes the TDF particularly useful for researchers seeking to understand why people behave in certain ways and to design targeted and effective interventions for behaviours change[134]. The TDF's flexibility is evident in its application across different methods and settings. With its 14 theoretical domains, the framework helps identify important beliefs and factors that might be missed when using non-theoretical or single-theory approaches.

However, one of the main challenges of the TDF is the overlap between some of its domains, which can make it difficult to clearly differentiate them. This overlap can pose a challenge when applying the framework, particularly for those who are less familiar with its structure[152].

There is a need for more research to better understand the barriers care home staff experience in relation to influenza vaccine uptake. By using health theoretical framework as a foundation, the PhD candidate can gain insight into the key behavioural factors that need to be addressed in behaviours change intervention. Using a determinant framework provides a practical way to analyze behavior, laying the groundwork for identifying an intervention tailored to the unique care home environment. The 14 domains of the TDF offer a comprehensive approach to exploring these behavioral factors, making it especially valuable in addressing gaps in the understanding of this specific behavior.

1.8.3 Evaluation frameworks

Evaluating Implementation refers to the systematic assessment of how an intervention is carried out in practice and its subsequent impact[137]. This involves process evaluation which focuses on describing how an intervention is implemented, identifying what aspects were implemented as planned[136]. It also helps in understanding the context in which the intervention was delivered and the mechanisms that may influence its success or failure[153].

The context in the evaluation of complex interventions is recognized as a critical factor that can significantly influence the effectiveness of an intervention. Context refers to the physical, social, cultural, organizational, political, and economic environments in which an intervention is evaluated[135].

In evaluating complex interventions, a robust and structured approach to process evaluation is important. The Medical Research Council guidance has highlighted the importance of such evaluations to ensure that interventions are not only implemented effectively but also that their outcomes can be accurately understood and interpreted[153].

Since interventions often interact in complex ways with their surroundings, it is important to consider various contextual factors when assessing how well an intervention works. These factors include the barriers and enablers in the implementation process. Engaging with the people who are delivering the intervention is also key to understanding when and why certain parts of the intervention work or do not work[153]. This involvement helps reveal the conditions that influence an intervention's success or failure.

Evaluation frameworks have been developed to provide structure for evaluating the implementation of interventions. For example, RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework outline essential aspects of implementation that should be assessed as part of intervention studies[154].

The TDF is widely used in process evaluation to understand the factors that influence the implementation of interventions. By providing a structured approach to identify and assess the cognitive, emotional, social, and environmental barriers and enablers, the TDF helps researchers gain insights into why an intervention succeeds or fails[134]. Its application in process evaluation ensures that the evaluation is theory-informed, enhancing the ability to systematically assess and refine implementation strategies.

1.8.4 Selecting a theoretical approach for developing and evaluating the interventions

The MRC guidance emphasizes the importance of grounding the development and evaluation in social or psychological theory. However, the challenges and limitations of using classic theories for behaviour change interventions, as discussed earlier in this chapter, make this

approach unsuitable for this thesis. Consequently, it is necessary to choose an appropriate framework, such as the TDF, to guide the development and evaluation of this intervention. In this thesis, the TDF was chosen and operates specifically as the behavioural analysis framework.

Several factors made the TDF the ideal choice for this PhD thesis:

1. It is accessible to those without a background in psychology, enabling healthcare professionals to apply it even if they are not experts in behaviours change theory. This aligns well with the MRC's emphasis on using a theory-informed approach.
2. The TDF's 14 domains provide comprehensive coverage of factors that influence behaviours, making it especially relevant to this research.
3. The framework is adaptable and has been successfully applied across a wide range of health research settings. It has proven particularly useful for exploring behaviours that are not fully understood, using methods such as systematic reviews and qualitative interviews[134,149].
4. A key strength of the TDF is how easily it links to behaviour change techniques. This connection allows researchers to transition from understanding behaviours to designing evidence-based interventions[134].

1.9 Applying the Medical Research Council's guidance to the current research

The MRC guidance provides a framework for developing interventions using an iterative approach, consisting of four key stages: 1) developing an intervention, 2) piloting and feasibility, 3), evaluating the intervention and 4) implementing the intervention. Each stage involves core elements such as considering the context, engaging stakeholders, identifying uncertainties, and refining the intervention. This thesis will focus on the development and evaluation of the intervention. In this thesis, the MRC framework is used as the overarching structure guiding how the intervention was developed and evaluated.

1.9.1 Developing an intervention

1.9.1.1 Identifying the evidence base

The MRC guidance recommends that the intervention should have a consistent theoretical basis and that this theory should be systematically used to guide the development of the intervention. Additionally, the MRC advises that the development of the intervention should be based on existing evidence to ensure that the intervention is likely to be effective.

In applying the MRC framework to the present research, Chapter 1 includes a literature review evaluating the effectiveness of vaccination interventions among care home staff, current strategies for improving vaccine uptake, and the existing and potential role of community pharmacies in delivering vaccination programs. However, a systematic review to identify barriers and enablers to vaccination uptake among care home staff had not been previously conducted. To address this gap, a systematic review was undertaken in Chapter 2 to develop a theoretically based intervention. Furthermore, Chapter 3 will present quantitative research conducted to supplement the literature review with additional evidence on interventions used in England to improve vaccination rates among care home staff.

1.9.1.2 Identifying/developing appropriate theory

In the second stage of intervention development, the MRC recommend to base the development and evaluation of an intervention on relevant theories, as this is more likely to result in an effective outcome[135,139]. The MRC guidance highlights the importance of understanding the expected changes and how an intervention is expected to work. A first step in this process is developing a strong theoretical foundation to explain how change happens. This involves examining existing evidence and theories to create a clear understanding of the mechanisms behind the intervention[135,139]. The MRC recommends using social science or psychological theories to identify the factors influencing the target behaviour, select appropriate behaviour change strategies, and effectively measure outcomes. In this thesis, the TDF was used specifically as the analytical framework for identifying behavioural barriers and enablers.

1.9.2 Evaluating the implementation

Conducting a process evaluation is essential for understanding both the effectiveness and implementation of complex interventions. The MRC guidance on process evaluation highlights the importance of examining how an intervention is delivered, identifying barriers and enablers, and considering the context in which it operates[153]. Additionally, the guidance emphasizes the importance of using a theoretical framework or theory to guide the evaluation because it helps to understand how an intervention works[153]. This approach is particularly relevant when delivering in-care home vaccination clinics for staff. It enables researchers to assess the fidelity of the intervention (ensuring it was delivered as intended) and to evaluate how the intervention interacts with its context, offering a comprehensive understanding of its implementation.

The process evaluation of complex interventions should include qualitative and quantitative methods to understand how the intervention makes change and to identify any unexpected outcomes[135,153]. Using qualitative methods in chapter 4 will help to explore the factors that influence the success of the intervention and providing valuable insights to guide future implementation and adaptation.

1.10 Integration of MRC Guidance and the Theoretical Domains Framework (TDF) in This Thesis

This thesis applies two key frameworks, the Medical Research Council (MRC) guidance for complex interventions[135] and the Theoretical Domains Framework (TDF)[148], to systematically support the development and evaluation of an intervention aimed at improving influenza vaccination uptake among care home staff. To clarify their roles within this thesis, the MRC guidance provides the overarching framework for developing and evaluating the intervention, while the TDF is applied specifically as the behavioural analysis framework used to identify determinants influencing vaccination uptake and clinic delivery.

The MRC framework provides a structured approach to the development, feasibility testing, evaluation, and implementation of complex healthcare interventions. It emphasizes the importance of theory, stakeholder engagement, and iterative refinement, ensuring that

interventions are effective and feasible[135]. This thesis aligns with the MRC guidance by incorporating the following elements:

- **Developing and identifying the intervention:** Identifying existing evidence on interventions to improve influenza vaccine uptake and using theoretical frameworks to identify barriers and enablers to inform the design of the intervention.
- **Process Evaluation:** Assessing the barriers and enablers to the delivery of influenza vaccination clinics through qualitative process evaluation.
- **Intervention refinement:** Using findings from the process evaluation, particularly interviews with vaccine providers, to inform recommendations for improving the future delivery of vaccination clinics.

Within this overall MRC framework, the TDF was applied as the primary behavioural analysis tool. The TDF provided a detailed structure for understanding the behavioural factors influencing intervention development and success of the intervention[149]. It was used to map behavioural influences related to vaccine uptake and vaccination clinics delivery to theoretical domains, thereby linking practical findings to theory. The TDF contributed to achieving the aims of the MRC guidance by providing a theoretical basis for designing, evaluating, and refining intervention components. The TDF was applied at three key stages of the thesis:

- **Intervention Development (MRC Stage 1):** The TDF was used to map barriers and enablers to vaccination uptake among care home staff through a systematic review. These findings informed the design of the FluCare intervention by ensuring it addressed key behavioural determinants.
- **Process Evaluation (MRC Stage 3):** The TDF was also used to analyse qualitative data from interviews with vaccine providers. By mapping interview findings onto the TDF domains, this thesis systematically identified factors influencing the delivery of the intervention.
- **Refinement of the intervention (Core element of MRC guidance):** Findings from interviews with vaccine providers, particularly the prioritised TDF domains, were used to inform recommendations to enhance the future delivery of influenza vaccination clinics.

In summary, the MRC framework served as the overarching guide for the design and evaluation of this complex intervention, whereas the TDF provided the theoretical foundation for understanding behaviour and informing the intervention's content. Together, they ensured that the FluCare intervention was developed and evaluated using an approach that was both methodologically rigorous (MRC) and theoretically grounded (TDF). This integrated use of frameworks strengthened the overall design and enhanced the practical relevance of the findings for improving influenza vaccination uptake in care home settings.

1.11 Contribution of This Thesis to the Development and Evaluation of FluCare

This PhD thesis was an important part of the development and evaluation of the FluCare study. While the FluCare team led the overall study design and implementation, this thesis specifically contributed through foundational research that informed the development of the intervention. The systematic review in this thesis identified barriers and enablers to influenza vaccine uptake among care home staff and the survey of local authorities identified existing interventions in the United Kingdom aimed at improving influenza vaccination uptake among care home staff. These studies played an important role in ensuring that the FluCare intervention was evidence-based and tailored to the specific needs of care home staff. They aligned with the Medical Research Council (MRC) guidance for developing complex interventions by providing a theoretical foundation for intervention design.

Additionally, this thesis contributed to the process evaluation of FluCare by exploring the barriers and enablers to delivering in-care home vaccination clinics from the perspective of vaccine providers (pharmacists and GP practice staff). As part of this, I conducted and analysed qualitative interviews to understand providers' experiences with the intervention. The findings informed practical recommendations for improving clinic delivery and refining the intervention's delivering strategies.

It is important to note that this qualitative study represents one component of the broader FluCare process evaluation. The wider process evaluation, led by the FluCare team, included additional work focusing on care home staff and managers, using surveys and interviews to assess perceptions of the intervention, communication effectiveness, and organisational

support for implementation. These additional components are described in a separate publication, which presents a comprehensive evaluation of intervention fidelity, mechanisms of impact, and contextual influences across diverse care home settings.

By addressing these aspects, this thesis strengthens the FluCare study by offering both theoretical and empirical contributions. The work aligns with MRC guidance by ensuring that the intervention is not only theoretically informed but also practically evaluated for real-world implementation.

1.12 FluCare study

The FluCare Study is an NIHR-funded public health research programme designed to improve influenza vaccination uptake among care home staff[155]. The study aimed to evaluate the effectiveness and cost-effectiveness of a complex, theory-driven intervention that addressed both individual and organisational-level barriers to care home staff influenza vaccination[156]. The intervention sought to enhance access to vaccines and address behavioural factors such as complacency, confidence, and convenience through tailored educational and organisational strategies. The study phases were guided by the Medical Research Council (MRC) framework for developing and evaluating complex interventions and informed by the Theoretical Domains Framework (TDF) to identify key behavioural determinants affecting vaccination uptake and the delivery of vaccination clinics. Findings from the study are expected to inform future vaccination policy and support the implementation of evidence-based interventions in care home settings.

1.12.1 Development of the Intervention (Sept-Oct 2021)

The FluCare intervention was developed to address known barriers to influenza vaccination among care home staff, drawing on evidence from a survey, qualitative research, and a systematic review conducted within the wider FluCare programme[156]. Comprehensive details of the intervention design and theoretical underpinnings are described in the published FluCare protocol and related papers[156-158].

As part of my PhD, I designed and conducted a systematic review to identify barriers and enablers associated with influenza vaccine uptake among care home staff. I developed the

review protocol, performed the literature searches and data extraction, led the analysis, and authored the manuscript. These findings directly informed the development of intervention strategies within the FluCare project. In addition, I independently developed and led a national survey of local authorities to explore current practices related to influenza vaccination among care home staff. With supervisory input, I refined the research questions, selected the methods, managed data collection through Freedom of Information (FOI) requests, and led the analysis and write-up. The survey findings helped shape the development of the FluCare intervention by identifying gaps in existing practice, highlighting effective approaches, and informing the design of potential intervention components.

Recognising the complexity of vaccination behaviour, the FluCare team adopted an evidence-based, multi-component approach consistent with National Institute for Health and Care Excellence (NICE) guidance on improving vaccine uptake[159]. Organisational-level strategies such as performance monitoring and incentive mechanisms were included, alongside educational and accessibility components; further details are available in the published FluCare protocol[156].

1.12.2 Feasibility Study (Oct 2021-Jul 2022)

A feasibility study of the FluCare intervention was conducted during the 2021/2022 influenza season to assess the deliverability of the intervention and the ability to recruit and engage care homes and vaccine providers[160]. The study demonstrated that the intervention was both feasible and acceptable to participants, providing valuable insights that informed refinements to the intervention materials and trial protocol. Detailed methods and findings from this feasibility work are available in the published FluCare feasibility paper[160].

1.12.3 Definitive trial (Apr 2022 – Apr 2023)

The main FluCare cluster randomised controlled trial was conducted during the 2022/2023 influenza season to evaluate the effectiveness and cost-effectiveness of the intervention in increasing influenza vaccination uptake among care home staff[161]. The trial compared care homes implementing the FluCare intervention with control homes providing usual practice. Detailed information on the trial design, recruitment process, and intervention delivery is available in the published FluCare trial protocol[156].

The primary outcome was the proportion of care home staff vaccinated during the influenza season[161]. Overall, the trial showed only a small, non-significant increase in vaccination rates in the intervention group compared with the control group. However, a planned sub-analysis indicated a significant improvement in vaccination uptake among care homes that hosted on-site vaccination clinics[161].

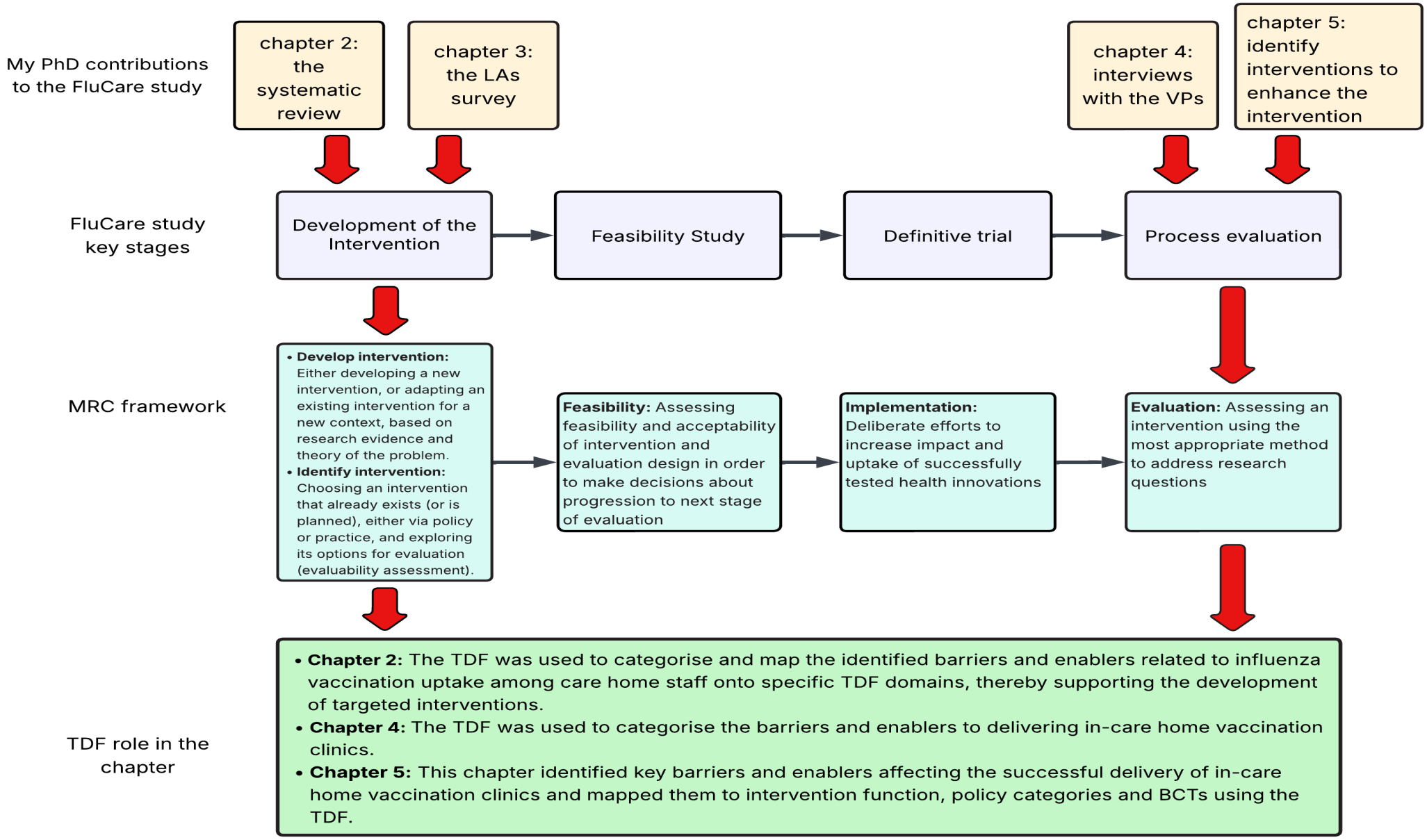
1.12.4 Process evaluation (Apr 2023 – Sep 2023)

A process evaluation was conducted to explore how the FluCare intervention was implemented and to understand the contextual and behavioural factors influencing vaccination uptake among care home staff[162]. Comprehensive details of the overall process-evaluation design are described in the published FluCare process-evaluation protocol[162].

As part of my PhD, I led the qualitative component focusing on vaccine providers. I contributed to developing the process-evaluation protocol, particularly in designing the qualitative work related to the vaccine providers and took primary responsibility for its execution[162]. This included designing the interview topic guide (with supervisory and team input), inviting vaccine providers from community pharmacies and GP practices, conducting the interviews, and leading the analysis of the qualitative data. I also wrote the results and discussion of this work, which are presented as an independent chapter in this thesis. The insights generated from this qualitative study provided valuable understanding of how vaccination clinics were delivered, the barriers vaccine providers faced, and ways to enhance delivery in future seasons[163]. While these findings informed parts of the broader FluCare process evaluation, the analysis and interpretation presented in this thesis are distinct and represent an original contribution. This qualitative study also stands as an independent publication.

Figure 2 below provides a visual summary of how each thesis chapter contributed to the development and evaluation of the FluCare intervention. It illustrates the alignment of each chapter with key stages of the FluCare study and the MRC framework, and highlights the specific role of the TDF where applicable. This figure demonstrates the integrated and systematic contribution of this thesis to both the theoretical foundation and practical implementation of the intervention.

Figure 2: Contribution to FluCare Project, MRC Framework, and TDF Role.



Note: LA = Local Authority; VP = Vaccine Provider; TDF = Theoretical Domains Framework; MRC = Medical Research Council; BCTs = Behaviour Change Techniques.

1.13 Summary

Seasonal influenza poses a significant risk, particularly to care home residents. Vaccinating care home staff is important in mitigating this risk, as there is a link between higher staff vaccination rates and improved health outcomes for residents, including fewer hospitalizations and deaths. Additionally, vaccinated staff benefit from better health, leading to fewer sick days and improved care continuity, which makes care homes more sustainable.

Despite recommendations for vaccinating care home staff, influenza vaccination rates among them remain low. The barriers and enablers to influenza vaccine uptake in care homes setting have not been comprehensively explored and characterised. Whilst some of the barriers and enablers reported in other settings may overlap with those of care homes. There is a need to synthesize these barriers and enablers to better understand the factors affecting vaccine uptake in care home settings and to inform targeted interventions.

All previous systematic reviews on the effectiveness of interventions to increase vaccination rates have primarily focused on healthcare workers in general, with most studies conducted outside the United Kingdom. However, there is a clear need to explore interventions specifically aimed at improving vaccination rates among care home staff in the UK. This highlights the rationale for conducting a survey to identify the interventions used to increase vaccination rates in care home staff.

Despite government recommendations and the authorization for GPs and pharmacists to vaccinate care home staff in care homes, the adaptation and delivery of this service in care homes can present challenges for some vaccine providers. Therefore, it is important to conduct a study to identify these challenges, propose interventions, and ensure the long-term sustainability of this service. Following the Medical Research Council's guidance on developing and evaluating complex health interventions, the TDF was chosen for its broad applicability and robust evidence supporting its use in both the development and evaluation of intervention.

1.14 Research aims and objectives

This thesis aims to explore the development of evidence-based interventions to improve influenza vaccination uptake among care home staff.

1.14.1 Research objectives

1. to understand the barriers and enablers affecting the uptake of the influenza vaccine among care home staff.
2. to explore local authorities' interventions that aim to improve influenza vaccination uptake for care home staff.
3. to explore contextual and perceived barriers and enablers to the delivery of in-care home influenza vaccination clinics.
4. to identify interventions to enhance the delivery of vaccination clinics in care homes.

Chapter 2: A systematic review of barriers and enablers associated with uptake of influenza vaccine among care home staff

Publication developed from this chapter:

Alsaif F, Twigg M, Scott S, Blyth A, Wright D, Patel A. A systematic review of barriers and enablers associated with uptake of influenza vaccine among care home staff. Vaccine. 2023 Oct 6;41(42):6156-6173. doi: 10.1016/j.vaccine.2023.08.082. Epub 2023 Sep 4. PMID: 37673716.

2.1 Introduction

The influenza vaccination rate for health care workers is often below recommended levels in most countries[164,165], despite persistent recommendations and public health regulations on immunizations globally[166–168]. As indicated in chapter 1, influenza vaccination rates for care home staff are lower than those in all other healthcare settings (e.g., hospitals)[166,169–172], putting care home residents, who are vulnerable to influenza and its complications, at serious risk of infection.

Many systematic reviews have explored determinants associated with epidemic and seasonal influenza vaccination in health care workers population in general[45–48,50,173–179], but no reviews have been specific for care home staff. Identifying the barriers and enablers related to influenza vaccine uptake among workers in these settings is necessary to inform the design of an intervention since many factors differ from one health care setting to another.

To improve the influenza vaccination rate for care home staff, intervention design is recommended to be based on a theory to enhance the likelihood success of the intervention[50]. The TDF has been shown to be an effective tool for determining factors influencing behaviour, barriers to changing behaviour, and how internal and external factors influence individuals' decisions[148,149]. Additionally, the TDF is also linked to a taxonomy of behaviour change techniques, which can be used to develop interventions, as well as evaluating these interventions[180].

Several reporting guidelines were considered for this systematic review, including the MOOSE (Meta-analysis Of Observational Studies in Epidemiology) checklist for observational studies[181], ENTREQ (Enhancing transparency in reporting the synthesis of qualitative research) for qualitative evidence syntheses[182], and SWiM (Synthesis without meta-analysis) for narrative syntheses without meta-analysis[183]. However, these tools each have limitations in relation to the design and aim of this systematic review. For example, the MOOSE checklist focuses specifically on meta-analyses of observational studies and is less applicable when studies are diverse in design and outcomes. ENTREQ is tailored for qualitative syntheses and lacks guidance for handling mixed-methods evidence. SWiM is designed for reviews that use narrative or alternative methods of quantitative synthesis, but it is still evolving and has not

been widely adopted across mixed-method systematic reviews. In contrast, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines were selected as the most appropriate framework because they offer a robust, widely accepted structure for reporting systematic reviews across diverse study designs and synthesis methods[184]. PRISMA accommodates both qualitative and quantitative data, supports narrative synthesis, and allows flexibility where meta-analysis is not feasible. In addition, the PRISMA-S extension was followed to ensure transparency in the reporting of search strategies, supporting reproducibility and completeness in documenting the literature search process[185]. Elements of the PRISMA-S extension were incorporated in the reporting of the search strategy, including database names, full search strategy, dates of search, the updated search and deduplication methods.

As part of my PhD research, I independently designed and conducted this systematic review to explore the barriers and enablers affecting influenza vaccine uptake among care home staff through the lens of the Theoretical Domains Framework (TDF). I developed the protocol, refined the methods, conducted the literature searches, selected studies, performed data extraction, led the synthesis and TDF mapping, and wrote up the findings. While the overall research focus was aligned with the FluCare study, this review was undertaken independently and was part of the FluCare study**.** The insights gained from this systematic review directly contributed to identifying the key behavioural and organisational determinants that needed to be addressed in the FluCare intervention. This PhD study ensured that the FluCare intervention was grounded in a strong theoretical foundation, enhancing its potential effectiveness in improving vaccination rates among care home staff.

2.1.1 Aims and Objective

To inform the design and development of a care home staff intervention to improve influenza vaccination uptake, the aim is to undertake a narrative synthesis of the literature to identify reported barriers and enablers and then to map them to the relevant domains of the TDF.

2.2 Method

2.2.1 Search strategy

The systematic review protocol (Appendix 1) was developed and registered with the International Prospective Register of Systematic Reviews (PROSPERO: CRD42021248384). A preliminary scoping search (Appendix 2) was conducted to inform the development of the search strategy, identify data extraction tools, select appropriate quality assessment tools, and establish inclusion and exclusion criteria. Although this scoping search followed systematic review principles in line with PRISMA guidelines, its purpose was exploratory to inform the development of a full systematic review focused on identifying barriers and enablers to influenza vaccination among care home staff, a population for which no prior focused systematic reviews were found. However, it is important to clarify that this was not a formal scoping review as defined by as defined by Peters et al., which follow distinct methodologies including broader objectives and eligibility criteria[186]. The scoping search in this thesis used structured processes for screening, quality appraisal, and data synthesis to support the design of the subsequent systematic review.

The PhD candidate conducted the literature search using the following databases:

- PubMed Central.
- CINAHL (EBSCO).
- PsycINFO (EBSCO.
- AMED (EBSCO).
- MEDLINE (Ovid).
- EMBASE (Ovid).
- IBSS (International Bibliography of the Social Sciences).
- Scopus.

The "PICO" mnemonics (Population, Intervention, Comparator, Outcome) were used to identify the search terms for the systematic review. A combination of subject heading and key words derived from the review question were used, such as “care home,” “long term care facility,” “staff,” “influenza,” “vaccination,” “immunization,” “barrier,” “enabler,” “knowledge” and “attitude”. The search strategy comprises a combination of controlled

vocabulary (MeSH terms) and keywords. The PhD candidate modified the Mesh terms for each database that searched. The search strategy used Boolean operators "AND, OR" to combine the search terms and "NOT" to exclude irrelevant terms.

The search strategy of the systematic review was as follows: **Population:** (((nursing home[MeSH Terms]) OR (long term care[MeSH Terms])) OR (facilities, skilled nursing[MeSH Terms])) OR (residential facilities[MeSH Terms])) OR ((care or hospice or rest or elderly or geriatric or aged) AND (home* or facilit* or setting* or institution* or organisation*))) AND ((health care provider[MeSH Terms]) OR (staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar* or assistant* or aide*))).

AND

Intervention: ((influenza or flu) AND (vaccin* or immuniz* or immunis* or inoculation* or shot* or jab)).

Comparator: not applicable.

AND

Outcome: Barrier* obstacle* or knowledge or attitude* or behavi* or refusal or Rejection or belief* or doubt* or hesitan* or distrust or trust or mistrust or rumo* or misinformation* or misconception* or view* or opinion* or objector* or reject* or controvers* or oppos* dilemma or criticis* or Perception* or experience*) OR (Enabler* or facilitat* or Motivat* or Intervention* or encourag* or promot* or enhanc* or advocate or support* or improv* or increas* or utilisation or utilization **NOT** (H1N1[Title]) OR (swine[Title]) OR (avian[Title]) OR (child*[Title]) OR (pediatric*[Title]) OR (adolescen*[Title]) OR (neonatal*[Title]) OR (cancer[Title]) OR (diabet*[Title]) OR (molecul*[Title]) OR (conference[Title]) OR ("systematic review"[Title]) OR (quickstats[Title]) OR (news[Title]).

A detailed search strategy for PubMed (table 3) was developed and adapted for the other databases. In accordance with PRISMA-S guidance[185], full database-specific search strategies—including search terms, Boolean operators, filters, and result counts—are presented in Appendix 3 to enhance transparency and reproducibility. The search conducted

in May 2021 and updated in February 2023, and one additional study included. The reference list of included articles and relevant systematic reviews were searched to elicit further articles.

Table 3: PubMed database search strategy.

Date:	Query	Results
11/05/2021	Search: (((((((nursing home[MeSH Terms]) AND (long term care[MeSH Terms])) AND (facilities, skilled nursing[MeSH Terms])) AND (facilities, residential[MeSH Terms])) OR ((care or hospice or rest or elderly or geriatric or aged) AND (home* or facilit* or setting* or institution* or organisation*))) AND ((health care provider[MeSH Terms]) OR (staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar* or assistant* or aide*))) AND (((influenza) OR (flu)) AND (vaccin* or immuniz* or immunis* or inoculation* or shot* or jab))) AND ((Barrier* or obstacle* or knowledge or attitude* or behavi* or refusal or Rejection or belief* or doubt* or hesitanc* or distrust or trust or mistrust or rumo* or misinformation* or misconception* or view* or opinion* or objector* or reject* or controvers* or oppos* dilemma or criticis* or Perception* or experience*) OR (Enabler* or facilitat* or Motivat* or Intervention* or encourag* or promot* or enhanc* or advocate or support* or improv* or increas* or utilisation or utilization))) NOT ((H1N1[Title]) OR (swine[Title]) OR (avian[Title]) OR (child*[Title]) OR (pediatric*[Title]) OR (adolescen*[Title]) OR (neonatal*[Title]) OR (cancer[Title]) OR (diabet*[Title]) OR (molecul*[Title]) OR (conference[Title]) OR ("systematic review"[Title]) OR (quickstats[Title]) OR (news[Title]))	1,151

Note: MeSH = Medical Subject Headings; [Title] restricts the search term to the article title

2.2.2 Inclusion and exclusion criteria

Inclusion:

- Primary research studies explicitly reporting factors (barriers or enablers) that influence the influenza vaccine uptake among care home staff.
- Health or social care workers involved in the care of care homes residents, which include administration staff, full-time, part-time workers.
- The data of care home staff are reported separately.
- Quantitative, qualitative or mixed-method studies that identify the barriers and enablers to care home staff vaccination.
- Studies written in English.

Exclusion:

- Studies with multiple participants from different settings were excluded if care home staff are less than 50% of participants.
- Studies focused on pandemic influenza vaccines, e.g., H1N1 vaccines, Covid-19 vaccines.
- Studies reporting only non-modifiable determinants (e.g., age, gender, ethnicity).
- Systematic reviews
- Conference reports
- Editorials, letters, commentaries and abstracts.

2.2.3 Study selection

The search result was exported to EndNote to remove the duplicate articles. After removing the duplication, the title and abstracts were exported to Microsoft Excel for titles and abstracts screening.

Three steps were applied to identify the eligible studies:

1. The PhD candidate (FA) and a second independent reviewer (AB) screened the titles of all studies identified in the search. Any disagreement during titles screening was resolved through discussion. If there was disagreement between reviewers or the title lacked

sufficient information to make an inclusion decision, the study was moved forward to the abstract screening stage rather than being excluded at this point.

2. The PhD candidate (FA) and the same independent reviewer (AB) independently screened the abstracts of all studies with relevant or unclear titles. If disagreements arose between reviewers, they were discussed and resolved by consensus. Additionally, if an abstract was unclear or did not provide sufficient information to make a confident inclusion or exclusion decision, the full text was retrieved and reviewed. This approach was taken to minimise the risk of excluding potentially relevant studies and ensure a careful and inclusive review process.
3. Full texts of potentially eligible studies were assessed to determine final inclusion. The PhD candidate (FA) created a structured Excel table that included the predefined inclusion and exclusion criteria (Appendix 4). This table was used to ensure consistent application of the criteria across reviewers. The full texts were divided among three co-reviewers (MT, SC, and AP), and each reviewer's assessments were compared to those of FA. Any disagreements or inconsistencies were discussed in team meetings to reach consensus, ensuring accuracy and transparency in the selection of included studies.

During the three stages, Cohens Kapp was calculated to assess the level of agreement between reviewers.

2.2.4 Data extraction

A data extraction form was designed using Microsoft Excel to systematically extract study characteristics from eligible studies. The form was initially developed during the scoping search by the PhD candidate (FA) and was piloted on two studies to ensure clarity, consistency, and relevance of the extracted items. During this piloting phase, a second reviewer (DW) also independently extracted data from the same two studies, and the results were compared with those of FA to assess the usability and reliability of the data extraction form. Minor revisions were then made to improve the structure and comprehensiveness of the form before full data extraction commenced in the systematic review. One reviewer (FA) extracted the following data:

- First author.

- Country of study.
- Year of study.
- Study objectives.
- Study design (e.g., survey, interview).
- Type of care home (e.g., nursing, residential).
- Ownership of care home (e.g., for profit, public).
- Number and size of care home that participated in the study.
- Number of participants and response rate.
- Vaccination rate of care home staff.
- Type of participants (e.g., nurses, nursing assistants).

For the analysis of barriers and enablers, the PhD candidate (FA) uploaded all eligible full-text studies into the computer software program NVivo 14 (QSR International) to facilitate the coding of quantitative and qualitative data into codes aligned with the Theoretical Domains Framework (TDF). Barriers and enablers were first extracted as free text and then coded into the relevant domain. Barriers and enablers were identified inductively from the text but categorised deductively using the TDF. A working definition of a "barrier" (i.e., anything reported to obstruct influenza vaccine uptake) or "enabler" (i.e., anything reported to motivate or support influenza vaccine uptake) was used to maintain consistency during extraction. The barriers and enablers were identified from the results sections of the included studies, either from the data presented in tables or from the authors' interpretations of their findings. To ensure accuracy of the data extraction of barriers and enablers, a second reviewer (DW) independently checked a 20% sample of included studies. Discrepancies in the extracted data were resolved through discussion. In studies that included data from multiple healthcare settings (e.g., hospitals, home care), only data specific to care home staff were extracted and analysed. Where disaggregation was not possible, the study was excluded unless it was judged that the majority of data reflected the care home setting.

2.2.5 Quality assessment

The Critical Appraisal Skill Program (CASP)[187] was applied for qualitative studies, whereas the Center for Evidence-based Management (CEBMa)[188] critical appraisal checklist was applied

for cross-sectional studies. These tools were selected for their relevance, clarity, and frequent application in systematic reviews of public health research. CASP enables structured evaluation of methodological rigour in qualitative studies, while the CEBMa tool is specifically designed for assessing the validity of cross-sectional survey designs. Each study was assessed against the relevant checklist criteria. Responses to individual checklist items were recorded using 'yes', 'no', or 'can't tell', following the original format of each tool. For mixed-method studies, the PhD candidate (FA) selected the appropriate tool to assess the quality of the part of the study that focused on barriers and enablers. The quality assessment was carried out by the PhD candidate (FA), with a 20% sample (10 studies) of studies assessed independently by a second reviewer (MT). While formal inter-rater reliability statistics were not calculated, comparison of independent assessments showed high agreement. Minor differences, such as on sample representativeness, were resolved through discussion.

2.2.6 Reporting

A PRISMA (Preferred Reporting Items for Systematic Reviews) flowchart was selected to report the outcomes of the systematic review, providing a summary of the entire study screening process[184]. The PRISMA chart details the number of studies identified during title screening, abstract screening, and full-text screening, as well as the number of duplicates removed and the reasons for study exclusion at full-text screening stage.

In addition, the PRISMA-S (PRISMA extension for Searching) checklist was used to guide the reporting of the literature search process[185]. PRISMA-S focuses on the transparency and completeness of search strategies across all databases and information sources used. Key elements recommended by PRISMA-S were incorporated into this review, including:

- Full search strategies for each database, including Boolean operators and limits applied.
- Names of all databases searched.
- Dates of initial and updated searches.
- Use of deduplication methods and reference management tools.
- Manual searching of reference lists for additional eligible studies.

Detailed database-specific search strategies and results are provided in Appendix 3, in line with PRISMA-S guidance.

2.2.7 Data synthesis

The data synthesis was carried out using the Theoretical Domains Framework (TDF) to structure and interpret the barriers and enablers to influenza vaccine uptake. The PhD candidate (FA), who received training in the application of the TDF, conducted the initial mapping of identified barriers and enablers to relevant TDF domains. To enhance the rigour of the mapping process, a behavioural scientist (SS) independently reviewed a 20% sample of the included studies. This dual-coding approach was used to assess consistency and minimise subjective bias. Where discrepancies arose, they were discussed in depth until a consensus was reached. Disagreements often reflected different perspectives on which domain was most proximally related to the behaviour. For instance, the barrier of "concern about side effects" could be related to multiple TDF domains: Beliefs about consequences (due to perceived harm), Emotion (because concern or fear is an affective response). After discussion with SS, we adopted the conventional approach of coding to the domain most proximal to the behaviour, which in this case was "Emotion".

Following domain mapping, the data within each domain were analysed to identify key factors, which were then synthesised into higher-order categories of barriers and enablers. The PhD candidate (FA) and MT checked the alignment of the extracted data with the assigned categories and assessed whether each element represented a barrier or enabler to vaccination uptake. This dual validation helped ensure conceptual accuracy and internal consistency. Finally, the frequency of each TDF domain across studies was recorded to provide a descriptive summary of which behavioural domains were most commonly reported.

2.3 Results

2.3.1 Results of the search

The database search retrieved 6352 articles (Figure 3). Duplicates were removed using EndNote, and the total number of retrieved and unique records was 4025 and reported in the PRISMA flow diagram (Figure 3). Following the removal of duplicate articles, a total of 3828 studies were excluded based on screening of their titles and abstracts. One hundred and ninety-seven studies were reviewed in full text. Of these, 155 studies were excluded from the review for several reasons: they were not related to care homes (e.g., focused on hospitals), they were not about care home staff, care home staff made up less than 50% of the study participants, data specific to care home staff were not reported separately, or the study did not investigate barriers and enablers. In total, 42 studies met the inclusion criteria (Figure 3). No further studies identified from searching the reference list of the included studies and the relevant systematic reviews.

Reviewer Agreement and Inter-Rater Reliability Inter-rater agreement between reviewers at each stage of the screening process was assessed using Cohen's Kappa coefficient[189], with the following results:

- Title Screening Stage:
    - Both reviewers included: 64 titles.
    - Both reviewers excluded: 3,257 titles.
    - Only Faisal included: 682 titles.
    - Only Annie included: 4 titles.

Cohen's Kappa = 0.13 [95% CI: 0.01–0.20], agreement = 83%. This indicated slight agreement between reviewers.

- Abstract Screening Stage:
    - Both reviewers included: 131 abstracts.
    - Both reviewers excluded: 533 abstracts.

- Only Faisal included: 66 abstracts.
- Only Annie included: 9 abstracts.

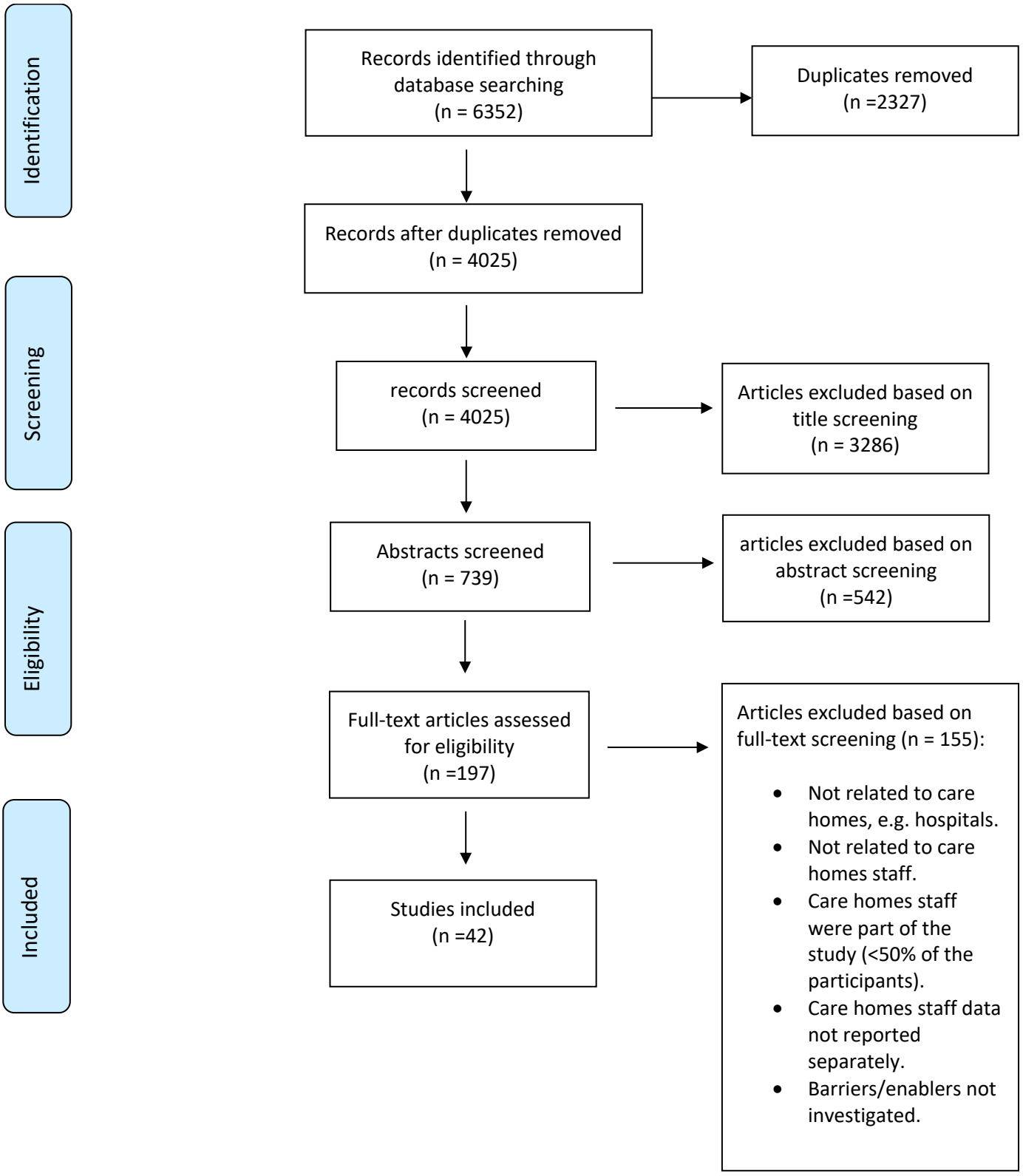
Cohen's Kappa = 0.71 [95% CI: 0.61–0.80], agreement = 89.9%. This indicated substantial agreement between reviewers.

- Full-Text Screening Stage:

    - All reviewers included: 42.
    - All reviewers excluded: 151.
    - Studies included only by Faisal: 0.
    - Studies included by other reviewers: 4.

Cohen's Kappa = 0.94 [95% CI: 0.41–0.60], agreement = 98%. This indicated almost perfect agreement among reviewers. The full screening process is summarised in the PRISMA flow diagram (Figure 3).

Figure 3: PRISMA Extension for Systematic Review – flow diagram



2.3.2 Study design and characteristics

Study characteristics are summarized in Table 4. All of the studies were conducted in high-income countries, as defined by the World Bank income classification[190]. These included the United States (n = 13), Ireland (n = 5), Canada (n = 4), Australia (n = 4), Hong Kong (n = 4), Italy (n = 3), Belgium (n = 2), France (n = 2), the Netherlands (n = 2), Germany (n = 1), the United Kingdome (n = 1), and Israel (n = 1). The included articles were published between 1993 and 2022, with half of the articles (n=20) published from 2015 to 2022. Regarding the ownership of care homes, 15 studies were carried out in non-profit and public care homes, 6 studies were in non-profit care homes, one studies in private care homes and 20 studies did not specify the care home type. With regard to type of care home where studies were carried out, 15 studies took place in nursing homes, 8 studies in nursing and residential homes, 3 studies were based in residential homes, and 16 studies did not specify the care home type. The sample size of participants ranged from 9 to 2,226 participants. The vaccination rate of care home staff of the included studies ranged from 0% to 94%. The participants of the included studies comprise a mixed sample of health care professionals involved directly (e.g., nurses, nursing aid) and indirectly (e.g., managers, catering, maintenance) in the care of care home residents. Most studies (n=31) utilized quantitative methods (i.e., data collected via surveys), seven studies had a qualitative study design (i.e., interviews or focus group discussion), and four studies used mixed method design. The reported barriers and enablers did not vary across different study design.

2.3.3 Objectives of the studies

Table 4 also summarises the objectives of the studies included in this systematic review. The general idea of the included studies is to investigate various aspects of influenza vaccination among care home staff. The included studies aim to identify the barriers and enablers related to vaccination uptake, explore attitudes and beliefs about the influenza vaccine, assess demographic, behavioural, and organizational factors influencing influenza vaccination rates, and evaluate interventions designed to improve vaccination coverage. The studies include a wide range of objectives, including understanding reasons for vaccine hesitancy, determining the effectiveness of educational and organizational measures, and examining the impact of

policy changes on vaccination rates. Overall, they seek to provide insights into how to increase influenza vaccination rates among care home staff and healthcare workers in different care settings.

Table 4: Studies characteristics of the included studies.

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Nace (2007)[191]	US	*"A needs analysis conducted to determine the barriers to, and drivers of, staff immunization"*	observation and semi-structured interviews	Nursing & residential homes	non-profit/public care homes	1/300 bed	unclear number interviewed	from 54.0% in 1996, to high of 95.5% in 2003. 86% in 2005.	Nursing 59%, Dietary 15%, Housekeeping 4%, Laundry 2%, Maintenance 6%, Activities, social work, wellness 7%, Administration 7%
Halpin (2019)[192]	Ireland	*"to investigate HCWs' attitudes towards, and beliefs about, seasonal influenza vaccination in a residential care facility for older adults"*	survey	Nursing & residential homes	non-profit/public care homes	1/50 residents	95 questionnaires were distributed, RR: 35 (37%)	57%	Healthcare assistant: 12 (34%), Nurses: 9 (26%), Housekeeping staff: 6 (17%), Catering: 3 (9%), Management: 2 (6%), Allied healthcare professionals: 2 (6%), Administration:1 (3%), directly and indirectly healthcare providers
Moretti (2020)[193]	Italy	*"a. To describe adherence and attitudes of NH staff towards flu vaccination;* *b. To explore staff hesitancy and its relationship with the attitude towards flu vaccination"*	survey	Nursing home	non-profit/public care homes	4 nursing homes/437 persons	437 distributed questionnaires, RR: 166 (38%)	Only 5/166 (3.0%) declared having a flu vaccination each year, and 16/166 (9.6%) reported to have had at least one flu shot in the last three years	Staff managers/Leadership—Administrator, Medical Director, Director of Nursing: 5 (3.0%). Direct care staff—Physicians, Healthcare Assistants, Healthcare Technicians, physical therapists: 88 (53.0%). Nurses: 31 (18.7%). Other healthcare providers—Occupational/Speech/Respiratory therapists, dieticians /nutritionists, animators, Social Worker, Psychologist: 18 (10.8%). Administrative staff: 9 (5.4%) Support staff—Food Service /Dietary, Housekeeping, Laundry Service, Maintenance: 8 (4.8%). Missing: 7 (4.2%). HCW and all other professionals

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Boey (2018)[194]	Belgium	*"to determine demographic, behavioural and organisational factors that are associated with vaccination uptake in HCWs in both hospitals and nursing homes"*	mixed method / survey and semi-structured interviews	Nursing home	not specified	14 nursing homes	2,266 nursing home staff, RR: 635 (27.9%)	Vaccinated in 2014: 52.6%. Vaccinated in 2015: 55.9%	Physician: 1 (0.2%), Nurse: 60 (9.4), Nursing assistant: 103 (16.2%), Nursing Aides: 240 (37.8%), Other HCWs: 71 (11.2%), Administrative, facilities and logistics: 160 (25.2%)
Kenny (2020)[195]	Ireland	*"to identify the determinants associated with the self-reported receipt of the influenza vaccine by HCWs in long-term care facilities"*	cross-sectional survey	not specified	non-profit/public care homes	21 LTCFs	372/1,094 (34%)	46.5%	nurses (35.5%), general support staff (33.1%), health and social care professionals (9.9%), management and administration (9.4%), medical and dental (0.3%), non-specified category of other patient and client care workers (10.2%), all categories of HCWs
King (2019)[196]	Ireland	*"to understand key factors that promote or inhibit HCW vaccination uptake within LTCF"*	survey	not specified	for-profit/ private & non-profit/public	8 LTCFs	236, RR: (51%)	50%	nurses: 26.5% (n=58), health and social care worker: 41.5% (n= 91), support: 16%, admin and management: 8%, prefer not to say: 7%, other: 5%

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Akker (2009)[197]	Netherlands	*"To assess whether nursing homes (NHs) made organizational improvements to increase influenza vaccination rates in healthcare workers (HCWs) and to quantify the beliefs of NH administrators on the arguments used in favor of implementation of mandatory influenza vaccination of HCWs"*	survey	Nursing home	not specified	310 NHs	185/310 (RR: 59.7%)	19%	NHs Administrators
Wong (2018)[171]	Hong Kong	*"to compare the influenza vaccination pattern between clinical and long term care facility (LTCF) nurses"*	survey	not specified	not specified	any LTCF worker in Hong Kong	sample size: 830 from 2014-18/ RR: not reported	32%	nurses
Kimura (2007)[198]	US	*"to ascertain the reasons for the low influenza vaccine coverage of health care workers and used this information to design and test interventions to improve their vaccination rates"*	survey	not specified	for-profit/ private & non-profit/public	30 LTCFs	1020 (45%) of 2271 questionnaires were returned	30% in 2000-01/ 34% in 2001-02	Nurse: 275 (27%), Nursing assistant: 564 (55%), Housekeeping staff: 127 (12%), Rehabilitation therapist: 54 (5%), direct resident contact (nurses, nursing assistants, rehabilita- tion therapists, and housekeeping staff)

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Tannenbaum (1993)[199]	Canada	*"to develop a program aimed at increasing the acceptance of influenza vaccine among nursing home personnel"*	survey	Nursing home	not specified	1	RR: 197 (73.5%)	pre-trail: control home :16.7%, intervention homes: 12/76 (15.8%) {post-trail: control home: 13 (9.8%), intervention home 25.9%}	Nurses: 23 (17%), Nursing assistance: 8 (6%), Orderly: 51 (51%), other professionals: 9 (7%), others(Others: Kitchen staff, maintenance workers, laundry staff, security guard, housecleaning staff: 37 (28%)
Lee (2017)[200]	Hong Kong	*"to evaluate the implementation of respiratory protection measures among infection control officers (ICOs) and health care workers (HCWs) in these homes in Hong Kong"*	cross-sectional survey	residential homes	for-profit/ private & non-profit/public	87 OAHs/no of beds 107.2±63.0	1,763 HCWs, RR: 74.5%	54.8%	registered nurses: 74 (4.2%), enrolled nurse: 156 (8.8%), health worker: 386 (21.9%), Care worker: 704 (39.9%), allied health professionals and assistants: 380 (21.6%), missing: 63 (3.6%)
Hauri (2006)[201]	Germany	*"1-to detremine influenza vaccine coverage among staff of LTCFs in Hesse, Germany. 2- to identify the factors that influence vaccine uptake by staff and the effectiveness of various measures adopted to increase vaccine uptake"*	cross-sectional survey	not specified	for-profit/ private & non-profit/public	36	905/2,574, RR:35%	22%	skilled nursing staff, domestic and cleaning staff, support staff, nonsupport staff, nursing trainees, food preparation or distribution staff and administrative staff.

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Manuel (2002)[202]	Canada	*"to investigate the health behaviour associated with influenza vaccination among health care workers in long term care facilities"*	mixed method/ focus group-cross-sectional survey	not specified	not specified	2 LTCFs for survey/ one LTCF for focus group	231/401, RR:58, two focus groups 7 and 9 staff respectively	39%	nursing staff 44 (19%), healthcare aide 85(37%), maintenance or housekeeping 49(21%), activity aide 19(8%), managemant 24(10%)
Lorini (2020)[203]	Italy	*"to address whether HL and vaccine confidence affect influenza vaccination uptake among staff of NHs. The research queries are the following:* *i. Does HL influence vaccination uptake among staff of NHs?* *ii. Does vaccine confidence influence vaccination uptake among staff of NHs? iii. Are HL and vaccine confidence related?"*	cross-sectional survey	Nursing home	for-profit/ private & non-profit/public	28	710	9.6% always get vaccinated, 16% in 2016–2017 and 16.6% 2017–2018	Medical doctors * Nurses: 93 (13.1%) Physiotherapists: **37 (5.2%)** Assistants/aides: 364 (51.3%) Health educators: 25 (3.5%) Other clinical staff: 40 (5.6%) Cleaning staff : 45 (6.3%) Other nonclinical staff: 60 (8.5%)

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Hutt (2010)[204]	US	*"to determine whether a comprehensive approach to implementing national consensus guidelines for nursing home acquired pneumonia (NHAP), including influenza and pneumococcal vaccination, improves resident subject and staff vaccination rates"*	interviews	Nursing home	profit/ private care homes	16	Twenty-two interviews with 31 participants	baseline vaccination rate: 40% in intervention homes, 0% in control homes. Post-intervention: greater than 50% in the intervention homes	16 director of nursing, 2assistant DONs, 9 nurses, 2 staff development coordinators, 2 administrators
Mody (2006)[205]	US	*"To assess the response of long-term care facilities (LTCFs) to the 2004-2005 influenza vaccine shortage and the impact on resident and healthcare worker (HCW) immunization rates"*	A cross-sectional survey	not specified	for-profit/ private & non-profit/public	380/total of 38,447 beds	380/820, RR:46.3%	38.4%	Not reported
Thomas (1993)[206]	US	*"to investigate staff attitudes towards influenza vaccination in a long-term-care setting and intervene to increase staff compliance with influenza vaccination"*	survey	not specified	not specified	1/300 bed	173/195, RR: 89%	8%	nurses and aides (98) and dietary workers (37). Environmental service workers (22), maintenance employees (13), administration (13), and special services employees (12) make up the rest of the staff

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Boey (2020)[207]	Belgium	*"to evaluated the usefulness of a ready-to-use instruction manual and its impact on vaccination uptake, attitudes toward influenza vaccination and reasons for vaccine acceptance"*	survey	Nursing & residential homes	not specified	11/ median number of 121 beds (range: 65–161)	645/1250, RR: 51.4%	mean vaccination coverage 54% pre-intervention, 68% post-intervention.	nurses (23.6%), nursing aides (33.7%%), Pharmacists, audiologists, physiotherapists, paramedics, psychologists (11.6%), Medical technical staff, administrative, facilities and logistics (28.6%), Other HCWs, unknown function (2.5%)
Nace (2011)[208]	US	*"1-to improve immunization rates among health care workers for influenza and among residents for influenza and pneumococcal vaccines in a network of collaborating nursing homes. 2- to identify barriers to immunization by conducting focus groups in collaborating nursing homes to help improve immunization rates in subsequent studies"*	focus group	not specified	non-profit/public care homes	6 (ranged between 59 to 202 beds)	Six LTC facilities, at least 4 staff members from each LTCF, not reported	range between: 14.3%-56.9% (2002: vaccination rate in all 6 facilities: 34.2%	Not reported

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Sand (2007)[209]	US	*"To improve staff immunization rates for influenza in long-term care facilities"*	A quality improvement project (meetings)	not specified	for-profit/ private & non-profit/public	15 LTCF / 50 to 2,000 beds	three to eight members per facility	range 17% to 66% before Quality Improvement	managers, administrators, nurses, physicians, and front-line workers
Sullivan (2008)[210]	Canada	*"to assess the level of and reasons for decisional conflict about receiving the influenza vaccine in a population of direct nursing care providers"*	cross-sectional survey	not specified	not specified	2	In Organization One: 76/202, RR: 38%, In Organization Two: 104/202, RR:51%	76% In Organization One, 64% In Organization Two	organization one: registered nurses, licensed vocational nurses, and registered practical nurses 31%, 38% nursing assistants, missing 30%. Organization two: registered nurses, licensed vocational nurses, and registered practical nurses 38%, 62% nursing assistants,
Groenewold (2012)[211]	US	*"To estimate influenza vaccination coverage among nursing assistants (NAs) working in US nursing homes, and to identify demographic and occupational predictors of vaccination status among NAs"*	Cross-sectional survey	Nursing & residential homes	for-profit/ private & non-profit/public	790	sample size of 2873 , 53.4%	37.1%	nursing assistants

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Halliday (2003)[212]	Australia	*"To examine the self-reported uptake of influenza vaccine by staff in residential aged care facilities in the Australian Capital Territory (ACT), and the factors influencing vaccine uptake by staff"*	cross-sectional survey	not specified	not specified	19	587/1,177, RR: 50%	28%	nursing (69%), administration (10%), domestic (6%), food handling (9%), maintenance (3%) and others (3%)
Daugherty (2015)[213]	US	*"to describe influenza vaccination rates and attitudes toward influenza and the influenza vaccine among long-term care employees in 37 homes"*	survey	Nursing home	for-profit/ private & non-profit/public	37	1,965	53.9%	RN:256 (13.0). LPN: 342 (17.4). CAN: 837 (42.6). Other: 531 (27.0)
Lai (2020)[214]	Australia	*"to determine influenza vaccine uptake rate among ACWs in Australia and examine the demographic predictors of vaccine uptake"*	survey	not specified	not specified	7	146/668, RR:22%	48%	registered nurse, pastoral care, manager, workplace trainer, caterer, and administrative staff, nursing assistant and specialised dementia carers, aged carers (85%), nursing (7%), managerial, training and administrative staff (6%), and others (2%)

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Shroufi (2009)[215]	UK	*"1-to establish the uptake of influenza vaccine amongst care home staff with a direct health or caring role in Greater Nottingham care homes with nursing. 2-to investigate care home clinical staff's knowledge, attitudes and beliefs associated with vaccine uptake"*	survey	Nursing home	not specified	58 for care homes survey. Staff survey: A random sample of 24 care homes was selected to be surveyed by placing all care homes in the area on a database.	169/219, RR:77%	17%	122 care assistants, 35 registered nurses and 12 matrons.
Shahar (2017)[216]	Israel	*"to explore factors that affect the intention of nurses at a long-term care facility to receive the influenza vaccine and whether the health belief model predicts this intention"*	survey	not specified	not specified	1	150/170, RR:88%	42%	nurses
Ofstead (2017)[217]	US	*"to develop and evaluate an intervention program designed to increase influenza uptake among HCPs in LTCFs"*	survey	Nursing home	for-profit/ private & non-profit/public	4/ >90 beds	323/584, RR:55%	50%	nursing assistants (CNAs), licensed practical nurses (LPNs) and registered nurses (RNs)

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Quinn (2014)[218]	Ireland	*"to present an insight into the issues concerning nurses with regard to the seasonal influenza vaccine"*	semi-structured interviews	residential homes	non-profit/public care homes	1	11	not reported	nurses
Goldstein (2004)[219]	US	*"To determine the attitudes, policies, and barriers for requiring annual versus voluntary influenza vaccina- tions for the staff of healthcare institutions in North Carolina. - to identify potential barriers to employee vaccinations"*	survey	Nursing home	not specified	91	91/99, RR:91.9%	not reported	the infection control individual or the individual most knowledgeable about immunization practices
O'Connor (2015)[220]	Ireland	*"to assess the preparedness of LTCFs in the HSE East area at the start of the 2013/2014 influenza season for an influenza/ILI, outbreak and to identify how the Department of Public Health could support these facilities"*	survey	Nursing & residential homes	for-profit/ private & non-profit/public	97	97 /166, RR:58%	range 0-94%	Director of Nursing or general manager

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Chan (2013)[221]	Hong Kong	*"to examine the prevalence and associated factors of influenza vaccination in Chinese nHCWs"*	cross-sectional survey	Nursing home	not specified	58	1,300/1398, RR:93%	55.9%	nursing home healthcare workers
O'Neil (2017)[222]	US	*"to assess knowledge, attitudes and practices (KAP) regarding infection prevention policies and influenza vaccination among staff at a LTC facility"*	survey	Nursing & residential homes	not specified	1/120bed	73/170, RR:42.9%	not reported	Nurse 22 (30.1), Patient care technician 7 (9.6), Physical therapist/PTA 7 (9.6), Occupational therapist 4 (5.5), Recreation therapist 2 (2.7), Administrator 3 (4.1), Social worker 4 (5.5), Food services worker 6 (8.2), Environmental services worker 3 (4.1), Facilities worker 4 (5.5), Dietician 1 (1.4), Did not answer 10 (13.7)
Lorini (2020)[223]	Italy	*"to understand the choice architecture of influenza vaccination acceptance or refusal among the staff of nursing homes and to promote vaccination acceptance using the nudge approach"*	mixed-method/ cross-sectional survey	Nursing home	not specified	111 NHs	212/527 (RR: 40.2%) for qualitative questionnaires in intervention group- 2135 (RR:47.8%) in intervention and comparison group for the *Cross-Sectional Study*	22.3%	all the staff members

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Chen (2010)[92]	Hong Kong	*"1-to increase uptake of influenza vaccination among RCHE staff in Hong Kong.2- to explore the factors affecting the acceptance or refusal of vaccination among staff of RCHEs"*	mixed-method/six focus group interviews-cross-sectional survey	residential homes	not specified	16 in focus group, 21 intervention homes, 20 control homes	36 HCWs in the focus group, 1419, RR: 82.7%	The participating RCHEs had varying staff vaccination rates ranging from 36.7% to 92.3% (in focus group), in intervention homes:39.4%, in control homes: 36.3%	six (20.6%) were persons in charge, 11 (38.0%) were nurses (registered nurses or enrolled nurses), six (20.7%) were HCWs, five (17.3%) were care workers and one (3.4%) was supporting staff not providing direct care to residents
Elias (2017)[224]	France	*"to estimate the influenza vaccination coverage for the 2015–2016 winter season in NH workers in Ille-et-Vilaine, a department of the Brittany region, located in western France. Secondary objectives aim to assess the factors related to IV among NH workers"*	cross-sectional survey	Nursing home	for-profit/ private & non-profit/public	40 NHs/33 (85%) participated in this survey/a median number of 71 beds (min 28; max 270)	480/485, RR:99%	20% self-report by staff (Median IV coverage for all sampled establishments for the season 2015–2016 was estimated at 18.2% ranging from 0% to a maximum of 69.2%)	HCW (physicians, nurses or pharmacists) (42.9%) or facilities and logistics staff (35.7%). Administrative positions were held by 11% of workers.
Huhtinen (2019)[225]	Australia	*"to identify the perceived barriers to the implementation of the Australian guidelines on influenza outbreak management with RACF staff in an inner city Sydney region"*	survey	Nursing & residential homes	for-profit/ private & non-profit/public	28/ranged from 41 to 140 (median 66)	28/61, RR:46%	not reported	Director of nursing:4 (14%), Facility manager: 14 (50%), Senior registered nurse: 9 (32%), Other: CEO:1 (4%)

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Yassi (2010)[226]	Canada	*"1-to explore the views of BC health care workers regarding how best to promote vaccine uptake. 2-to explore the motivators and barriers to HCWs being vaccinated"*	focus groups	not specified	not specified	Overall 76 participants , 45 HCWs from long-term care, 23 from acute care and 15 from community care facilities	83 HCWs	not reported	registered nurses, licensed practical nurses, unit clerks, physicians, care aides, dietary staff, housekeeping and kitchen staff, occupational therapists, librarians, hairdressers, lab-oratory staff, home support workers, psychiatric support workers and recreational aides
Moran (2019)[227]	Australia	*"to examine the current climate around influenza vaccinations for Australian HCWs and aged care staff by exploring the attitudes of key stakeholders"*	semi-structured interviews	not specified	not specified	9	Overall, 22 participants, Nine were from ACFs, seven from hospitals, four from government departments and two from relevant peak bodies	not reported	infection control officers, managers of healthcare facilities and health department leaders
Akker (2009)[228]	Netherlands	*"to assess which demographical, behavioural and organisational determinants were associated with influenza vaccine uptake in HCWs"*	survey	Nursing home	not specified	32/mean capacity of 161 beds per nursing home	1,125/1,889, RR:60%	32.6%	5% physicians, 15% nurses, 58% nursing assistants, other 21.5%

Table 4: Studies characteristics of the included studies. (Continued)

First author/ year of study	Country of study	Research question/aim/objectives	Study design	Type of care home	Ownership of care home/facility	Number of homes/size of home	Number of participants staff/sample size/RR	Vaccination rate	Type of participants/staff
Yue (2019)[229]	US	*"to describe attitudes toward vaccination and assess workplace interventions associated with influenza vaccination among a national sample of healthcare personnel working in LTC facilities"*	survey	Nursing & residential homes	not specified	not reported	332	77.1%	Physicians, dentists, nurse practitioners, physician assistants, nurses, allied health professionals, pharmacists, and students in a medical-related field: 66(20%), Technicians/technologists, emergency medical technicians, paramedics, and assistants/aides: 234(52.6%), Administrative support staff/managers, housekeeping and food service staff, and other nonclinical support staff: 32 (27.4%)
Sophie Vaux (2022)[230]	France	*"to provide updated data on NH HCW vaccination coverage in France, to identify determinants of vaccination status, and to indicate measures which appear to increase vaccination coverage in these settings"*	cross-sectional survey	Nursing home	for-profit/ private & non-profit/public	589	1 189/589 NH (49.5%)	30.6%	Physicians, Nurses, Nursing assistants, Other paramedical personnel, Non-medical professionals

Note: US = United States; UK = United Kingdom; HCWs = Healthcare workers; HCP = Healthcare professional; NH = Nursing home; LTCF = Long-term care facility; CNA = Certified nursing assistant; LPN = Licensed practical nurse; RN = Registered nurse; RR = Response rate.

2.3.4 Quality assessment

The quality assessment of the quantitative studies is summarized in Table 5. Regarding the quantitative studies, most had a clear research question, used appropriate study design, and clearly described the method of subjects' selection. There is a range of questionnaire validity and reliability assessments across the included studies. one study examined content validity and internal consistency[193], while another utilized data from a pre-validated survey[211]. In two studies, the questionnaires were based on previously published questionnaires[194,207], whereas three studies utilized pre-tested questionnaires but did not report any information on their validity[201,216,224]. Additionally, eight studies included in the review reported conducting a sample size calculation and aimed to recruit all eligible participants[92,194,200,202,215,216,224,230]. There are concerns in terms of quality due to the possibility of selection bias, representativeness of the sample, and lack of pre-study calculation of statistical power. Such quality concerns can lead to a restricted judgment on whether a satisfactory response rate was achieved or not. Another concern relates to the lack of use of a validated and reliable survey instrument. Some studies lacked sufficient details because they were embedded within a larger study design.

Table 5: Quality assessment of quantitative studies (CEBMa).

Study	1	2	3	4	5	6	7	8	9	10	11
Halpin (2019)[192]	Y	Y	Y	Y	N	N	N	N	Y	N	N
Moretti (2020)[193]	Y	Y	Y	Y	C	N	C	Y	Y	Y	N
Boey (2018)[194]	Y	Y	Y	N	Y	Y	N	Y	Y	Y	N
Kenny (2020)[195]	Y	Y	Y	N	Y	N	C	C	Y	Y	N
King (2019)[196]	Y	Y	Y	N	Y	N	C	C	Y	Y	N
Akker (2009)[197]	Y	Y	Y	N	Y	N	C	C	Y	Y	Y
Wong (2018)[171]	Y	Y	N	C	N	N	C	C	Y	Y	Y
Kimura (2007)[198]	Y	Y	Y	N	Y	N	N	C	Y	N	N
Tannenbaum (1993)[199]	Y	Y	N	Y	N	N	Y	C	Y	N	Y
Lee (2017)[200]	Y	Y	C	C	Y	Y	Y	C	N	N	Y
Hauri (2006)[201]	Y	Y	Y	N	Y	N	N	Y	Y	Y	N
Manuel (2002)[202]	Y	Y	N	Y	N	Y	C	C	Y	Y	Y
Lorini (2020)[203]	Y	Y	Y	Y	N	N	C	C	Y	Y	Y
Mody (2006)[205]	Y	Y	Y	N	Y	N	C	C	Y	N	Y
Thomas (1993)[206]	Y	Y	Y	Y	N	N	Y	C	N	N	Y
Boey (2020)[207]	Y	Y	Y	N	N	N	C	Y	Y	Y	Y
Sullivan (2008)[210]	Y	Y	Y	Y	N	N	C	C	Y	N	Y
Groenewold (2012)[211]	Y	Y	Y	N	Y	N	C	Y	Y	Y	Y
Halliday (2003)[212]	Y	Y	Y	N	Y	N	C	C	Y	Y	N
Daugherty (2015)[213]	Y	Y	Y	Y	N	N	C	C	Y	N	Y
Lai (2020)[214]	Y	Y	Y	Y	N	N	N	C	Y	Y	Y
Shroufi (2009)[215]	Y	Y	Y	Y	N	Y	Y	C	Y	Y	N
Shahar (2017)[216]	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N
Ofstead (2017)[217]	Y	Y	Y	Y	N	N	C	C	N	N	N
Goldstein (2004)[219]	Y	Y	Y	N	N	N	Y	C	N	N	Y
O'Connor (2015)[220]	Y	Y	Y	N	Y	N	C	C	Y	N	Y
Chan (2013)[221]	Y	Y	Y	Y	N	N	Y	C	Y	Y	Y
O'Neil (2017)[222]	Y	Y	Y	Y	N	N	N	C	N	N	Y
Lorini (2020)[223]	Y	Y	Y	Y	N	N	C	C	Y	N	Y
Chen (2010)[92]	Y	Y	Y	N	Y	Y	Y	C	Y	Y	Y
Elias (2017)[224]	Y	Y	Y	Y	C	Y	Y	Y	Y	Y	Y
Huhtinen (2019)[225]	Y	Y	Y	Y	N	N	N	C	N	N	Y
Akker (2009)[228]	Y	Y	Y	N	C	N	C	C	Y	Y	N
Yue (2019)[229]	Y	Y	Y	Y	Y	N	C	C	Y	Y	Y
Sophie Vaux (2022)[230]	Y	Y	Y	N	Y	Y	C	C	Y	Y	Y

*1. Did the study address a clearly focused question / issue? 2. Is the research method (study design) appropriate for answering the research question? 3. Is the method of selection of the subjects (employees, teams, divisions, organizations) clearly described? 4. Could the way the sample was obtained introduce (selection)bias? 5. Was the sample of subject's representative with regard to the population to which the findings will be referred? 6. Was the sample size based on pre-study considerations of statistical power? 7. Was a satisfactory response rate achieved? 8. Are the measurements (questionnaires) likely to be valid and reliable? 9. Was the statistical significance assessed? 10. Are confidence intervals given for the main results? 11. Could there be confounding factors that haven't been accounted for? Y: Yes, N: No, C: Can't tell. * A mixed-methods study. (reproduced from* CEBMa[188])

The quality assessment of the qualitative studies is presented in Table 6. The qualitive content of four studies was part of interventional studies whereas four studies used mixed methods[191,204,208,209]. Therefore, the quality assessment was focused on the qualitative part of the studies. All studies explicitly stated the aim of the research. The qualitative methodology, the research design and data collection were appropriate for most of the included studies. Some studies described the recruitment strategy inadequately, failed to examine the relationship between the researcher and the participants, and did not address any potential bias during the formulation of the research questions and data collection process. Some studies described the ethical issues insufficiently and did not describe the method used for the analysis. Although some studies had a clear statement of the findings, these findings were authors' interpretations -without the use of participants' quotes- which may affect the credibility of the findings.

Table 6: Quality assessment of qualitative studies (CASP).

Study	1	2	3	4	5	6	7	8	9
Nace* (2007)[191]	Y	Y	C	C	C	N	N	N	N
Boey* (2018)[194]	Y	Y	Y	Y	Y	Y	Y	N	C
Manuel* (2002)[202]	Y	Y	Y	C	Y	C	C	C	Y
Hutt (2010)[204]	Y	Y	Y	C	Y	C	Y	C	C
Nace (2011)[208]	Y	Y	Y	C	Y	C	N	N	C
Sand (2007)[209]	Y	Y	Y	C	C	C	C	C	Y
Quinn (2014)[218]	Y	Y	Y	Y	Y	C	Y	Y	Y
Lorini* (2020)[223]	Y	Y	Y	Y	Y	C	Y	Y	Y
Chen (2010)[92]	Y	Y	Y	Y	Y	Y	Y	C	C
Yassi (2010)[226]	Y	Y	Y	Y	Y	Y	C	Y	Y
Moran (2019)[227]	Y	Y	Y	Y	Y	Y	Y	Y	Y

*1. Was a clear statement on the aims of the research provided? 2. Was the qualitative methodology appropriate? 3. Was the research design appropriate for the aims of the research? 4. Was the recruitment strategy appropriate for the aims of the research? 5. Was the data collected in a manner that addressed the research issue? 6. Has the relationship between researcher and participants been adequately considered? 7. Have ethical issues been considered? 8. Was data analysis sufficiently rigorous? 9. Was a clear statement of the findings provided? Y: Yes N: No, C: Can't tell. * A mixed-methods study. (reproduce from CASP [187])*

2.3.5 Barriers and enablers

During the data extraction phase, the PhD candidate (FA) identified a total of 691 barriers and enablers influencing influenza vaccine uptake among care home staff. These barriers and enablers were then mapped to the TDF domains. The mapping of barriers and enablers to TDF domains was reviewed independently by a second coder for a sample of studies. Disagreements were resolved through discussion, and consensus was achieved using the most proximal domain approach (Section 2.2.7). This ensures the reliability of the synthesis presented below. Through further analysis, the findings were categorized into 71 barriers and 62 enablers specifically related to influenza vaccine uptake. The TDF domains most frequently mapped to were Belief about consequences (e.g., belief about the effectiveness of the influenza vaccine) (32 studies); Environmental context and resources (e.g., accessibility to vaccine (30 studies); Social influence (e.g., influence of colleagues) (25 studies); Emotion (e.g., fear of side effects) (26 studies); and Knowledge (e.g., Lack of knowledge about the vaccine the efficacy) (22 studies). No barriers or enablers were identified in the domain of “Skills" and “Beliefs about capabilities”. The following sections will provide a detailed description of the TDF domains including the specific barriers and enablers within each domain that impact the influenza vaccine uptake. The domains were arranged in descending order according to the number of studies that reported factors related to each domain (table 7).

2.3.5.1 Belief about consequences

Care home staff who were reluctant to accept the influenza vaccine lacked belief in its effectiveness [92,194,196,200,203,207,209,212,215,216,218,223,224,228]: “*33.4% of NH workers thought that the influenza vaccine is ineffective”*[224]. Care home staff were concerned about the side effects and safety of the vaccine [92,192,194,195,200,207,209,212,215,216,218,223,224,228] : *“Most of the respondents (83.7%) agreed that the influenza vaccine has unpleasant side effects”*[216]. The perception that the influenza vaccine is not necessary [194,195,207], influenza is not serious [193–195,207,216,221], and a lack of concern about getting influenza [193,207,216,221] act as further critical barriers to the uptake of the influenza vaccine: “*There was a highly reduced chance (approximately 92%) of influenza vaccination for those who felt that they could resist the virus very well”*[215]. Previous experience with influenza vaccination side effects [171,195,202,218,223] and the belief that the influenza vaccine lacks value, usefulness, or benefits for oneself or others [193,195,207,210,216] are also significant

barriers that prevent care home staff from accepting the influenza vaccine: "*Other respondents report a perception of "general uselessness", without detailing why they believe that: "I believe it's not necessary" (respondent NH_9_3) "I think that getting vaccinated is not useful for me"*[203]. Enablers to the uptake of the influenza vaccine were the staff's perception of spreading influenza to others [194,207,213], and recognizing the risk of influenza [192,194,195,207,228,229]: *"Behavioural determinants univariately associated with influenza vaccine uptake are shown in Table 3. In the domain perceived susceptibility, 'a high personal risk for influenza infection' (OR 6.37, 95% CI 4.62–8.77)"*[228].

2.3.5.2 Environmental context and resources

Environmental context and resources were identified as barriers and enablers of the influenza vaccination. Financial resources for care home and staff are an important factor for staff influenza vaccination rate in care homes. Financial constraints[92,194,215,218] or lack of funds for vaccination[225,227] makes it difficult for care homes to provide a free onsite influenza vaccine service or improve the accessibility to the vaccine[191,193,220] which acts as a barrier to influenza vaccine uptake: *"Lack of accessibility for night-shift staff was found to be an important obstacle for vaccine uptake"*[92]. Enablers to influenza vaccine uptake include accessibility of the influenza vaccine[192,194–196,204,212,216], availability of the influenza vaccine at a suitable[215] and flexible time[228], and adequate provision of the influenza vaccine[217,228]: *"Fifty-one per cent of unvaccinated respondents indicated that they would have influenza vaccination if it was available at work"*[212]. Countries with financial constraints encountered barriers that impacted influenza vaccination rates among care home staff, including the United States[198,211,217,219], Australia[212,225,227], and France[224]. In addition, countries facing challenges related to influenza vaccine access, such as Australia[227], Hong Kong[92], Ireland[220], Belgium[194], Italy[193], and the United States[191,205,208], also experienced difficulties in promoting influenza vaccination among care home staff. Many studies showed that a shortage of influenza vaccine supply reduced the vaccination rate among care homes[191,205,208,209]: *"A vast majority of these LTCFs (157 [87.9%]) felt that the shortage would result in a lower immunization rate among their HCWs. Indeed, this concern was reflected by reduced HCW immunization rates (mean ± SD, 27.7% ± 28%) among facilities reporting that shortage in the number of vaccine doses would influence HCW immunization rates, compared with immunization rates (mean ± SD, 46.6% ± 26.8%) among facilities that felt that vaccine shortage would not influence their programs (P < .*

001)"[205]*.* Other studies reported that refusing the influenza vaccine due to the presence of a health condition[92,195,214,215], allergy[206] prevented staff from getting vaccinated. A high turnover of care home staff decreases the vaccination rate among staff and prevents organizations from tracking vaccination uptake[208,209,217].

2.3.5.3 Emotion

Worries about the influenza vaccine[195], fear of side effects[92,171,192,193,198,200,207,215,217–220,223], or fear of contracting influenza from the vaccine[198,201,217,223] were significant barriers to its uptake: *"For those who had not received the seasonal influenza vaccination, worries about the side effects of vaccination …were perceived as the major barriers"*[200]. Vaccinated staff expressed less concern about the vaccine and its side effects than non-vaccinated staff[199,212]. In many studies, fear of needles was a reason for refusing the influenza vaccine[92,196,201,206–209,212,215,217,219,220,222,223]: *"Individual staff members offered many reasons to resist immunizations: distaste for needles and pain"*[209]. Some staff expressed frustration when they felt care from the organization towards its staff was lacking which may have acted as a barrier to accept the influenza vaccine[202,218,226]. Mandating the influenza vaccine could exacerbate negative emotions for some staff due to feelings of loss of autonomy[218].

2.3.5.4 Social influence

Doctor–staff communication was discussed in many studies. A recommendation by a doctor to be vaccinated with the influenza vaccine promotes staff uptake[192,194,196,201,204,207,212,216,226,230]. Workplace support was an enabler in getting the influenza vaccine[192,194,196,202,204,207,212,215,216,226], and absence of support was a barrier[191,212]: *"Reasons for non-acceptance of influenza vaccine by staff of residential aged care facilities: Work did not recommend the flu injection 90 (26%)"*[212]*.* Encouragement from colleagues[194,195,202,215,216,218,223,226,228] and family member[171,194,202,212,223,228] was an essential factor in accepting the influenza vaccine. Lack of trust or low confidence in government or administration recommendations was a barrier to getting the influenza vaccine[202,208]. Feeling supported in making a decision to receive the influenza vaccine[195,228] and providing personalized information[194,218,227,230] were perceived to be enablers in many studies, especially if given by a trusted person: *"Participants tended to believe that the most meaningful communication strategies centred around one-on one conversations with declining staff members. ''The staff kind of just want to talk to somebody and talk it through*

and just have an open honest conversation."[227]. In addition, the media had the ability to influence staff decisions, raise awareness, and encourage influenza vaccine uptake[92,215,218,224,228].

2.3.5.5 Knowledge

Lack of knowledge about the influenza vaccine[191,194,209,210,218,223], its efficacy[194,221], frequency of the vaccine[228], the adverse effects[202,218,221], and lack of awareness of the need to vaccinate[192,212,220] were barriers to influenza vaccine uptake: *"In unvaccinated staff, not being convinced about the efficacy of the vaccine (43.1% in hospitals 55.8% in nursing homes)…. were the most important reasons for non-vaccination."*[194]. Some studies reported that a limited understanding of influenza was a barrier to the influenza vaccine uptake, particularly with regards to awareness of the risk and transmission of influenza[191,194,209,221,223]. Receiving sufficient information on influenza and the influenza vaccine was thought to improve influenza vaccine acceptance[215,217,218,228] whilst those who had not been provided with sufficient information were vaccinated less often than those who had[209,218,225,226,228]: *"Participants highlighted the importance of addressing nurses' questions and concerns, and giving them further information: 'I am one of those people that would be willing to change if more information came out that could sway me'"*[218]. Many studies showed that awareness of the influenza vaccination recommendations was associated with higher uptake of the influenza vaccine[194,197,218,224,225,230].

2.3.5.6 Social/professional role and identity

Sixteen studies reported barriers and enablers within this domain. Recognition that getting the vaccine was an obligation of staff's social and professional role toward residents, workplace, and others is seen as an important factor[194,197,202,207,218,222,223,227,228]: *"NHs in which the administrators agreed with the following statements had a significantly higher mean vaccination rate of NH HCWs: NH HCWs have a special responsibility in preventing influenza transmission to NH residents"*[228]. Care home staff who were not fully convinced and committed to their obligation to receive the influenza vaccine were less likely to get vaccinated against influenza[193,195,210].

2.3.5.7 Goals

All of the factors related to the "Goals" domain were reported to be enablers to get vaccinated against influenza. The most critical factor that encouraged staff to be vaccinated was their priority goal to protect themselves[92,192,194,195,206,207,212,216,217,222,223], their families[192,194,207,216,222,223], and the residents[92,192,194,206,207,212,216,222,223]: *"correlation between respondents' acceptance of the vaccine and their desire to protect their families (r=0.67, P=0.01) was greater than the correlation between vaccine acceptance and the desire to protect patients (r=0.592, P=0.01)"*[192]. In addition, receiving the vaccine was seen as a way to avoid sickness absence[192,217].

2.3.5.8 Optimism

Staff were pessimistic and expressed a negative attitude towards the effectiveness[195,200,207,223] and safety[195,202,223] of the influenza vaccine, which act as potential barriers to accepting the influenza vaccine: *"doubts about the usefulness of the vaccine (28.5% in hospitals and 32.9% in nursing homes)….were the most important reasons for non-vaccination."*[194]. In addition, having confidence in one's immunity can serve as a potential barrier to uptake the influenza vaccine[212,215].

2.3.5.9 Intention

The enabler identified as motivation to get the influenza vaccine was the presence of care home staff's intention to receive the influenza vaccine next year[194,195,206,210,222]. On the other hand, if care home staff lack the intention to receive the vaccine, it acts as a barrier and reduces the likelihood of them getting vaccinated[196,201,206,216]: *"Among employees who took the vaccination in the current year, 94 percent planned to do so again in the next year. Six percent of employees who did take the vaccination responded that they would not take future vaccinations. Among employees who did not take the vaccination in the intervention year, 79 percent did not plan to do so in future years."*[206].

2.3.5.10 Reinforcement

In the context of promoting influenza vaccination among healthcare care home staff, some of the enablers identified in the "reinforcement" domain. In four studies, positive reinforcement (e.g., social reward, incentives) was seen as a significant encouragement for vaccination[194,211,217,229]: *"We noted statistically significant positive trends in vaccination*

coverage across increasing levels of ….feeling respected/rewarded for work"[211]. There was strong opposition to mandatory influenza vaccination to promote vaccination uptake among care home staff[193,226].

2.3.5.11 Memory, Attention and Decision Processes

Some care home staff cited forgetfulness as the reason for not receiving the influenza vaccine[193,198,207,223]: *"Among those who did not receive the influenza vaccine for the 2001 to 2002 season, common reasons for not receiving the vaccine included ….. Other reasons included forgetting to get vaccinated (16%)"*[198]. Enablers to receive the vaccine were receiving reminders[92,194,212].

2.3.5.12 Behavioral regulation

In one study, providing feedback on performance was identified as a factor that could help increase the rate of influenza vaccination among care home staff[198]. However, when there was no feedback given, it was seen as a potential barrier to improving vaccination rates: *"Organizational barriers to better immunization: Lack of any feedback or shared learning"*[191].

Table 7: Theoretical Domains Framework, barriers and enablers to influenza vaccine uptake.

Theoretical domain framework	***Key factors***	***Barriers***	***Enablers***
Environmental context and resources (30 studies)	Financial resources	• Lack of fund or financial resources[92,194,215,218]. • Lack of fund for vaccination program[225,227]. • No health insurance[211]. • Unavailability of free vaccine at workplace[198].	• Free of charge influenza vaccination[201,204,212,215,230]. • free onsite influenza vaccine[214,217].
	Accessibility to vaccine	• Poor accessibility to vaccination service[191,193,220]. • Poor accessibility related to work time/shifts[92,194,208,209,227].	• Easily access to vaccine[192,194–196,204,212,216]. • Availability of vaccine at work site[215].
	Time	• Lack of time to get influenza vaccine[193,198,208,223]. • Vaccination taking long time[219]. • Vaccination at not suitable time[192].	• Vaccination at convenient time[194]. • Offered at flexible day and time[228]. • vaccination offered many times[217,228]. • HCWs have enough time[195].
	Availability of influenza vaccine	• Lack/shortage of vaccine supply[191,205,208,209].	
	Organizational vaccination policy	• Vaccination policy enforced[219]. • Not required by employer[171,217]. • Lack of vaccination policy[217].	• Mandatory policy for vaccination. • vaccination policy[210,215] or requirement[217].
	Adverse reaction to vaccine	Egg allergy[206].	No allergic reaction[196].
	Health condition	Presence of other health condition[92,195,214,215].	
	Medical contraindication	Medical contraindication[201,223].	
	Staff turnover	Staff turnover[208,209,217].	
	GP role	Not vaccinated by their GP[215].	Registration with GP[215].
	organisational culture		organisational culture/climate[195].

Table 7: Theoretical Domains Framework, barriers and enablers to influenza vaccine uptake. (Continued)

Theoretical domain framework	***Key factors***	***Barriers***	***Enablers***
Belief about consequences (32 studies)	Belief about the effectiveness of the influenza vaccine	Perception that vaccination is not effective in preventing influenza[92,194,196,200,203,207,209,212,215,216,218,223,224,228].	Belief that influenza vaccine is effective[92,194,200,206,207,211,212,215,218,224,228].
	Belief about the side effects of the influenza vaccine	• General wrong belief about side effects[92,192,194,195,200,207,209,212,215,216,218,223,224,228]. • Belief that influenza vaccine weakens immune system[194,207]. • Will get influenza from the vaccine[192,194,202,207,216–218,223] or cause influenza symptoms[209].	The belief that influenza vaccine does not have side effects[192,196,202,213,216,228].
	Belief about the safety of the influenza vaccine	Distrust of influenza vaccine safety[92,198,216,222].	Perception that influenza vaccine is safe[92,212,222,223,229].
	Perceived necessity of the influenza vaccine	• Perception that vaccination not necessary[194,195,207]. • never get flu[198,207,208,212,223]. • no need for the vaccine[192,217]. • fit and healthy[195].	
	Perceived susceptibility to the influenza	Lack of concerns about getting influenza[193,207,216,221].	• The belief that oneself or HCWs at risk of getting influenza[192,194,196,207,213,216,228,229]. • The belief that (others) residents[213,218,229] or family[194] at risk of getting influenza.

Table 7: Theoretical Domains Framework, barriers and enablers to influenza vaccine uptake. (Continued)

Theoretical domain framework	***Key factors***	***Barriers***	***Enablers***
Belief about consequences (32 studies) (Continued)	Beliefs about the seriousness of the influenza	• Perception that influenza is not dangerous[193–195,207,216,221]. • Perception that influenza is not serious for residents[199,212].	Belief that influenza is sever/dangerous condition for me[216,228,229] or for the elderly[192,194,195,207,228,229].
	Salience of consequences	bad experiences with influenza vaccination[171,195,202,218,223].	Bad experiences with influenza[192,201,202,223,224,227].
	Perceived susceptibility to spread influenza		belief about possibility to infect others[194,207,213].
	Perceived benefit of the influenza vaccine	Belief that the influenza vaccine is not valuable/useful/beneficial for me[193,195,207,210,216] or for others[195,223].	Belief that influenza vaccine is valuable/useful/beneficial for yourself and others[192,202,216,228,229].
Social influence (25 studies)	Doctor-staff communication	Lake of doctor/GP recommendation[193,212,224].	Doctor recommendation to get influenza vaccine[192,194,196,201,204,207,212,216,226,230].
	Work and supervisor's role	Lack of recommendation and support from workplace/employer/supervisors[191,212].	Encouragement and support from workplace/employer/supervisors[192,194,196,202,204,207,212,215,216,226].
	Influence of colleagues	Lack of encouragement from colleagues[195,218,226].	Encouragement from colleagues[194,195,202,215,216,218,223,226,228].
	Influence of family or close contact	Negative experiences happened to close contacts[218].	Support from family members or close contact[171,194,202,212,223,228].
	Government role	Lack of trust in government and administration[202,208].	Trust in government recommendations[202].
	Media role		Using media to prompt influenza vaccine[92,215,218,224,228].
	Communication		personalized communication[194,218,227,230].

Table 7: Theoretical Domains Framework, barriers and enablers to influenza vaccine uptake. (Continued)

Theoretical domain framework	***Key factors***	***Barriers***	***Enablers***
Social influence (25 studies) (Continued)	Social comparisons		Comparison with others[208].
	Perceived support	Lack of perceived support on receiving influenza vaccine decision[210].	Perceived support on receiving influenza vaccine decision[195,228].
	Role models		trusted role model[195,217,218].
Emotion (26 studies)	Fear/concern of side effects	• General fear or concern of side effects[92,171,192,193,198,200,207,215,217–220,223]. • Fear of getting influenza from vaccine[198,201,217,223].	Absence of concern about side effects[199,212].
	Fear/concern of needles	Fear of needles[92,196,201,206–209,212,215,217,219,220,222,223].	
	Fear or concern of influenza vaccine	Fear or concern of influenza vaccine[195].	
	Compassion with care home staff	Lack of sympathy with care home staff[202].	
	Concern about influenza	Absence of concern about influenza[221].	
	Working condition	Feeling organization not caring about staff[202,218,226].	Job satisfaction[211].
	autonomy of care home staff	Perception of powerless and anger of mandating vaccination[218].	
Knowledge (22 studies)	Knowledge about influenza vaccine	Lack of knowledge about the vaccine[191,194,209,210,218,223], the efficacy[194,221] or the side effects of the vaccine[202,218,221] or misconceptions about vaccine[92,194].	knowledge about influenza vaccine[216,218,228].
	Knowledge about influenza	Lack of knowledge about the risk of influenza[223], transmission[223] and contracting influenza.	knowledge about influenza[228], risk of contracting and transmit of influenza[223].

Table 7: Theoretical Domains Framework, barriers and enablers to influenza vaccine uptake. (Continued)

Theoretical domain framework	***Key factors***	***Barriers***	***Enablers***
Knowledge (22 studies)(Continued)	Awareness about the importance of influenza vaccine	Lack of awareness about the need[192,212,220] or the importance of influenza vaccination[194,215,216,225].	Awareness about the importance of influenza vaccine[192,218,223,228].
	Education and provision of information	• Lack of clarity of information[208,218]. • Insufficiently informed about influenza and vaccine[223]. • Lack of scientific information[226]. • Don't believe evidence[195]. • Lack of provision of information[209,218,225,226,228]. • Insufficient information[218,226].	• Provision of education materials[212,218,228,230]. • Sufficiently informed[215,217,218,228].
	Awareness about influenza vaccine recommendations	Lack of awareness about the influenza vaccination recommendations[195].	Awareness of influenza vaccination recommendation[194,197,218,224,225,230].
	knowledge of the frequency of the vaccination	Lack of knowledge about the frequency of influenza vaccination[228].	Knowledge of the frequency of the vaccination[224].
	awareness of the availability of the influenza vaccine	Lack of awareness of the availability of the influenza vaccine[215].	Awareness about the availability of the influenza vaccine[195].
Social/professional role and identity (16 studies)	Professional roles toward residents	Lack of awareness of professional role toward residents[193,223].	Awareness of professional role toward residents[194,197,202,207,218,222,223,227,228].
	responsibility of staff to get vaccinated	Lack of belief in the role and responsibility of HCW to get vaccinated[193,195,210].	• Belief in the need/responsibility of staff to get vaccinated[194,228] every year[196]. • Belief that vaccination is their duty.

Table 7: Theoretical Domains Framework, barriers and enablers to influenza vaccine uptake. (Continued)

Theoretical domain framework	***Key factors***	***Barriers***	***Enablers***
Social/professional role and identity (16 studies) (Continued)	Social role and responsibility	Lack of awareness/lack of social role to protect others[193,223].	Awareness of social role to protect others[202,203,222].
	Social role and responsibility	Lack of awareness/lack of social role to protect others[193,223].	Awareness of social role to protect others[202,203,222].
	Organizational commitment		Awareness of professional role toward workplace[194,196,207,217,223,228].
	Cultural identity	Lack of believe in immunization[209].	
Goals (11 studies)	Vaccine protection		Goal priority: • Self-protection[92,192,194,195,206,207,212,216,217,222,223]. • Family protection[192,194,207,216,222,223]. • Residents' protection[92,192,194,206,207,212,216,222,223]. • Others protection[195,216,217,222].
	Goal related to work commitment		Avoid sickness absence[192,217].
	action planning		Having action plan[195].
Optimism (12 studies)	Optimism about the efficacy of influenza vaccine	Lack of confidence in the efficacy of influenza vaccine[195,200,207,223].	Confidence in the efficacy of the influenza vaccine[194,203,223].
	Value of the influenza vaccines	Pessimism about the value/usefulness of vaccines[194].	Optimism about the value of influenza vaccine[202].
	Trust vaccine	• Lack of trust in vaccine safety[195,202,223]. • General lack of trust in influenza vaccine[192,209] or skepticism[225].	Trust vaccine safety[203].
	Identity	Confidence in own immunity[212,215].	

Table 7: Theoretical Domains Framework, barriers and enablers to influenza vaccine uptake. (Continued)

Theoretical domain framework	***Key factors***	***Barriers***	***Enablers***
Intentions (10 studies)	Intention to get vaccinated	No intention to get the vaccine[196,201,206,216].	Intention to get vaccinated[194,195,206,210,222].
	conscious decision		Feeling of freedom of choice[194,207,228].
Reinforcement (8 studies)	Reward	• Incentives[195]. • Lack of incentives[191].	Reward for getting vaccine[194,211,229] and Incentives[217].
	legislation	Mandating influenza vaccine[193,226].	
	Inner feeling		Feel of making difference[195].
Memory, Attention and Decision Processes (7 studies)	Forgetting	Forgetting to get the vaccine[193,198,207,223].	
	attention to vaccination	Lack of attention to vaccination[212,223].	
	Prompts/cues		Reminders[92,194,212].
Behavioural regulation (2 studies)	feedback on performance	Lack of feedback on performance[191].	Feedback on performance[198].
Skill (0 studies)			
Beliefs about Capabilities (0 studies)			

Note: GP = General Practitioner;; HCWs = Healthcare workers.

2.4 Discussion

This systematic review found that although there are signs that care home staff are accepting the influenza vaccine and have positive attitudes towards it, there are also significant barriers that impede them from accessing the influenza vaccine. The results of this systematic review support the conclusions drawn from previous reviews, which state that the behavior surrounding vaccination is complicated and influenced by numerous factors[231]. The findings regarding individuals' views on vaccination align with previous systematic reviews from other health care settings, including concerns about side effects, beliefs in efficacy, and safety[45,47,48,173,177,179].

Using a comprehensive theoretical framework for understanding the behaviours of care home staff toward the influenza vaccine is helpful in providing a structured method for recognizing barriers and enablers and designing interventions aimed at improving influenza vaccine uptake[180,232].

After conducting this synthesis using the TDF, specific barriers and enablers were categorized that could be useful in targeting areas for potential interventions in the future. In addition, this review lays the groundwork for developing a customized and complex intervention to improve influenza vaccine uptake among care home staff by connecting the barriers that can be changed to the appropriate behavior change techniques (BCTs).

The majority of the studies included in this review have reported the presence of misconceptions regarding the vaccine, including concerns about its safety or effectiveness. These findings agree with other similar reviews conducted in various healthcare settings[47,177]. Interestingly, healthcare workers who were hesitant to receive the influenza vaccine expressed similar concerns as those observed during the COVID-19 pandemic, such as worries about the safety, efficacy, and potential side effects of the vaccine[233]. This suggests that educational interventions should be prioritized and should include a range of informative materials, such as leaflets, posters, and videos. These resources can effectively address potential concerns and contribute to a comprehensive understanding of influenza vaccination among care home staff[93,234]. Furthermore, encouraging open and honest communication between staff and management about their concerns and experiences with the vaccine was seen as an enabler to accept the vaccine[235].

It was observed that there is a relationship between the desire to protect themselves, their family and the patients they are caring for and acceptance of the influenza vaccine and the willingness to receive the influenza vaccine. These findings are consistent with the outcomes of previous systematic reviews conducted on the topic[48]. Therefore, incorporating information on the protective benefits of vaccines for care home staff, their relatives, and patients into educational interventions may serve as an important component of any vaccination advocacy initiative. Additionally, it is important to highlight both the potential benefits and limitations of influenza vaccines within these interventions. Acknowledging the current evidence on vaccine effectiveness, including its variations and uncertainties, can contribute to a more transparent and informed communication strategy. This approach can effectively contribute to enhancing awareness and promoting positive vaccination behaviors within the care home settings[45,236].

This review also found that having a reliable person who could provide accurate information about vaccinations was an enabler to accept the influenza vaccine. It has been found that healthcare providers may not have the time to search for information from national public health institutes[237], and this highlights the importance of providing information about the influenza vaccine, using engaging media to disseminate the information, and having a trustworthy point of contact to convey the information to the healthcare workers[93,234,238].

The low uptake of the influenza vaccine among care home staff can also be attributed to several environmental and organizational factors such as financial constraints, vaccine shortage, whereas providing financial support for care homes to make the vaccine accessible and available to staff were reported to improve influenza vaccination rate[172]. A significant barrier to influenza vaccination uptake among healthcare workers in hospital settings is the lack of accessible and convenient vaccination services[47,177]. However, research has indicated that healthcare personnel who work in care homes face greater barriers in accessing influenza vaccination compared to those who work in other healthcare settings[169].

There is a need for health systems to be more involved in supporting this sector by offering incentives or reimbursements to ensure that care homes and vaccine providers have the resources they need to provide the vaccine[239]. In addition, ensure a stable and consistent supply of the vaccine, which can be done through better planning and coordination with

vaccine providers and distributors may therefore be beneficial in improving influenza vaccine rate[240].

The adverse reaction to the influenza vaccine or allergy to eggs could prevent care home staff from getting the vaccine. To better understand these barriers, the findings were categorized using the TDF, which provides a structured approach to identifying influences on behavior and guiding intervention design. These specific barriers were categorized under the Environmental Context and Resources domain, as they require restructuring the physical environment. For example, by offering alternative vaccines or medical interventions for staff experiencing these issues.

One of the most important motivators to get the vaccine is a supportive environment for the care home staff to get vaccinated and improving the accessibility and availability of the vaccine, especially through providing a free onsite vaccine service in a flexible schedule[191,241,242]. Also, providing support and resources to care homes to track and monitor the vaccination rate of their staff, even with high turnover rates. This can include using electronic health records or other tracking systems to monitor vaccine uptake and ensure that all staff are receiving the vaccine.

The act of getting vaccinated is a behaviour that is a complex and requires consideration of various factors, including attitudes, beliefs, motivation, perceived risk, and social and organizational influences[243]. Therefore, it is essential to understand the complex nature of vaccination and its determinants in order to develop effective strategies to encourage vaccination uptake.

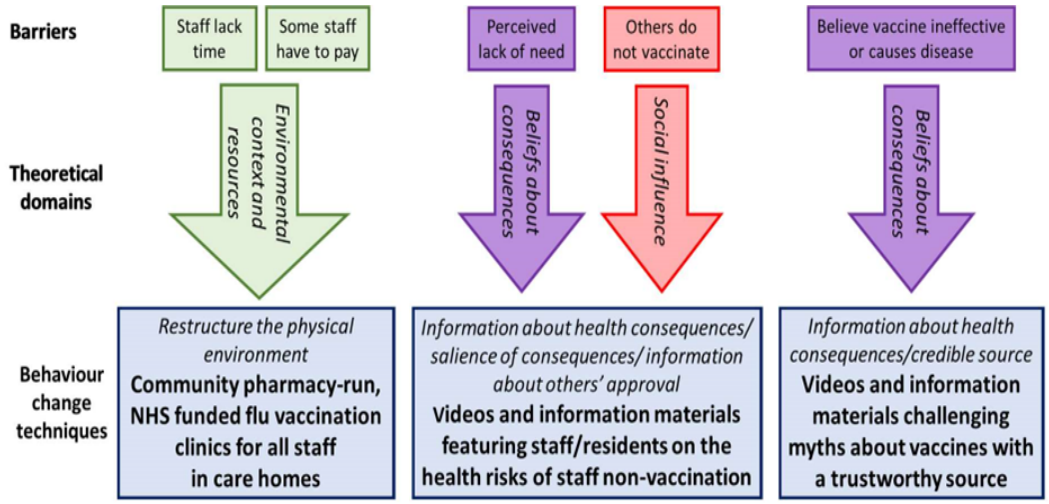
Interventions aimed at increasing access to influenza vaccine, raising awareness about the vaccine, and providing incentives were found to have limited effectiveness when implemented individually[98]. Combined interventions are required as many studies indicated that a greater uptake of vaccinations among healthcare workers was achieved through the implementation of multiple interventions across various domains[96,176,235,244].

Care homes can differ in terms of their context, residents, staff characteristics, services provided, and size. Furthermore, care homes can vary significantly between countries, and even within the same country, due to distinctive regulations at the national or regional level,

as well as the unique needs of each geographical area[96]. Therefore, when developing interventions, theory can be used to understand factors influencing behaviour change and to determine appropriate techniques. Evidence helps decide which behaviours to target, effective behaviour change techniques, and modes of delivery. Practical considerations, such as resource availability and acceptability in the targeted setting, must also be considered[180].

The findings of this review supported the developing of FluCare interventions that target multiple levels, including individual and organizational factors. With the results of this systematic review in addition to results of the survey conducted by Patel et al.[156,158], the FluCare team identified five main individual-level barriers to influenza vaccination (access to vaccination; cost of vaccination; perceived lack of need; vaccine beliefs; and peer influences)[156]. The FluCare team identified appropriate behavior change techniques (BCTs), which were the active components of interventions, and formed part of the final intervention[156], as illustrated in Figure 4.

Figure 4: Relationship between behaviour change techniques, barriers, and theory.



The development of the intervention was designed by the FluCare team through a stakeholder consensus group using the Nominal Group Technique. This process involved care home staff and organizational representatives to ensure the intervention was deliverable and met the APEASE criteria (affordability, practicality, effectiveness, acceptability, side-effects, equity)[245]. In addition, the FluCare intervention was enhanced with organizational-level strategies. As mentioned in this systematic review, care home staff are more likely to engage

in behaviors aligned with organizational priorities (social/professional role and identity), and employer encouragement (social influence) significantly boosts vaccination uptake among staff. Therefore, the final FluCare intervention addressed both individual and organizational barriers to staff vaccination. It included two components targeting individual barriers (on-site influenza clinics and behavior change information materials, such as videos, posters, and leaflets) and two components targeting organizational barriers (performance monitoring with feedback and financial incentives for care homes with staff vaccination rates above 70%).

2.4.1 Strengths and limitations

This systematic review has several strengths. Firstly, including qualitative and quantitative research provides a comprehensive understanding of the complex nature of vaccine uptake behaviour among care home staff, and highlights the valuable insights that can be gained from both approaches. Secondly, the TDF was used to gain a thorough comprehension of the factors that prevent or facilitate the uptake of the influenza vaccine among care home staff. The TDF's inclusion in the study provides a strong foundation for developing an intervention that is both evidence and theory-based.

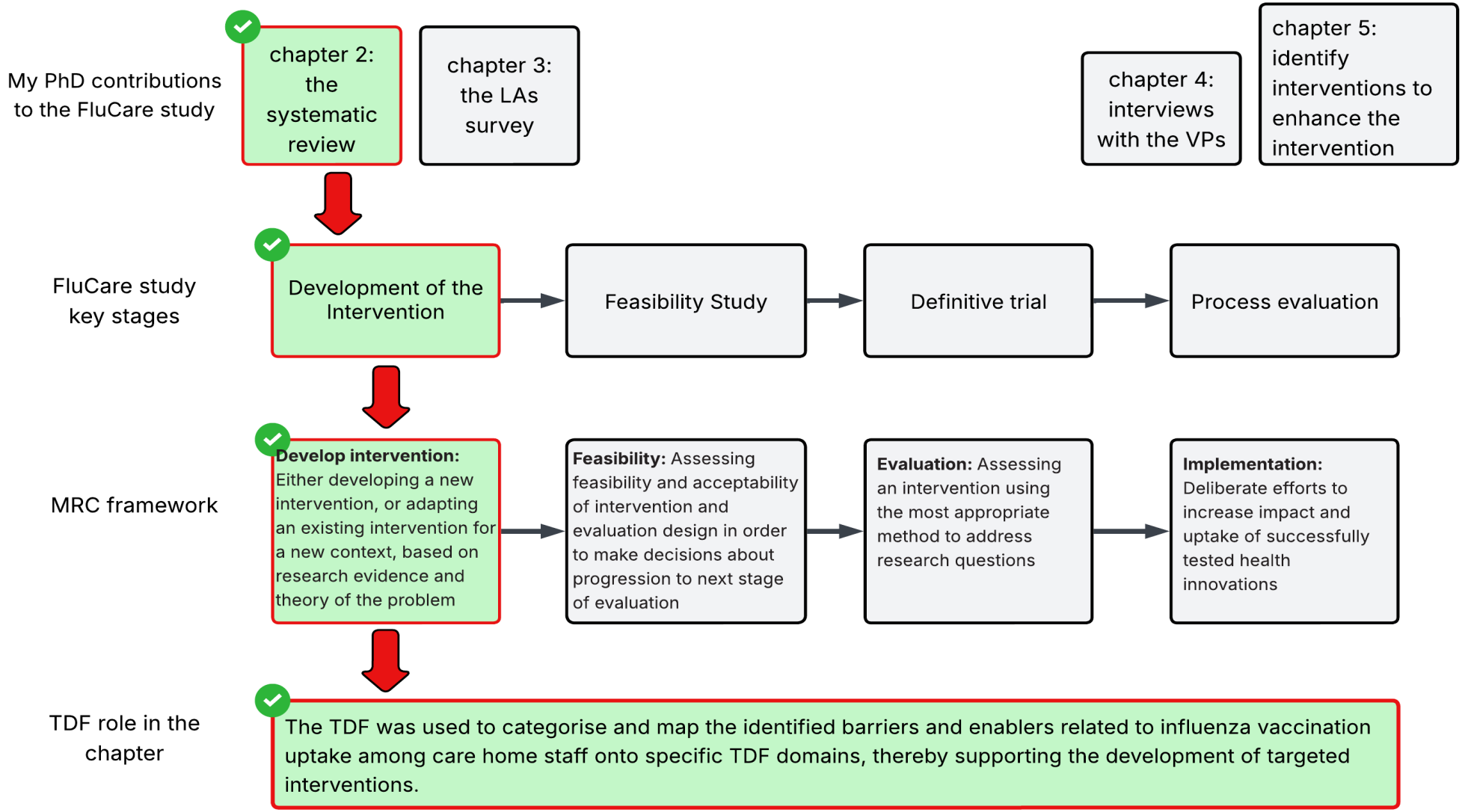
This systematic review solely included studies conducted in English and predominantly consisted of research carried out in North America and European countries. As a consequence, there is a potential restriction on the general applicability of the findings to alternative settings, particularly with regard to organizational culture. In this review, factors from surveys were included even if they were indicated by less than 10% of participants. This decision was made to provide a comprehensive overview of the barriers and enablers to influenza vaccine uptake among care home staff. By considering all factors, including those endorsed by a small proportion of participants, a broad range of perspectives and potential influences on the phenomenon under investigation was sought. Many studies included in this systematic review relied on surveys to explore barriers and enablers to influenza vaccine uptake among care home staff. While this methodology allows for standardized data collection, it also introduces the possibility of bias as the pre-determined questions may reflect the authors' beliefs.

2.5 Conclusion

This systematic review provides a comprehensive overview of the barriers and enablers affecting the uptake of influenza vaccine among care home staff. Multiple theoretical domains are likely to play a significant role in influencing vaccination uptake among care home staff. Several barriers and enablers were identified at the individual, organizational levels. The findings of this review emphasize the importance of understanding the complex nature of vaccination behaviour and developing strategies that combine various interventions across different domains.

The findings of this systematic review played an important role in developing the FluCare intervention, ensuring it addressed key individual-level barriers, such as vaccine access and beliefs, while also addressing organizational challenges, such as the lack of access to influenza vaccines. This review also highlighted the importance of the need for convenient vaccination access and the importance of management support, which informed the exploration of the barriers and enablers to delivering vaccination clinics within care homes. Figure 5 summarises the contribution of Chapter 2 to the development of the FluCare intervention, including its alignment with the MRC framework and the Theoretical Domains Framework (TDF). In line with the MRC guidance for developing complex interventions, this chapter identifies barriers and enablers to influenza vaccination using theoretical domain framework (TDF). The next chapter builds on these findings by presenting a survey of local authorities, which describes current initiatives to improve influenza vaccination uptake among care home staff and provides further insights to inform the refinement of the FluCare intervention.

Figure 5: Chapter 2 Contribution to FluCare Project, MRC Framework, and TDF Role.



Note: LA = Local Authority; VPs = Vaccine Providers; TDF = Theoretical Domains Framework; MRC = Medical Research Council.

Chapter 3: Local Authorities' Schemes to Improve the Influenza Vaccination Rate for Care Home Staff

3.1 Introduction

Although local authorities in England are not directly responsible for commissioning and delivering vaccine programs, they do have a responsibility for advocacy, communication, and health promotion in their respective regions[246]. During the COVID-19 pandemic, local authorities played an important role by facilitating vaccination efforts in care homes. They accomplished this by promoting confidence in the vaccine and ensuring that the vaccination process was accessible as possible for care homes[100].

The local authorities are in a unique position to support the delivery of vaccination services to care homes under their local area[247]. A comprehensive overview of interventions conducted by local authorities is essential to inform policy-makers and commissioners about the overall scope of these interventions and the differences in approaches across various regions. This underscores the need for a national perspective on these efforts to improve vaccination rates in care homes. However, it is worth noting that there has been no prior study conducted to identify the interventions undertaken by local authorities with regard to improving the influenza vaccination rates for care home staff.

As outlined in Chapter 1, the latest MRC guidance emphasises drawing on existing or planned interventions to inform the development and evaluation of new interventions[135]. Building on the findings from Chapter 2, which highlighted multiple behavioural and organisational barriers influencing influenza vaccination uptake, this chapter examines how local authorities currently address these challenges through their own intervention strategies.

As part of my PhD research, I designed and led a national survey of local authorities to identify the existing interventions aimed at improving influenza vaccination uptake among care home staff. I developed the survey, managed data collection through, conducted the analysis, and wrote up the findings. While the FluCare team provided advisory input during the development of the survey and later during the analysis and interpretation of results, this study was executed independently as part of my PhD research. The findings from this survey helped inform the development of the FluCare intervention by identifying real-world practices, gaps, and regionally specific strategies. Understanding current practices and gaps

provides insights for the development of the FluCare intervention and informs broader strategies to optimise vaccination uptake among care home staff.

3.1.1 Aim and objectives

The aim of this study is to describe local authority initiatives that aim to improve influenza vaccination uptake for care home staff, with the overarching goal of identifying current practices, innovation, and informing the design of a future intervention to address low vaccine uptake among care home staff. With respect to enhancing care home staff vaccination rates, the objectives are to:

1. Describe the range of education initiatives used to enhance care home staff willingness to be vaccinated.
2. Describe schemes used to increase accessibility of vaccinations to care home staff.
3. Describe any incentive schemes for care homes to improve the influenza vaccination rate of care home staff.
4. Identify the influenza vaccination target-rates that local authorities set.
5. Describe how the local authorities monitor performance in care home staff vaccination uptake.
6. Describe initiatives that local authorities plan to use in the future to improve care home staff influenza vaccination rates.
7. Identify any additional innovative approaches used.
8. Examine the association between specific local authority intervention components and influenza vaccination rates among care home staff.

3.2 Method

3.2.1 Ethical approval

Before commencing the research, ethical approval was sought and granted from the Faculty of Medicine and Health Sciences Research Ethics committee at the UEA. The study protocol is provided in Appendix 5, while the ethics approvals and ethics amendment approvals are included in Appendices 6 and 7.

3.2.2 Survey rationale

The most effective way to collect data from a widely dispersed sample in this research was via the use of surveys. Online surveys were selected due to their capacity to reach a large number of respondents and their time-efficiency, which is critical in a sequential explanatory design[248]. In addition, surveys use a standardised technique to ensure that all participants are given the same questions[249]. Since no previous studies have identified interventions to improve care staff influenza vaccination rates in the UK, a survey approach was chosen as an appropriate method for this study to help design the FluCare intervention.

3.2.3 Survey development

Survey questions were guided by the aim and objectives of this study. The survey was developed through a comprehensive process led by the PhD candidate (FA). The development process involved several stages. Initially, the PhD (FA) candidate conducted a literature search to explore local authorities' activities related to vaccination services. Secondly, to inform the development of survey response options and questions, intervention strategies were gathered from systematic reviews examining approaches to improve vaccination rates among care home staff and healthcare workers[96–98,244,250,251]. Additionally, the studies included in the systematic review in Chapter 2, which examined the effectiveness of these interventions, were used to inform and identify the intervention options. Intervention-related questions were ordered according to the most commonly used strategies in previous studies, with educational interventions listed first due to their frequent implementation.

Finally, the PhD candidate (FA) sought feedback from members of the FluCare research team (DW, AP, and ES), who are experienced researchers in care home services and vaccination. A series of discussions were held to refine the survey and ensure its relevance. In addition, a local authority health protection manager (Ems) reviewed a draft version of the survey and provided feedback on content and clarity.

The PhD candidate made several amendments to improve the clarity and content of the survey. These refinements included:

- Focusing the survey specifically on older people's care homes, excluding children's homes or homes for individuals with learning disabilities.
- Clarifying that “care home staff” referred to all workers, regardless of their role, as long as they had direct or indirect contact with residents.
- Adding a new question to explore whether local authorities had partnerships for delivering vaccination services.
- Modifying and expanding response options to enhance clarity and provide comprehensive answer choices.

The finalized survey consists of 10 sections with 25 questions, covering key areas such as the availability of vaccination schemes, educational interventions, accessibility strategies, and incentive programs for care homes and staff. Additionally, the survey asked about influenza vaccination target rates set by local authorities and the methods used to monitor vaccination rates in care homes. The answer options included both yes/no responses and open-ended questions to allow for more detailed and explanatory answers. The final version of the survey is provided in Appendix 8.

3.2.4 Improve response rate

The PhD candidate applied relevant strategies identified in a Cochrane review to improve the survey response rates[252]. The survey was designed to be short and take 5-10 minutes to complete. The FluCare study and the UEA logos were added to the front page to indicate that the survey are sponsored by the University of East Anglia. The PhD candidate also prepared invitation emails that encouraged recipients to forward the survey to the department responsible for health promotion programmes within their local authority. To maximise

participation, a follow-up email was sent to non-responding local authorities one month after the initial invitation. The survey was available in two formats to provide local authorities with flexibility in their response method: a Word-based version to be returned to the PhD candidate via email, and an online version accessible through a link on Jisc online survey.

3.2.5 Piloting

The PhD candidate piloted different approaches to identify the most effective method for contacting local authorities and distributing the survey. In the first phase, the survey was sent via an online link to 10 randomly selected local authorities. However, only one response was received, indicating that an online-only distribution method was not effective.

In response to this, the PhD candidate adopted a dual approach, distributing the survey both as an online link and as a Word document. This was informed by the knowledge that some local authorities require surveys to be submitted as formal requests in a Word format. To test this revised approach, the PhD candidate resent the survey to the nine non-responding local authorities from the first phase and also sent it to an additional 10 random local authorities via Freedom of Information (FOI) requests. This strategy substantially improved the response rate, with 12 out of 19 local authorities (63%) responding.

A third method was also piloted, the PhD candidate contacted nine local authorities directly to request the contact details of the most appropriate person to complete the survey. Although six local authorities provided contact details, only one individual responded to the survey. Due to the low response rate, this method was not pursued further.

The initial low response rate from the online-only distribution highlighted the need for Freedom of Information (FOI) requests and offering the survey in both an online and Word format to ensure a higher response rate. Table 8 illustrates the methods used and the response rates from local authorities across different phases of the pilot survey.

Table 8: Response rates from local authorities across pilot survey phases.

method	number of LAs	response rate
first pilot: (no FOI request, no Word document)	10	(1/10) 10% responded to the survey.
second pilot: Nonrespondent to the first request (9) + 10 more LAs (survey in Word document + FOI request)	19	• 12/19 (63%) responded to the survey. • 3/19 (15%) mentioned that they are not responsible for vaccination programmes. • 4/19 (21%) did not respond.
second pilot: request contact details for the person who is responsible for vaccinations in care homes	9	• (6/9) provided contact details. • (1/9) responded to the survey. • (1/9) refused to provide contact details.

Note: LAs = Local Authorities; FOI = Freedom of Information.

3.2.6 Survey validity

The validity of a survey research tool refers to its accuracy in measuring what it intends to measure, and how well the results represent the true findings among both the study participants and similar individuals not participating[253,254]. This also involves assessing whether the questions collect accurate data and are relevant to the study objectives[253,254]. To enhance the survey validity, the survey underwent a structured validation process, including face validity, content validity, and piloting.

To ensure the survey content aligned with existing evidence on influenza vaccination interventions, a comprehensive literature review was conducted. The systematic review presented in Chapter 2 played an important role in informing the selection of survey items, ensuring that all major intervention strategies previously evaluated in research were incorporated. Additionally, experts in vaccination, public health, and care home services, including members of the FluCare research team (DW, AP, ES), provided feedback on clarity, wording, and relevance of the survey.

To assess face validity, the survey was shared with a health protection manager from Wakefield council (EmS) who provided feedback on clarity, structure, and relevance. This helped to ensure that the survey align with real-world practices and ensure that the questions were appropriate for local authority respondents. Minor modifications were made based on their input, including clarifications on terminology, such as defining "care home staff," rewording unclear questions, and adjusting response options to improve comprehension. Following this, a pilot study was conducted with local authorities to test their responses to the survey. Based on the pilot results, further refinements were made, such as specifying that interventions should refer only to those implemented during the 2021/22 influenza season to standardize responses. Through these iterative validation steps—including expert review, stakeholder feedback, and pilot testing—the survey was refined to ensure content and face validity, as well as practical feasibility for the target audience.

3.2.7 Main distribution

Freedom of Information (FOI) requests were used to collect data from local authorities across England. Under the Freedom of Information Act 2000, public sector organizations, including local authorities, are legally required to provide requested information unless exempt under relevant provisions of the Act[255].

An inquiry was sent to local authority staff to determine what level of government would be best to direct questions on influenza vaccination activities to. Following this, it was determined that the annual influenza programmes activities are devolved to the upper and one tier local authorities. By the end of the 2021/22 influenza season, the PhD candidate distributed the survey using Freedom of Information (FOI) requests to all 151 local authorities in England. These included upper-tier authorities (county councils) and one-tier authorities (unitary authorities, London boroughs, and metropolitan boroughs), which are typically responsible for public health services[256,257]. All local authorities included in the study were contacted by the local authority's FOI email or a specified form through the local authority's website. This enabled the local authority to determine who was best placed to respond to the request.

The use of FOI requests offered several advantages for this study. First, it ensured a high response rate because local authorities are obligated to respond within 20 working days, thereby increasing accountability and likelihood of participation[255]. Second, FOI requests provided access to official and structured data, making responses more standardized than voluntary surveys, which may suffer from variability in reporting data[258]. Third, the FOI process allowed access to data that might not be publicly available, particularly regarding specific vaccination policies and interventions at the local level[255].

However, there were also limitations in using FOI requests. While public bodies are legally required to respond, some responses indicated that local authorities did not have the requested data or were not responsible for influenza vaccination among care home staff. This resulted in some missing data, particularly regarding vaccination rates[255]. Another limitation was that FOI requests primarily gather actual data, limiting the ability to obtain qualitative insights on implementation challenges and contextual factors influencing vaccination programs[259]. Furthermore, the legal obligation to respond does not necessarily ensure high data accuracy, as responses often depended on how individual local authorities recorded and reported their information[259]. Some responses were incomplete or referred to external organizations, leading to inconsistencies in data quality.

3.2.8 Analysis

The PhD candidate (FA) conducted the data analysis in consultation with a statistician (AC). Responses from the Word form were manually entered into the Jisc online survey, and the data was exported to SPSS version 27 for analysis. A descriptive statistical analysis was conducted to quantify the number of interventions and to provide details about the sample of schemes, including their frequencies and characteristics.

To examine the association between each intervention component and the influenza vaccination rate among care home staff, separate univariate linear regression analyses were conducted to assess the association between each individual intervention component and the staff vaccination rate. This approach was selected because the study is exploratory and descriptive in nature, and the relatively small sample size (n = 117) limited the degrees of freedom available for including all intervention variables simultaneously in a single

multivariable model. Many intervention types were also implemented together by the same local authorities, creating a high risk of multicollinearity if analysed in one model**.** Rather than building a predictive model that includes all interventions, the aim was to identify which individual interventions may be associated with vaccination uptake. Separate models allowed clearer interpretation of the potential contribution of each component while adjusting for a key confounder (the number of care homes per local authority) and avoided multicollinearity issues that could arise in a multivariable model given the relatively small sample size and overlapping interventions.

An exploratory multiple regression including all 18 intervention variables and the number of care homes (19 predictors) was conducted to assess model feasibility. With sample size (n = 117), the residual degrees of freedom (99) fell below the recommended sample size for reliable estimation (50 + 8m = 202)[260,261]. The model was not statistically significant ($F(18, 99) = 1.608$, $p = 0.072$) (Appendix 9). Based on these results, separate univariate regression models were conducted for each intervention, adjusting for care home count, to reduce model complexity and avoid overfitting. As multiple separate models were run, no formal adjustment for multiple comparisons was applied; results are therefore considered hypothesis-generating rather than confirmatory. This method aligns with the objective of the study which is to explore associations between local implementation strategies and vaccination uptake.

Data on staff vaccination rates at the Local Authority level were obtained from the Capacity Tracker, a publicly available source published by the Department of Health and Social Care (https://www.gov.uk/government/collections/monthly-statistics-for-adult-social-care-england)[262]. This approach was adopted because a substantial number of local authorities did not provide self-reported vaccination rates in the survey responses. Each intervention was treated as a binary categorical variable (Yes/No), and the vaccination rate was analysed as a continuous outcome variable (percentage of staff vaccinated). In addition, to account for potential confounding, the number of care homes in each Local Authority was included as a covariate in all regression models. The number of care homes variable was obtained from the Care Quality Commission (CQC) public data resource (https://www.cqc.org.uk/about-us/transparency/using-cqc-data)[263]. Prior to conducting regression analyses, key assumptions

were tested, including linearity of the relationship between the number of care homes and vaccination rate, normality of residuals, homoscedasticity, and absence of multicollinearity. For each model, the unstandardised regression coefficient (B), standard error, p-value, and R^2 were reported. Additionally, an independent-samples t-test was conducted to compare NHS Capacity Tracker vaccination rates between local authorities that responded to the survey and those that did not, in order to assess potential response bias.

Furthermore, a Spearman's rank-order correlation was conducted to examine the relationships between three continuous variables: the number of care homes in each local authority, the number of interventions implemented, and the influenza vaccination rate. This analysis was selected due to its suitability for non-normally distributed public health data, and it provided a non-parametric assessment of monotonic relationships between variables[264]. This analysis enabled exploration of whether larger care home systems or higher intervention intensity were associated with improved vaccination uptake.

Responses to the open-ended sections were reviewed to identify any additional methods used by Local Authorities that were not included in the original options. These responses were listed without formal content or thematic analysis, focusing on examples and clarifications provided by the local authorities.

3.3 Results

The overall response rate was 95.3% (144 out of 151 local authorities). Most of the local authorities responded to the initial request (82.7%, n=125), while 19 local authorities (12.5%) responded after a reminder was sent. No response was received from 4.6% (n=7) of local authorities. Out of the 144 that responded to the FOI request, 27 replied to the request but did not complete the survey, either because they did not hold information on care home staff influenza vaccination or indicated that they were not responsible for delivering or monitoring these services. Among the 117 local authorities that responded to the survey, the total number of care homes was 11,595. This represents approximately 78.4% of the total care home provision in England (14,795 care homes in total). This high level of coverage indicates that the responded local authorities account for the majority of the national care home landscape, enhancing the representativeness of the findings.

Regarding the categories of care home staff for whom vaccination was expected, local authorities provided the following responses: 94.9% (111/117) expected care staff to be vaccinated. Additionally, 69.2% (81/117) of the respondents anticipated that administration staff would also be vaccinated. Furthermore, 77.8% (91/117) expected both domestic/housekeeping and catering staff to receive vaccinations. Finally, 83.8% (98/117) of the local authorities anticipated that agency/temporary staff should be vaccinated as well. The percentage of local authorities that expected all care home staff, including care staff, administration staff, domestics/housekeeping, catering staff, and agency/temp staff to be vaccinated was 66.6% (n=78).

The local authorities that monitored influenza vaccine coverage during the 2021/22 influenza season accounted for 85.5% of the total (n=100/117). The tool most frequently used by local authorities to measure influenza vaccination rates for care home staff were the NHS Capacity Tracker (89.0%). Methods used to measure the vaccination rate are detailed in table 9. Some local authorities mentioned other methods to measure the influenza vaccination like contacting care home managers to regular updates on vaccination status or having their own vaccination tracker, or using NHS National Data Platform (Foundry).

Table 9: tools used to measure the influenza vaccination rate.

Tool	no. of LAs (%)
NHS Capacity tracker	89 (89.0%)
Immform	15 (15.0%)
National Immunisation Vaccination System (NIVS)	10 (10.0%)
other	24 (17.4%)

Note: LAs = Local Authorities.

Out of the 117 local authorities, 75 (64.1 %) reported the influenza vaccination rates within their respective areas. The median (IQR) influenza vaccination rate was 30.1% (24.0-37.1%). Among the local authorities that provided vaccination rate data, only three local authorities (4%) reported influenza vaccination rates above 80% (Table 10). Of the 117 local authorities, 29.9% (n=35) had set an influenza vaccination target. According to the NHS Capacity Tracker data, the mean influenza vaccination rate for care home staff across the 117 local authorities was 26.4% (SD = 6.7%), with values ranging from 9.3% to 43.0%. While self-reported rates were not provided by all local authorities, the NHS Capacity Tracker offered a more consistent and standardised dataset, which was therefore used in the statistical analysis to ensure comparability across all areas. A comparison of NHS Capacity Tracker data between responding and non-responding local authorities showed no statistically significant difference in mean vaccination rates (p = 0.099), suggesting that survey participation was not strongly biased toward higher or lower performing local authorities.

Table 10: local authorities' Influenza Vaccine Rate Categories.

Category	no. of LAs	Percentage
0-20%	9	12.0%
21%-40%	52	69.3%
41%-60%	5	6.7%
61%-80%	6	8.0%
81%-100%	3	4.0%

Note: LAs = Local Authorities.

3.3.1 Overview of local authorities' interventions

In total, 91 out of 117 (77.8%) local authorities initiated interventions to enhance influenza vaccination rates for care homes. Additionally, 14 out of 117 (11.9%) local authorities reported having local partners responsible for developing such interventions.

3.3.1.1 Educational interventions

Local authorities that offered training or provided information materials to care home staff accounted for 91.4% (n=96). The most commonly reported educational intervention was *"Inform staff about where to obtain free vaccination".* Table 11 presents the percentage and frequency of the educational interventions employed by local authorities.

Table 11: Educational interventions.

Interventions	no. of LAs (%)
Inform staff where they could obtain free vaccination	83 (86.5%)
Educational leaflets and/or posters	79 (82.3%)
Informing care home staff of influenza vaccination goal and/or policies	62 (64.6%)
Face to face training (virtual or physical)	46 (47.9%)
Educational videos	34 (35.4%)
Email/text messages reminders to care home staff to get influenza vaccine	43 (44.8%)
Providing additional education to staff who declined vaccine	42 (43.8%)
Publicising vaccination uptake rate to care homes	29 (30.2%)
Educational toolkit	25 (26.0%)

Note: LAs = Local Authorities.

Local authorities also provided various educational interventions not mentioned in the choices, including regular Q&A sessions for care providers, reminder letters to care home staff, calls with care homes with low vaccination uptake, individual conversations with care home staff, and newsletters with guidance updates and resources about the vaccine. Additionally, letters from the Directors of Public Health and social media campaigns were utilized. These initiatives aimed to enhance communication and increase vaccine uptake among care home staff.

3.3.1.2 Interventions used to enhance access to influenza vaccine

Local authorities that provided interventions to facilitate access to the influenza vaccine were 63.8% (n=67). The most frequent access intervention used was "*Facilitate free vaccination via*

GP or pharmacist with vouchers/letters". Table 12 presents the percentage and frequency of the interventions initiated by local authorities to improve access to influenza vaccine.

Table 12: Enhance access to influenza vaccine interventions.

Interventions	no. of LAs (%)
Facilitate free vaccination via GP or pharmacist with vouchers/letters	41 (61.2%)
Located vaccination clinics within care homes	40 (59.7%)
Ensure pharmacies and GP have sufficient stocks for the whole influenza season	37 (55.2%)
Ensure care home staff not eligible under the current NHS influenza vaccination scheme get free influenza vaccine from GP, community pharmacy or NHS trust.	32 (47.8%)
Offer influenza vaccine during day and night shifts (Out of hours provision)	9 (13.4%)
Provided transport or travel reimbursement	7 (10.4%)

Note: LAs = Local Authorities; GP = General Practitioner.

Other methods used to enhance access to the influenza vaccine included providing free taxi cabs from the workplace to local pharmacies or GPs for vaccination, setting up drive-thru clinics, and offering the opportunity to request vaccination visits from the Health and Wellbeing bus.

3.3.1.3 Incentive Interventions

Only 14.3% (n=15) of local authorities provided incentives to care home managers or owners, while 9.5% (n=10) offered incentives to care home staff. Examples of these incentives included offering one-hourly pay to enable care home staff to access the vaccine and providing funding to cover lost hours if staff took time off for vaccination. Additionally, one local authority implemented an award scheme for care homes that vaccinated their staff, with gold, silver, and bronze awards given to care homes that managed to vaccinate 90-100%, 80-90%, and 70-80% of their staff, respectively. Care homes received a framed certificate, shop vouchers for staff, and £500 donation to resident fund.

3.3.1.4 Intervention Evaluation

Local authorities reported that they conducted evaluations for the interventions at a rate of 18.1% (n=19), with 23.8% (n=25) stating that they found "Enhancing access to the influenza vaccine" to be the most effective intervention in their opinion.

3.3.2 Association Between Intervention Components and Staff Vaccination Rates: Linear Regression Analysis

Linear regression analyses were conducted to explore the association between each intervention and the influenza vaccination rate among care home staff, adjusting for the number of care homes in each local authority (Table 13). Although most interventions were not statistically significant, a few showed positive associations and had overall model significance (*Model Sig.*).

Each intervention was analysed in a separate regression model, adjusting for the number of care homes. This approach was adopted to explore the individual association of each intervention with vaccination uptake, as part of an exploratory analysis. Informing care home staff of influenza vaccination goals and/or policies was associated with higher vaccination rates ($B = 2.259$, $p = 0.063$), with a statistically significant overall model (*Model Sig.* = 0.028). Other interventions that showed positive associations with vaccination rates and relatively strong overall model fit included availability of interventions to enhance access to vaccination ($B = 1.669$, *Model Sig.* = 0.065), locating vaccination clinics within care homes ($B = 1.602$, *Model Sig.* = 0.073), ensuring that pharmacies and GPs had sufficient stock throughout the season ($B = 1.807$, *Model Sig.* = 0.062), and ensuring that care home staff not eligible under the NHS scheme could still access free vaccination ($B = 1.965$, *Model Sig.* = 0.056). Although the individual *p*-values for these predictors did not meet the conventional threshold for statistical significance ($p < 0.05$), their consistent positive direction and relatively model-level significance suggest a potential contribution to improving vaccination uptake.

Table 13: Linear Regression Results: Intervention Availability and Staff Vaccination Rates (Adjusted for Number of Care Homes).

Predictor Variable	Unstandardized B	Std. Error	Standardized Beta	t	p-value	R Square	Adjusted R Square	F	Model Sig.
Availability of educational intervention	-0.173	1.627	-0.010	-0.106	0.915	0.031	0.015	1.867	0.159
Educational leaflets and/or posters	-0.768	1.304	-0.054	-0.589	0.557	0.034	0.017	2.040	0.135
Face to face training (virtual or physical)	-1.082	1.241	-0.080	-0.872	0.385	0.038	0.021	2.253	0.110
Educational videos	-0.488	1.345	-0.033	-0.363	0.717	0.032	0.016	1.929	0.150
Educational toolkit	-0.548	1.506	-0.034	-0.364	0.717	0.032	0.016	1.929	0.150
Informing care home staff of influenza vaccination goal and/or policies	2.259	1.204	0.170	1.876	0.063	0.060	0.044	3.678	0.028*
Inform staff where they could obtain free vaccination	1.434	1.345	0.098	1.066	0.289	0.041	0.024	2.447	0.091
Providing additional education to staff who declined vaccine	1.203	1.264	0.087	0.952	0.343	0.039	0.022	2.328	0.102
Email/text messages reminders to care home staff to get influenza vaccine	-2.177	1.234	-0.160	-1.764	0.080	0.057	0.040	3.467	0.035*
Publicising vaccination uptake rate to care homes	-0.832	1.378	-0.055	-0.603	0.547	0.034	0.018	2.049	0.134
Availability of interventions to enhance access to vaccine	1.669	1.233	0.124	1.354	0.178	0.047	0.030	2.807	0.065

Table 13: Linear Regression Results: Intervention Availability and Staff Vaccination Rates (Adjusted for Number of Care Homes). (Continued).

Predictor Variable	Unstandardized B	Std. Error	Standardized Beta	t	p-value	R Square	Adjusted R Square	F	Model Sig.
Located vaccination clinics within care homes	1.602	1.275	0.115	1.257	0.211	0.044	0.028	2.676	0.073
Offer influenza vaccine during day and night shifts (Out of hours provision)	-2.460	2.363	-0.099	-1.041	0.300	0.040	0.024	2.420	0.093
Facilitate free vaccination via GP or pharmacist with vouchers/letters	0.489	1.275	0.035	0.384	0.702	0.033	0.016	1.937	0.149
Ensure pharmacies and GP have sufficient stocks for the whole influenza season	1.807	1.305	0.127	1.384	0.169	0.047	0.031	2.850	0.062
Ensure care home staff not eligible under the current NHS influenza vaccination scheme get free influenza vaccine from GP, community pharmacy or NHS trust	1.965	1.352	0.134	1.454	0.149	0.049	0.032	2.952	0.056
Provided transport or travel reimbursement	1.341	2.578	0.048	0.520	0.604	0.034	0.017	2.000	0.140
Offer incentives to care home managers	0.173	1.652	0.010	0.104	0.917	0.031	0.015	1.866	0.159
Offer incentives to care home staff	-0.658	2.180	-0.028	-0.302	0.763	0.032	0.015	1.908	0.153

Note: Std. Error = Standard Error; t = t-statistic; R Square = Coefficient of Determination; GP = General Practitioner; NHS = National Health Service.
** $p < 0.05$ is considered statistically significant.*

3.3.3 Association Between Number of Care Homes and Vaccination Uptake: Potential Structural Influences

The number of care homes in each local authority was positively associated with staff vaccination rates across most regression models, with unstandardised B coefficients typically ranging from 0.012 to 0.015 (Table 14). Although these associations were not always statistically significant, the consistently positive direction suggests that local authorities with a higher number of care homes tended to report slightly higher average vaccination rates. This relationship may reflect underlying structural characteristics. For example, local authorities with more care homes may be larger, urban areas with more developed public health infrastructure and resources. Therefore, the observed association may be partially confounded by factors such as population size, service capacity, or urban/rural classification, which were not adjusted for in this analysis.

Table 14: Association Between Number of Care Homes in Local Authority and Staff Influenza Vaccination Rate.

Predictor Variable	Unstandardized B (Number of care homes)	p-value (Number of care homes)
Availability of educational intervention	0.013	0.056
Educational leaflets and/or posters	0.013	0.050
Face to face training (virtual or physical)	0.013	0.055
Educational videos	0.013	0.053
Educational toolkit	0.013	0.052
Informing care home staff of influenza vaccination goal and/or policies	0.014	0.039*
Inform staff where they could obtain free vaccination	0.012	0.076
Providing additional education to staff who declined vaccine	0.012	0.059
Email/text messages reminders to care home staff to get influenza vaccine	0.013	0.049*
Publicising vaccination uptake rate to care homes	0.013	0.054
Availability of interventions to enhance access to vaccine	0.012	0.082
Located vaccination clinics within care homes	0.012	0.058
Offer influenza vaccine during day and night shifts (Out of hours provision)	0.015	0.034*
Facilitate free vaccination via GP or pharmacist with vouchers/letters	0.013	0.057
Ensure pharmacies and GP have sufficient stocks for the whole influenza season	0.012	0.076
Ensure care home staff not eligible under the current NHS influenza vaccination scheme get free influenza vaccine from GP, community pharmacy or NHS trust	0.011	0.102
Provided transport or travel reimbursement	0.013	0.051
Offer incentives to care home managers	0.013	0.056
Offer incentives to care home staff	0.013	0.056

*Note: GP = General Practitioner; NHS = National Health Service; * $p < 0.05$ is considered statistically significant.*

3.3.4 Associations Between Care Home Density, Intervention Activity, and Vaccination Uptake

Table 15 presents the results of a Spearman's rank-order correlation analysis, which was used to assess the associations among three variables: the number of care homes in each local authority, the number of interventions implemented, and the reported influenza vaccination rate among care home staff. The analysis identified a statistically significant positive correlation between the number of care homes and vaccination rates (Spearman's ρ = 0.287, p = 0.002), indicating that local authorities with more care homes tended to report higher staff vaccination uptake. However, no significant correlations were observed between the number of care homes and the number of interventions (ρ = 0.078, p = 0.401), or between the number of interventions and vaccination rates (ρ = 0.099, p = 0.290). These findings suggest that while scale of care provision may be associated with improved vaccination rates, the number of reported intervention strategies alone did not demonstrate a strong relationship with uptake levels. This correlation further supports the regression findings, where the number of care homes consistently showed a small but positive association with vaccination rates across multiple models.

Table 15: Correlation Between Number of Care Homes, Vaccination Rate, and Number of Interventions Across Local Authorities

Association	Correlation	p-value
Number of care homes vs Vaccination Rate	0.287**	0.002
Number of care homes vs Number of interventions	0.078	0.401
Vaccination Rate vs Number of interventions	0.099	0.290

*Note: **Correlation is significant at the 0.01 level (2-tailed).*

Table 16 integrates data on the number of care homes within each local authority, their reported influenza vaccination rates for care home staff, vaccination rate from NHC capacity tracker, and the presence or absence of specific intervention types. This table enables a comparative perspective across different local authorities. Across the 117 responding local authorities, the number of care homes varied significantly from 9 to 475.

Table 16: Overview of Local Authority Interventions and Their Association with Staff Influenza Vaccination Rates in Care Homes

Local Authority	Number of care homes	Self reported Vaccination Rate	NHS Capacity tracker Vaccination rate	Education intervention	leaflets	Face to face	videos	toolkit	inform about goal /policies	inform about free vaccination	additional decline	email-text reminders	publishing uptake	enhance access interventions	within care home	night shifts provision	free vaccination-vouchers/letters	Ensure sufficient stock	free vaccine for not eligible staff	travel reimbursement	Care home incentives	staff incentives	Number of interventions
Rutland County Council	13	47.0%	43.0%											√									1
Bracknell Forest Council	14	41.0%	40.0%																				0
Swindon Borough Council	48	NA	38.9%	√					√	√	√			√	√		√		√				8
Dudley MBC	90	37.7%	37.8%	√		√	√		√	√											√		6
Isle of Wight Council	69	39.0%	37.7%	√					√	√	√	√		√	√								7
Cumbria County Council	142	67.0%	37.3%	√	√				√	√				√	√			√					7
Durham County Council	138	NA	36.4%	√	√	√	√		√	√	√										√		8
Warwickshire County Council	180	27.8%	36.2%	√	√	√			√	√				√	√		√	√	√				10
North Yorkshire County Council	200	36.7%	36.2%	√	√	√	√	√	√	√	√		√	√			√	√	√		√	√	15
Warwickshire County Council	163	37.4%	36.2%	√	√	√			√	√				√	√		√	√	√				10
South Tyneside	32	38.0%	35.9%	√	√		√	√	√	√	√	√	√	√	√		√	√		√	√	√	16
Plymouth City Council	96	NA	35.6%	√	√	√	√		√	√	√	√											8
Solihull MBC	66	NA	35.6%	√	√	√	√		√	√	√	√	√	√			√						11
Gloucestershire	198	34.0%	35.5%	√	√					√		√		√				√	√				7
West Berkshire District Council	43	NA	35.5%	√	√				√	√				√			√		√				7
Reading Borough Council	30	32.0%	35.2%																				0
East Riding of Yorkshire Council	146	36.0%	34.9%	√	√	√				√													4
Walsall Council	57	32.0%	34.0%	√	√	√				√	√			√	√		√	√	√				10
Hertfordshire County Council	260	24%	33.8%	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√		√	√	17
Stockport Metropolitan Borough Council	63	NA	33.3%	√	√	√			√	√	√			√	√			√	√	√	√		12
North Tyneside Council	43	34.0%	32.9%	√	√				√	√				√			√	√					7
Bury Council	51	NA	32.5%	√	√	√			√	√	√	√	√	√	√			√					11
Barnsley Metropolitan Borough Council	72	31.6%	32.0%	√	√				√	√	√			√	√		√	√	√				10

Table 16: Overview of Local Authority Interventions and Their Association with Staff Influenza Vaccination Rates in Care Homes. (Continued)

Local Authority	Number of care homes	Self reported Vaccination Rate	NHS Capacity tracker Vaccination rate	Education intervention	leaflets	Face to face	videos	toolkit	inform about goal /policies	inform about free vaccination	additional decline	email-text reminders	publishing uptake	enhance access interventions	within care home	night shifts provision	free vaccination-vouchers/letters	Ensure sufficient stock	free vaccine for not eligible staff	travel reimbursement	Care home incentives	staff incentives	Number of interventions
Devon County Council	310	33.0%	31.7%	√	√					√	√	√	√	√									7
City of York Council	39	NA	31.5%	√	√			√	√	√		√											6
Hampshire County Council	475	45.0%	31.3%	√	√					√		√		√			√						6
Oldham	44	31.0%	31.2%	√	√	√		√	√	√	√		√	√	√		√	√	√				13
Northumberland	98	33.3%	31.2%	√						√				√	√				√				5
Nottinghamshire County Council	280	30.3%	31.1%	√	√		√	√						√	√		√						7
Tameside	37	NA	31.0%	√					√	√				√				√					5
Blackpool Council	67	32.0%	31.0%	√	√		√	√	√	√	√		√										8
Bolton	55	32.0%	30.5%	√		√			√	√		√	√	√			√		√				9
Wolverhampton	68	NA	30.0%	√	√			√	√	√				√	√								7
Cornwall	221	40.0%	29.9%																				0
London Borough of Sutton	74	28.0%	29.7%	√	√	√			√	√	√		√								√	√	9
Knowsley Metropolitan Borough Council	25	35.0%	29.6%	√	√		√		√	√				√	√								7
Portsmouth City Council	38	84.0%	29.5%	√	√		√			√	√	√		√	√		√		√				10
Trafford	56	64.6%	29.5%	√	√	√			√	√	√	√		√	√		√	√	√				12
Wandsworth	32	NA	29.5%	√																			1
Torbay Council	81	30.0%	29.2%	√	√		√			√	√	√											6
Oxfordshire County Council	127	NA	29.1%	√		√			√	√	√	√		√			√	√	√	√			11
Staffordshire	250	67.0%	29.0%	√	√		√	√		√			√	√	√	√		√	√		√	√	13
Derby City Council	66	NA	28.8%	√	√				√	√													4
Sefton Council	131	NA	28.6%																				0
Wokingham Borough Council	52	27.2%	28.6%	√										√									2
Medway	68	NA	28.5%	√	√		√	√	√	√	√	√	√										9

Table 16: Overview of Local Authority Interventions and Their Association with Staff Influenza Vaccination Rates in Care Homes. (Continued)

Local Authority	Number of care homes	Self reported Vaccination Rate	NHS Capacity tracker Vaccination rate	Education intervention	leaflets	Face to face	videos	toolkit	inform about goal /policies	inform about free vaccination	additional decline	email-text reminders	publishing uptake	enhance access interventions	within care home	night shifts provision	free vaccination-vouchers/letters	Ensure sufficient stock	free vaccine for not eligible staff	travel reimbursement	Care home incentives	staff incentives	Number of interventions
Doncaster Council	73	27.5%	28.3%	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√				15
London Borough of Croydon	126	22.5%	28.3%	√	√			√	√	√			√	√	√	√		√					10
Bradford Metropolitan District Council	114	62.0%	28.2%	√	√					√	√	√											5
Wigan Council	54	29.0%	28.2%	√										√	√			√			√	√	6
Wakefield Council	92	NA	27.9%																				0
Leicestershire County Council	170	33.0%	27.8%	√	√					√													3
Merton Council	38	31.0%	27.7%	√	√	√			√	√	√			√	√		√	√	√	√			12
Wiltshire	165	70.0%	27.4%																				0
Warrington Borough Council	48	25.0%	27.2%	√	√	√		√	√	√													6
Bath and North East Somerset	55	NA	27.2%	√	√	√			√	√													5
Derbyshire County Council	257	NA	26.9%	√										√	√		√						4
Sunderland	81	32%	26.7%																				0
Darlington Borough Council	32	26%	26.6%																				0
Ealing Council	46	NA	26.6%	√	√		√		√	√			√	√	√		√			√	√		11
Rotherham Metropolitan Borough Council	79	26.6%	26.5%																				0
Kirklees Council	126	59%	26.4%	√	√				√	√	√	√	√	√	√	√	√	√	√	√	√		15
Bedford Borough, Central Bedfordshire and Milton Keynes	180	96.8%	26.2%	√	√				√	√		√	√	√					√				8
Bedford Borough	77	97.3%	26.2%	√	√				√	√		√	√	√					√				8
Norfolk and Waveney	330	29%	26.0%	√	√	√	√		√	√	√	√	√	√				√	√		√		13
Redcar & Cleveland Borough Council	44	25.1%	26.0%											√									1
Royal Borough of Kensington and Chelsea	11	18.6%	25.6%	√	√	√			√			√											5

Table 16: Overview of Local Authority Interventions and Their Association with Staff Influenza Vaccination Rates in Care Homes. (Continued)

Local Authority	Number of care homes	Self reported Vaccination Rate	NHS Capacity tracker Vaccination rate	Education intervention	leaflets	Face to face	videos	toolkit	inform about goal /policies	inform about free vaccination	additional decline	email-text reminders	publishing uptake	enhance access interventions	within care home	night shifts provision	free vaccination-vouchers/letters	Ensure sufficient stock	free vaccine for not eligible staff	travel reimbursement	staff incentives	Care home incentives	Number of interventions
Suffolk County Council	187	NA	25.3%																				0
East Sussex council	298	26.0%	25.0%	√	√	√	√	√	√	√	√			√	√		√	√	√				13
Wirral Metropolitan Borough Council	117	NA	25.0%	√	√		√	√		√	√	√	√	√	√	√		√	√				13
Sandwell MBC	80	NA	24.9%	√	√	√	√		√	√				√			√	√					9
Herefordshire Council	84	33%	24.2%	√										√			√						3
West Sussex County Council	342	25%	24.2%	√	√				√	√				√									5
Newcastle City Council	62	NA	24.1%	√	√				√	√	√			√	√		√	√					9
Lancashire County Council	415	NA	23.7%	√		√				√													3
Sheffield	108	NA	22.8%																				0
Southampton City Council	54	NA	22.8%	√	√	√			√	√				√	√								7
Surrey County Council	407	25.0%	22.8%	√	√	√	√	√	√	√	√	√		√	√	√		√	√				14
North Lincolnshire Council	56	NA	22.7%	√	√	√	√			√	√	√		√			√	√	√				11
Brighton and Hove City Council	88	23.7%	22.4%	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√				16
Nottingham City Council	78	NA	22.4%																				0
North Northamptonshire and West Northamptonshire Councils	227	66.5%	22.3%	√	√	√		√	√	√	√	√	√	√	√	√	√		√				14
Lambeth	42	20.8%	22.0%	√	√		√	√		√				√	√		√	√					9
Royal Borough of Kingston Upon Thames	39	NA	21.8%	√						√		√		√									4
Birmingham City Council	276	22.5%	21.6%	√	√		√	√		√													5
Cheshire West and Chester Council	77	22.5%	21.5%	√		√			√	√		√											5
Royal Borough of Greenwich	43	24.0%	21.4%	√	√				√	√													4
Leicester City	101	22.0%	21.2%																				0

Table 16: Overview of Local Authority Interventions and Their Association with Staff Influenza Vaccination Rates in Care Homes. (Continued)

Local Authority	Number of care homes	Self reported Vaccination Rate	NHS Capacity tracker Vaccination rate	Education intervention	leaflets	Face to face	videos	toolkit	inform about goal /policies	inform about free vaccination	additional decline	email-text reminders	publishing uptake	enhance access interventions	within care home	night shifts provision	free vaccination-vouchers/letters	Ensure sufficient stock	free vaccine for not eligible staff	travel reimbursement	Care home incentives	staff incentives	Number of interventions
London Borough of Bexley	31	NA	21.1%																				0
Cambridgeshire County Council and Peterborough City Council	166	NA	20.9%	√	√				√	√													4
Halton Borough Council	25	25.17%	20.8%	√	√	√	√	√	√	√	√	√		√									10
Slough	15	21.0%	20.7%	√	√	√	√	√	√	√	√	√	√										10
Southend-on-Sea City Council	85	30.1%	20.6%																				0
Enfield	81	NA	20.5%	√	√							√											3
Blackburn with Darwen Borough Council	36	21.6%	20.5%											√	√		√	√			√		5
Lewisham Council	57	20.13%	20.3%	√	√	√				√	√	√		√	√		√	√	√				11
London Borough of Newham	24	24.0%	20.2%	√	√	√	√	√	√	√				√							√		9
Harrow	52	NA	20.0%	√	√	√			√			√		√			√						7
Gateshead LA	51	NA	19.8%	√								√		√	√		√	√	√		√		8
London Borough of Tower Hamlets	10	21.0%	19.7%	√	√	√	√			√			√										6
London Borough Hillingdon	46	NA	19.7%	√	√					√													3
Brent	56	25.0%	19.6%	√	√	√	√			√	√	√	√	√			√	√	√		√	√	14
Middlesbrough Council	43	NA	19.4%	√	√				√	√		√											5
Islington	16	20.0%	19.2%	√	√	√			√	√		√		√	√		√						9
Hartlepool Borough Council	26	NA	19.1%																				0
Richmond upon Thames	43	NA	18.9%	√																			1
Havering Council	58	NA	18.8%	√	√				√	√				√	√	√	√	√	√				10
Luton Borough Council	41	20.0%	18.5%	√	√	√		√	√	√	√	√	√								√	√	11
Calderdale Council	47	18.0%	17.0%	√	√					√		√		√	√								6
London Borough of Redbridge	79	82.0%	16.6%	√	√	√		√			√			√			√						7

Table 16: Overview of Local Authority Interventions and Their Association with Staff Influenza Vaccination Rates in Care Homes. (Continued)

Local Authority	Number of care homes	Self reported Vaccination Rate	NHS Capacity tracker Vaccination rate	Education intervention	leaflets	Face to face	videos	toolkit	inform about goal /policies	inform about free vaccination	additional decline	email-text reminders	publishing uptake	enhance access interventions	within care home	night shifts provision	free vaccination-vouchers/letters	Ensure sufficient stock	free vaccine for not eligible staff	travel reimbursement	Care home incentives	staff incentives	Number of interventions
Hammersmith and Fulham	9	20.0%	15.8%																		√	√	2
London Borough of Hackney	15	43.28%	15.4%	√	√	√	√		√	√	√	√	√										9
Central Bedfordshire	58	93.3%	15.4%	√	√				√	√		√	√	√					√				8
Hounslow	30	NA	12.0%	√			√		√	√			√	√	√		√	√		√	√	√	12
Westminster	11	18.6%	12.0%	√	√	√			√			√											5
Camden	10	NA	11.5%	√	√	√				√	√												5
London Borough of Barking & Dagenham	19	22.9%	9.3%	√	√	√	√			√	√	√	√	√			√						10

Note: NA = Not Available.

3.4 Discussion

The results of this nationwide study offer valuable insights into the strategies employed by local authorities to enhance influenza vaccination rates among care home staff. Despite care home staff being identified as a priority group for influenza vaccination[159], the study reveals that not all local authorities in England implemented interventions to improve vaccination rates among this group. While collaborative efforts between local authorities and local partners were observed, this did not always mean that programmes were successful in reaching the ambition vaccination rate in most of the local authorities' areas.

The study reveals significant variation in interventions aimed at improving influenza vaccination rates for care homes across local authorities in England. While most local authorities actively implemented interventions, some reported having none in their areas. Despite the fact that the majority of local authorities implemented interventions independently or in collaboration with local partners, it is noteworthy that some local authorities were not involved in developing and implementing any interventions in collaboration with other organizations. This indicates the persistence of barriers to partnership working between organizations[246,265].

The results suggest that most of the interventions reported by local authorities were not statistically associated with higher vaccination rates. Among the intervention types examined, only one intervention reached the conventional threshold for statistical significance ($p < 0.05$) in linear regression analyses after adjusting for the number of care homes per local authority, however a few interventions approached significance and may warrant further investigation.

Educational interventions were the most commonly reported, even they showed limited associations with vaccination rates[97,98,244,250]. This suggests that education alone may be inadequate, especially without accompanying behavioural or structural support. For instance, the positive association with vaccination rate for informing staff of vaccination goals might reflect the role of leadership engagement and a shared vision which were factors known to influence vaccination uptake as discussed in chapter 2[157]. In addition, clearly informing staff about vaccination policies and goals can enhance awareness and promote uptake, as

supported by previous findings that emphasised the value of leadership support and consistent messaging in improving vaccine acceptance[98].

The access-related interventions were not statistically significant in the regression models, but some of them demonstrated positive associations with staff vaccination rates. This suggests that enhancing vaccine accessibility could still play a supportive role in improving uptake. These exploratory findings are consistent with previous studies, which have highlighted that improved access to the vaccine was effective in increasing the vaccination rate[198]. This is also supported by the intervention conducted by Wakefield Council in 2018 to improve the vaccination rate for care home staff in their area. The intervention included providing flexible scheduling for on-site influenza clinics at care homes, which resulted in an increase in vaccination uptake[247]. In addition, a pilot study delivered in-home vaccination clinics led by a pharmacist showed a significant increase in the staff vaccination rate, from 46.5% in 2016 to 69.2% in 2017[132]. However, access related intervention was not statistically significant, and it is possible that in some local authorities implemented theses interventions without sufficient communication, planning, or follow-up, which may have limited their effectiveness[266]. Alternatively, these interventions may have lacking the behavioural insight or relational elements needed to motivate care home staff[134].

Although only 64.1% of local authorities provided self-reported vaccination data, the NHS Capacity Tracker offered a more consistent dataset across all 117 areas. The discrepancy between self-reported and national data suggests variation in access to local-level reporting systems and potential bias in self-reporting. Using Capacity Tracker data therefore strengthened the reliability of the overall analysis. Addressing the fact that all local authorities reported rates below 60%, the study emphasizes the need for improvement to achieve more widespread coverage among care home staff. In addition, the expectation for care staff to be vaccinated was high (94.9%), underscoring the critical role of frontline care providers in influenza prevention. However, expectations varied for other staff categories, with administration staff and agency/temp staff also considered by a significant proportion of local authorities.

Furthermore, the majority of interventions lacked evaluation, underscoring the need for more rigorous assessments, especially for care home staff where evidence is lacking. A significant

challenge lies in the limited evaluation of interventions, hindering a comprehensive understanding of their effectiveness. However, it is important to emphasize the need for strategies within the local authorities' public health teams to address challenges in interventions implemented in their respective areas. This particularly involves focusing on improving access to regular training and proactive performance evaluation to enable influenza vaccine providers and care home managers to recognize and share effective practices. Integrating such strategies has the potential to enhance the overall effectiveness of interventions targeting increased influenza vaccination rates among care home staff [265].

This study demonstrated a statistically significant positive association between the number of care homes in a local authority and the influenza vaccination rate among care home staff. This suggests that local authorities with a higher number of care homes tended to report higher vaccination coverage. One possible explanation is that areas with more care homes may have better-developed public health infrastructures, more dedicated vaccination programmes, or greater experience managing large-scale service delivery. Larger systems with integrated public health infrastructure may be better positioned to support resilient vaccination programmes[267]. The positive association between the number of care homes within a local authority and vaccination uptake may reflect underlying structural advantages. Areas with a higher density of care homes likely benefit from better health-care access and infrastructure, which has been shown to be positively associated with vaccination uptake at the population level[268]. However, the number of interventions reported by a local authority was not significantly associated with staff vaccination rates. This finding suggests that increasing the number of interventions may not be sufficient to improve uptake; instead, factors such as intervention quality, implementation context, and broader organisational capacity may play a more substantial role. This highlights the need for more nuanced strategies that go beyond the quantity of interventions and instead focus on tailoring them to local system capabilities and care home staff needs[231].

The study reveals variation in interventions for care home staff in England, with less focus on improving access to influenza vaccines, despite its proven effectiveness[48,97,173,244,250]. Interventions that involved incentives were used by fewer local authorities. However, evidence suggests that incentives can be a useful strategy for encouraging healthcare worker vaccination. For example, small monetary or non-monetary rewards have been associated

with increased uptake when embedded within broader multi-component programmes. The adoption of multiple interventions is essential, as numerous studies have shown that a significant increase in vaccination rates among healthcare workers results from the implementation of combined interventions[96,176,235,244].

It is necessary to prioritize efforts aimed at enhancing the coverage and effectiveness of interventions. To achieve this, continuous interventions should undergo rigorous assessments, including randomized controlled trials and coordinated multi-method evaluations. The inclusion of coordinated multi-method evaluations serves the purpose of comprehensively understanding not only the effectiveness but also the cost-effectiveness of the interventions. Moreover, the study emphasizes the necessity to evaluate the acceptability and effectiveness of interventions concurrently with their commissioning[153].

The FluCare research team incorporated in-care home vaccination clinics as a core component of the FluCare intervention. This approach aims to increase convenience and accessibility for staff, ensuring that more staff receive the vaccine and thereby improving vaccination coverage among care home staff. In addition, educational interventions were also included, reflecting the widespread use of these strategies among local authorities and their potential to raise awareness and address vaccine hesitancy. While the FluCare team led the overall intervention design, this study supported the inclusion of both the accessibility intervention and educational components by providing evidence on existing best practices.

3.4.1 Strength and limitations

This survey represents the first comprehensive study examining local authorities' interventions to improve influenza vaccination rates among care home staff in England. A key strength of this study was the high response rate (77.4%), with 117/151 local authorities providing data, reflecting strong engagement. Additionally, the use of Freedom of Information (FOI) requests added methodological robustness, ensuring access to official and structured data[255,258]. This approach helped secure a consistent dataset across different local authorities, reinforcing the credibility and validity of the findings. Furthermore, multiple steps were taken to strengthen the validity of the survey. Content validity was supported through a comprehensive literature review and expert consultation, ensuring that the survey captured

all major intervention strategies previously described in the literature. To complement this, face validity was established through review by public health manager to confirm the relevance, clarity, and appropriateness of the questions for local authority respondents. Additionally, a pilot study with local authorities further contributed to refining the survey's structure, improving its clarity and applicability.

This study also adopted a systematic analytical approach using linear regression and Spearman's rank-order correlation to explore the association between local authority interventions and influenza vaccination uptake among care home staff. A key strength was adjusting all regression models for the number of care homes per local authority, helping to account for structural differences such as size and capacity. The consistent positive association between care home numbers and vaccination rates across models supported the relevance of this adjustment. Another strength was the use of reliable, publicly available data. The vaccination rates were drawn from the NHS Capacity Tracker, ensuring complete and standardised coverage, while care home numbers were sourced from the Care Quality Commission. The univariate regression models offered straightforward interpretation, appropriate for the exploratory nature of the study, and model assumptions were tested to support robustness. Additionally, Spearman's rank-order correlation was well suited to the non-parametric nature of the data, allowing robust assessment of monotonic relationships, although it could not account for confounding or establish causality.

Despite these strengths, several limitations must be acknowledged. First, while the overall response rate was high, the analysis was limited to those local authorities that responded to the survey. Although self-reported vaccination data were incomplete, vaccination rates for all included local authorities were obtained from the NHS Capacity Tracker, a publicly available and standardised national dataset. As a result, there were no missing vaccination rate data among the included local authorities. For instance, given that vaccination rates were found to be associated with the number of care homes per local authority, it is possible that non-responding authorities may have had more or fewer care homes, which could affect the generalisability of the findings.

In addition, the accuracy of data on interventions commissioned by other agencies was another challenge, as this study did not cover schemes funded by Clinical Commissioning

Groups (CCGs) or other local authority partners, potentially excluding relevant initiatives. Moreover, as this study captures interventions from the 2021–2022 influenza season, there is a possibility that some interventions have evolved since data collection, limiting generalisability to future seasons.

Another limitation was the lack of integration of wider socio-demographic variables at the local authority level (e.g., ethnicity, and proportion of older residents). Incorporating these variables was beyond the scope of this chapter. Future research should consider combining such socio-demographic markers with structural indicators to provide a more comprehensive understanding of factors influencing vaccination uptake. In addition, a further limitation was the absence of qualitative insights from FOI responses. While FOI provided structured factual data, it did not allow for in-depth exploration of motivations, implementation challenges, or the perceived effectiveness of interventions. Moreover, another potential limitation is social desirability bias, which may have influenced responses, as some local authorities may have overstated their efforts to improve vaccination rates in an attempt to present a favourable perception of their initiatives[269]. It is also possible that some local authorities may have deemed the study less relevant if they were not directly responsible for influenza vaccinations among care home staff, potentially leading to non-response in those cases.

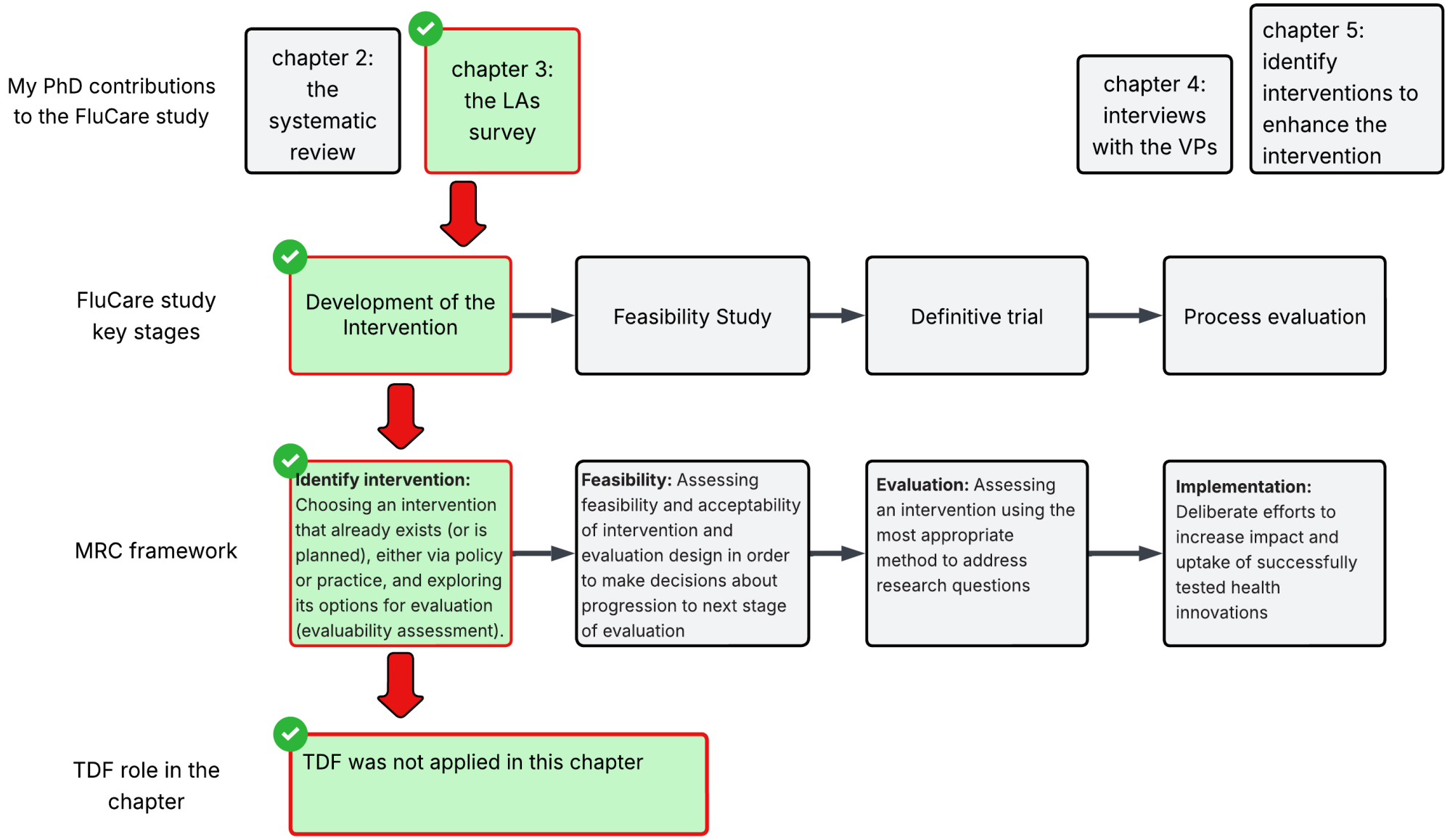
Furthermore, a limitation is that the validation of the survey relied mainly on expert judgement, without involving a wider group of stakeholders such as care home managers or additional local authority teams. This may have limited the range of perspectives used to assess the relevance and clarity of the questions. In addition, the survey may have underrepresented certain vaccination strategies used by local authorities as some local authorities may have implemented unique interventions that were not captured within the predefined survey response options. To mitigate this, the survey included open-ended questions, allowing respondents to provide additional details beyond structured responses. From an analytical perspective**,** limitation relates to the regression models which was adjusting for only one covariate (care home count) and did not account for other contextual factors like urban/rural classification. Additionally, the relatively small sample size (n = 117) limited the residual degrees of freedom, making it statistically inappropriate to include all intervention variables in a single multivariable model. As a result, each intervention was

analysed in a separate regression model, which increased the number of hypothesis tests conducted and therefore the risk of Type I error. Although one intervention showed a statistically significant association with vaccination rates ($p < 0.05$), no adjustments for multiple comparisons were applied, and this finding should be interpreted with caution. Despite the analysis limitation, the approach provided meaningful insights into which interventions may be linked to higher staff vaccination rates and serves as a useful foundation for future, more detailed evaluations. This study offers a unique and valuable national overview of influenza vaccination initiatives for care home staff in England. By identifying existing interventions and key gaps, it offers important insights for policymakers seeking to improve influenza vaccine uptake in care home settings.

3.5 Conclusion

These findings indicate that local authorities are actively pursuing measures to enhance influenza vaccination rates among care home staff. However, the results also underscore the presence of opportunities for further improvement in attaining high vaccination rates specifically among care home staff. One of the key opportunities lies in increasing access to vaccinations, such as through on-site vaccination clinics for care home staff. Additionally, the implementation of educational interventions, including strategies to inform staff about the importance of vaccination, vaccination goals, and organisational policies—represents another important area for development. Despite the efforts undertaken, there remains room for optimization and the implementation of targeted interventions to ensure comprehensive coverage and adherence to vaccination recommendations within these critical healthcare settings. This suggests a need for ongoing evaluation and refinement of interventions to address the challenges associated with influenza vaccination among care home staff, with a particular emphasis on improving access to make vaccination more convenient and accessible. These findings also highlight the importance of understanding the practical challenges faced by the vaccine providers who deliver in-care home influenza clinics, an issue explored in detail in Chapter 4. Figure 6 illustrates the contribution of Chapter 3 within the broader FluCare project, showing its alignment with the MRC framework and its role in identifying local authority practices. The next chapter builds on these findings by exploring contextual and vaccine providers' perceived barriers to and enablers to the delivery of in-care home influenza vaccination clinics.

Figure 6: Chapter 3 Contribution to FluCare Project, MRC Framework, and TDF Role.



Note: LA = Local Authority; VP = Vaccine Provider; TDF = Theoretical Domains Framework; MRC = Medical Research Council.

Chapter 4: Barriers and Enablers to the Delivery of In-Care Home Vaccination Clinics for Care Home Staff

4.1 Introduction

Protecting and enhancing the quality of life for care home residents is a shared priority between the UK government and medical professionals. As such, care home staff are recommended to get the influenza vaccine[99]. Community pharmacies and GP practices are well-positioned to deliver the influenza vaccine, given their existing relationships with care homes and their capacity to deliver healthcare services directly to these settings.

Chapter two highlighted several factors that influence adherence to influenza vaccination among care home staff, including limited access to vaccines and their availability within care homes—key barriers that significantly contribute to non-adherence[157]. Chapter three and other studies suggest that targeted interventions, including delivering the influenza vaccine directly to care home staff, could be effective in improving vaccination rates[96–98,250].

The FluCare project included a multi-centre randomised controlled trial (RCT) in which the intervention comprised educational materials, financial incentives, and in-care home vaccination clinics delivered by community pharmacy and GP staff. While the RCT evaluated the effectiveness and cost-effectiveness of this intervention[156], its success also depended on the implementation strategy and the practical barriers and enablers influencing clinic delivery.

To interpret vaccine providers' experiences, it is essential to understand the complexity of care home settings. Care homes are complex adaptive systems, consisting of interconnected sub-systems involving people, tasks, technology, the physical environment, and organizational culture[270]. In this environment, effective implementation is shaped by multiple contextual factors at different levels. At the individual level, attitudes and motivations of pharmacy and GP staff play a significant role in driving vaccination delivery efforts. At the organizational level, leadership support, resource allocation, and workflow processes are essential in facilitating or obstructing delivery. The local setting, characterized by care home manager interactions and staff engagement, is influenced by community norms, social support, and access to resources. At the systemic level, broader factors, such as healthcare policies, regulations, incentives, and financing mechanisms, have an impact on delivery efforts across settings.[271].

Understanding these contextual domains is essential to planning effective strategies that promote the adoption and sustainability of evidence-based practices, ultimately enhancing healthcare outcomes for care home residents[272]. This is especially important when implementing interventions that involve professionals from various organizations, such as pharmacies and GP practices and, whose goals, values, and operational approaches may differ but intersect in the healthcare and social care sectors[273].

This chapter presents an independent qualitative study conducted as part of my PhD research, focused specifically on the delivery of influenza vaccination clinics by vaccine providers involved in the FluCare intervention. While the wider FluCare study included a comprehensive process evaluation, this study was undertaken separately to gain an in-depth understanding of the perspectives and experiences of those directly responsible for delivering the vaccination clinics. This chapter presents an analysis that is methodologically and analytically separate from the broader process evaluation of the FluCare study. Building on the findings from Chapter 3, which identified gaps and variation in local authority support for vaccination initiatives, this chapter now focuses on the frontline delivery of vaccination clinics within care homes.

Process evaluation is important for understanding how an intervention is received by care homes, staff, and vaccine providers, as well as for identifying challenges that may arise during implementation[135,153]. The broader FluCare process evaluation, conducted independently from this chapter, is described in detail elsewhere[163]. The findings from this chapter were shared with the FluCare research team and used to triangulate with data from other sources, including interviews with care home staff and managers. This triangulation was undertaken to strengthen interpretation, confirm findings, and identify agreement or variation across datasets, thereby enhancing the robustness of the process evaluation of the FluCare intervention[162,163]. Vaccine provider insights on clinic logistics, communication with care homes, and reasons for clinic success or failure helped validate and enrich themes related to intervention implementation reported by care homes in the broader process evaluation[163].

Aim

To explore contextual and participants' perceived barriers and enablers to the delivery of in-care home influenza vaccination clinics.

Objectives

1. Identify the barriers and enablers perceived by vaccine providers in delivering in-care home influenza vaccination clinics.
2. Map the identified barriers and enablers to relevant Theoretical Domains Framework (TDF) domains to provide a structured understanding of the influences on behaviour.

4.2 Methods

4.2.1 Ethics approval and consent to participate

Ethical approval for the trial was obtained from the University of East Anglia, Faculty of Medicine and Health Ethics Committee on 1st August 2022 (study approval number ETH2122-2419) and governance approval was received from the UK Health Research Authority on 15th August 2022 (study approval number IRAS 316820). Written informed consent to participate in the study was obtained from vaccination providers. The PhD candidate contributed to the development of the FluCare process evaluation protocol[162], particularly in designing the sections related to interviews with vaccine providers.

4.2.2 Qualitative research

Qualitative research is an approach that focuses on collecting, analyzing, and interpreting non-numerical data—primarily words instead of numbers. It aims to understand how participants express their thoughts on specific topics, providing insights through the interpretation of these reflections[274]. Qualitative research relies on interpretation, as researchers analyze and describe the data by constructing meaning from the diverse range of participant responses. This interpretive process is important for understanding participants' perspectives effectively. Qualitative research methods involve formulating a research question and exploring its underlying meaning by gathering data from individuals in real-world contexts. In this study, data was collected from vaccine providers working in care home settings to understand their experiences and perspectives. The analysis of this data results in themes or patterns that the researcher interprets to provide insights into key topics[275]. Qualitative methodology is suitable when an in-depth understanding of the research question is needed. This approach involves engaging with specific participants, allowing them to share their experiences and perspectives related to the research question[275]. In qualitative research, the researcher plays an important role in the process, collecting data through various methods like interviews[275]. In contrast, quantitative research focuses primarily on the collection, analysis, and interpretation of numerical data and measurements[276]. In this study, data collected using qualitative methods helped build an understanding of the research

context, specifically focusing on the barriers and enablers faced by vaccine providers in delivering influenza vaccination clinics within care home settings.

4.2.2.1 Interviews

An interview is a conversation between a participant and a researcher, used as a method for collecting data through verbal interaction[277] . In research, interviews are designed to focus on a particular idea or research question, allowing participants to provide in-depth descriptions of their experiences. They are particularly valuable for gaining insight into participants' decision making processes and perspectives on the study topic[275]. Interviews provide a platform for individuals to share their thoughts and feelings privately, which they might hesitate to do in a group context. This approach facilitates a broad discussion on various topics, allowing the researcher to collect rich and comprehensive data[277].

There are several types of interviews used in qualitative research, including structured, semi-structured, and unstructured interviews[277] . In health research, the most frequently used methods are structured and semi-structured interviews. Structured interviews consist of a predetermined set of questions, following a strict format where the researcher adheres closely to the interview protocol[277]. This approach allows researchers to concentrate on specific phenomena or experiences of interest, which can be useful when there are numerous questions to cover. By maintaining a consistent structure, the researcher is able to ensure that the same areas are addressed across all participants, providing opportunities to investigate deeper into topics as they emerge[277].

Semi-structured interviews offer a balance between structured guidance and open conversation. This format ensures that the researcher collects all the necessary information without the need for follow-up interviews to address missed questions. These interviews also make use of an interview guide to direct the conversation, but they allow for flexibility in the discussion, incorporating more conversational elements[277]. Also, semi-structured interviews maintain some structure while also enabling the researcher to probe participants for additional details when necessary[277].

4.2.2.2 Focus groups

A focus group is a qualitative method for collecting data, where the researcher moderates a discussion among multiple participants[278]. Unlike interviews, focus groups foster the exchange of ideas and experiences among participants, which can lead to richer insights through collective discussion and debate[277]. This method is particularly effective for exploring complex issues, as it encourages participants to collaboratively generate and refine ideas, enhancing problem-solving capabilities[277]. Unlike in an interview setting, the researcher takes on a less active role, acting as a facilitator rather than directly driving the conversation[277]. However, a potential challenge with focus groups is that differences in social or professional status can create barriers to open communication[277]. Participants who perceive themselves to be in a lower position, such as those with less experience or responsibility, may be hesitant to share their views. One way to address this is by creating homogeneous groups to minimize power imbalances, though this can also reduce the diversity of viewpoints within the group. In addition, while focus group useful for generating discussion and interaction among participants, might have inhibited some participants from sharing openly, particularly if they felt uncomfortable discussing difficulties in a group setting.

4.2.3 Rational for study design

A qualitative approach was chosen for this study to explore the experiences, perspectives, and challenges faced by vaccine providers in delivering vaccination clinics in care homes. Given the limited existing research in this context, qualitative research allows for a detailed exploration of complex issues that cannot be fully captured through quantitative methods[276,279,280]. It provides the opportunity to explore into the nuances of vaccine providers' decision-making processes, motivations, and the contextual barriers and enablers influencing their actions. The focus on understanding "how" and "why" decisions are made makes a qualitative approach suitable for generating insights that can inform future interventions and policies.

Semi-structured interviews were selected as the primary method of data collection for this study. This method was chosen because it allows participants to share their experiences and perspectives in detail, while still maintaining a consistent structure across interviews. The

flexibility of semi-structured interviews enables the researcher to probe deeper into areas of interest based on participants' responses, providing rich, context-specific data. This approach is particularly valuable in exploring the diverse experiences of vaccine providers, capturing both individual motivations and the barriers they face in delivering vaccination clinics.

By using semi-structured interviews, this study aims to provide a comprehensive understanding of the barriers and facilitators faced by vaccine providers in delivering influenza vaccination clinics in care homes. This method ensures that individual experiences are captured in a way that is both consistent and flexible, offering the depth of understanding necessary to inform the design and delivery of effective interventions.

4.2.4 Reflexivity

Reflexivity is a core component of qualitative research that involves the researcher's active consideration of how their own background, beliefs, and positioning may influence the research process and its outcomes[281]. It requires an ongoing critical self-awareness and transparent reflection on the researcher's role, including their interactions with participants, interpretations of data, and overall contribution to knowledge production. During conducting this study, I adopted a reflexive approach throughout the research process to ensure transparency and credibility in data collection and analysis. My professional background as a pharmacist, my involvement in the wider FluCare study, and my attendance at interviews with vaccine providers during the feasibility stage along with access to the results of these interviews—provided me with valuable contextual knowledge. However, this also introduced the potential for preconceptions to influence both data collection and interpretation.

Based on my background, I held assumptions about the challenges faced by vaccine providers, such as issues related to the timing of clinics, communication, and care home infrastructure. Being aware of these expectations helped me remain cautious not to let them shape participants' narratives. For example, I anticipated that the late timing of clinics would pose a major challenge to their delivery. I documented these beliefs in a reflexive note prior to data collection and actively worked to ensure that the themes emerged inductively from the participants' accounts rather than being influenced by my own expectations. To address the

potential impact of these preconceptions, I made a conscious effort to avoid my prior assumptions before conducting interviews. After each interview, I wrote reflexive notes to capture my impressions, emotional responses, and reflections on how each interaction might have influenced the data collection. This practice helped me stay mindful of how my own positioning might shape my interpretation of the data and also informed supervision discussions and decisions about data saturation[282]. Reflexivity was further enhanced through collaboration with the FluCare process evaluation team (LB, TK) and my supervisor (MT), who reviewed emerging codes and contributed to the broader interpretation of the data. Each of these collaborators brought different disciplinary and professional perspectives to the analysis: LB and TK had backgrounds in qualitative health research and process evaluation, while my supervisor (MT) contributed expertise in community pharmacy and the evaluation of pharmacy services within primary care. These complementary perspectives provided opportunities to challenge my assumptions, refine coding decisions, and strengthen the credibility of the interpretations.

To prepare for this qualitative research, I undertook several relevant training courses. These included sessions on qualitative methods which provided both theoretical grounding and practical skills (Appendix 10). I also completed training in behaviour change frameworks and the development and evaluation of complex healthcare interventions—topics directly relevant to the aims of this study.

4.2.5 Recruitment

In the main FluCare study, 24 vaccine providers delivered at least one vaccination clinic, while 3 were unable to do so. Between November 2022 and March 2023, a total of 48 clinics were held, 14 of which did not vaccinate any staff. Most clinics (34/48) were delivered by pharmacy-led vaccine providers[163]. The PhD candidate (FA) led the recruitment of vaccine providers for qualitative interviews to explore their experiences in delivering the FluCare intervention. By the end of the 2023 influenza season in March, the PhD candidate (FA) sent invitations to all vaccine providers (community pharmacists and GP practices staff) who had participated in delivering the vaccination clinics, including those who were unable to deliver clinics. In total, 27 vaccine providers who had been involved in FluCare-related activities were contacted. For non-respondents, a follow-up email was sent two weeks after the initial

invitation to encourage participation. To support recruitment and acknowledge their contribution, all participants were reimbursed £30 for their time.

To ensure informed consent, the PhD candidate (FA) developed the participant information sheet in collaboration with the FluCare research team (Appendix 11) and provided comprehensive details about the research project in advance. Once a provider expressed interest in participating, a consent form was sent and completed prior to the interview. The consent process was conducted online, and a signed copy of the form was returned to the participant. After consent was obtained, the PhD candidate arranged the interview via Microsoft Teams and provided further information about the study as needed.

4.2.6 Inclusion and exclusion criteria

Inclusion Criteria:

- Community pharmacy and GP practice staff (including GPs, pharmacists, nurses, or practice managers).
- Individuals directly involved in delivering or attempted to deliver in-care home influenza vaccination clinics.

Exclusion Criteria:

- Individuals, such as managers who signed the research contract with the FluCare team but did not personally deliver clinics.

4.2.7 Data collection

4.2.7.1 Topic guide

The study topic guide (Appendix 12) was developed as part of this PhD research to guide interviews and gain a deeper understanding of vaccine providers' experiences with delivering the FluCare vaccination clinics. While the guide was primarily designed to address the aims of this PhD study, focusing on barriers and enablers to clinic delivery, it also contributed to the FluCare process evaluation by supporting data collection from vaccine providers, ensuring alignment with the broader evaluation objectives. The PhD candidate (FA) developed the

topic guide with the specific aim of exploring the barriers and enablers encountered during the delivery of vaccination clinics.

To ensure the topic guide's relevance and rigour, the PhD candidate first conducted a review of the literature to identify key themes related to vaccination service delivery and associated challenges. This was followed by a series of discussions with the FluCare research team, who provided practical insights based on their experience with the randomised controlled trial and the broader research context. Further refinement of the topic guide was informed by feedback from the FluCare process evaluation team (LB and TK), to ensure its alignment with the overall aim of the FluCare process evaluation. The topic guide included questions aimed at gathering insights into participants' experiences with delivering the influenza vaccine to care home staff. Additional questions explored the intervention's acceptability, aspects that participants found enjoyable, and their preferences regarding the continuation and future delivery of the service. Participants were encouraged to share any additional points that had not been addressed by the end of the interview.

The topic guide served as a prompt for participants who had limited information to share initially and ensured that all relevant topics were covered during the interviews. The open-ended questions were designed to elicit participants' views about the intervention and its impact on their work, enabling an in-depth examination of the barriers and enablers affecting the delivery process.

For the three healthcare professionals who were unable to deliver the influenza vaccination clinics, an updated topic guide (Appendix 13) was developed to identify the barriers that prevented them from delivering the clinics.

4.2.7.2 Interviews procedure

As part of this PhD research, the PhD candidate (FA) conducted all interviews with vaccine providers to explore their experiences in delivering the FluCare intervention. A member of the FluCare process evaluation team (CS) attended the interviews as an observer to provide additional support, gather supplementary information, or offer clarification when necessary. However, the PhD candidate was responsible for leading the interviews, engaging with participants, and ensuring that all relevant topics were fully explored.

To prepare for conducting the interviews, the PhD candidate undertook a mock interview with a member of the FluCare team (TK) to refine interviewing skills and techniques. Additionally, during the feasibility stage of the FluCare study, the PhD candidate observed interviews conducted with vaccine providers, care home staff, and managers to gain familiarity with the interview process and ensure readiness before independently conducting interviews for this study.

At the start of each interview, the PhD candidate welcomed participants, thanked them for their time, and provided a brief overview of the interview's purpose. Participants were reminded that they had previously received a participant information sheet (PIS) and were encouraged to ask any questions before proceeding. The PhD candidate also reiterated that all responses would remain confidential and anonymous. They were assured that no identifiable information would be shared with their employers or included in publications. Participants were informed that the interview would be audio-recorded for transcription purposes. The interview sessions were audio recorded using digital recorders and subsequently transcribed verbatim by a professional transcriber.

4.2.8 Data analysis

The PhD candidate (FA) conducted the data analysis using thematic analysis, following the approach described by Braun and Clarke (2006)[283]. Thematic analysis was chosen for its flexibility and suitability for examining the experiences and perspectives of participants in an in-depth manner[283]. This approach allowed the PhD candidate to systematically identify patterns within the data, specifically focusing on the barriers and enablers to delivering influenza vaccination clinics. Thematic analysis was also well-suited to the exploratory nature of this study, as it did not require a predetermined framework, enabling the PhD candidate to remain close to the data and capture nuanced meanings[283]. This approach was particularly relevant for understanding the complexities involved in delivering vaccination clinics and providing a comprehensive picture of the participants' views.

Transcripts were reviewed and analysed by the PhD candidate as they became available, allowing for concurrent analysis alongside ongoing interviews. This iterative process enabled the PhD candidate to explore emerging issues in greater depth during subsequent interviews.

The computer software program NVivo 14 (QSR International) was used to support the organisation and coding of the data. The analysis was conducted in four key phases:

Phase 1. Data Familiarization: Since the PhD candidate conducted all interviews, there was already a strong familiarity with the data. To deepen this understanding, each transcript was read multiple times, with informal notes made on potential coding ideas[283].

Phase 2. Generating Codes: The PhD candidate systematically coded the data, using an inductive approach to allow codes to emerge directly from participants' responses[283]. This ensured that the analysis accurately reflected participants' lived experiences rather than being shaped by a predefined structure. To enhance the reliability of the coding, a weekly discussion meeting was held with members of the FluCare process evaluation team (LB, TK) and the PhD candidate's supervisor (MT). These meetings served as a secondary check on the coding process; a sample of transcripts and their associated codes were reviewed collaboratively to ensure consistency in interpretation and coding logic. Any discrepancies were resolved through discussion, and the coding was refined iteratively based on FluCare process evaluation team feedback.

Phase 3. Grouping into Sub-themes: Following initial coding, the PhD candidate grouped related codes into sub-themes based on shared meanings and recurring patterns. These sub-themes offered a structured understanding of the barriers and enablers influencing the delivery of vaccination clinics. To enhance the credibility and robustness of the findings, the initial categorization was shared with the FluCare research team (LB, TK) and the PhD candidate's supervisor (MT), and refined based on their feedback. This process involved reviewing the sub-themes and example excerpts to ensure alignment with participants' experiences and clarity in interpretation. Although these discussions helped refine the sub-theme labels, all sub-thematic structuring decisions remained under the leadership of the PhD candidate. The findings were also presented to the Patient and Public Involvement (PPI) group of the FluCare study for further discussion, with the group broadly supporting the results. In addition, the results of this study at this stage were shared with the FluCare process evaluation team to be triangulated with findings from care home staff and manager interviews, and subsequently included in the FluCare process evaluation findings. Given the applied focus of the study, sub-themes were considered sufficient to answer the research

questions. The decision not to generate broader overarching themes was made to maintain a practical focus and deliver detailed, specific insights rather than higher-level conceptual abstractions.

Phase 4. Mapping to TDF Domains: The final sub-themes were mapped onto the Theoretical Domains Framework (TDF), and each was categorised as either a barrier or an enabler to the delivery of vaccination clinics. The TDF domain definitions (outlined in Chapter 1) were used to guide this mapping[148]. To ensure the rigour and robustness of the process, the PhD candidate sought expert input from a behavioural scientist (SS). An initial mapping table was shared with SS in advance of a meeting to review the categorisations and mapping to TDF domains. SS emphasised the need to clarify the perspective from which each barrier or enabler was conceptualised (e.g. whether it reflected the vaccine provider's view or their interpretation of care home staff behaviour). SS also recommended refining the wording of some sub-theme to ensure clearer alignment with the TDF domains definitions. These suggestions were incorporated into a revised mapping table. Minor disagreements or alternative interpretations were resolved through discussion to reach an agreement, and the final edits to the mapping were agreed and confirmed by SS.

4.3 Results

4.3.1 Characteristics of participants

The PhD candidate approached all 27 vaccine providers which included 20 pharmacists and 7 general practice staff (GPs, nurses). Seventeen vaccine providers agreed to participate in the interviews, with each interview lasting between 10 and 40 minutes. By the end of the interviews, data saturation was achieved, as no new information was emerging and recurring themes were evident. Of the vaccine providers who could not deliver a clinic, none agreed to be interviewed.

Table 17 provides an overview of the characteristics of the 17 vaccine providers. It includes information on the participant ID, gender, number of in-care home vaccination clinics they completed, total number of care home staff vaccinated, and their professional role alongside the setting from which they delivered the clinics (e.g., GP practice or community pharmacy). The number of clinics completed ranged from 1 to 4 per vaccine provider, and the total number of care home staff vaccinated varied from 0 to 13, highlighting differences in both clinic delivery and care home staff uptake across care homes.

The vaccine providers had varying levels of experience with care home work and held different job roles: community pharmacists (n = 9), a nurse based in a pharmacy (n = 1), a paramedic based in general practice (n = 1), nurses based in general practice (n = 4), and general practitioners (n = 2). The sample included nine female and eight male participants.

Table 17: demographic characteristics of the vaccine providers.

VP ID	Gender	Clinics completed	Total Staff Vaccinated	Vaccine Providers Role (setting)
1	Female	4	13	Nurse (community pharmacy)
2	Female	2	3	General practitioner (GP practice)
3	Female	1	5	Nurse (GP practice)
4	Male	4	1	pharmacist (community pharmacy)
5	Male	2	5	pharmacist (community pharmacy)
6	Male	2	7	pharmacist (community pharmacy)
7	Female	2	7	pharmacist (community pharmacy)
8	Female	2	11	General practitioner (GP practice)
9	male	2	13	pharmacist (community pharmacy)
10	Female	2	8	pharmacist (community pharmacy)
11	Male	2	0	pharmacist (community pharmacy)
12	Female	1	4	Nurse (GP practice)
13	Male	1	2	pharmacist (community pharmacy)
14	Female	1	12	Nurse (GP practice)
15	Female	1	12	Nurse (GP practice)
16	Male	3	6	Paramedic (GP practice)
17	Male	1	5	pharmacist (community pharmacy)

Note: VP ID = Vaccine Provider Identification Number; GP = General Practice.

4.3.2 Barriers and enablers to delivering vaccination clinics in care homes

Ten domains were identified as relevant to the delivery of the influenza vaccination clinics: environmental context and resources, social influences, knowledge, social/professional role and identity, intentions, emotion, optimism, beliefs about capability, reinforcement, and skills. Table 18 provides an overview of the sub-themes associated with each TDF domain and indicates which vaccine provider was linked to each sub-theme. The sub-themes were categorized as either barriers (B) or enablers (E) of delivery. Following table 18, each sub-theme is explained in detail with supporting participant quotes to illustrate the findings within each TDF domain.

Table 18: Barriers and Enablers to the Delivery of In-Care Home Vaccination Clinics.

Theoretical domain	Barriers (B)	Enablers (E)
Environmental context and resources (Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour)	late timing of the intervention delivery *Ph, NGP, GP, NPh, PGP*	accessibility and convenient of care home location *Ph, NGP, GP*
	challenges in paperwork streamlining and administrative tasks *Ph, NGP, GP*	availability of suitable location for the vaccination clinics *Ph, NGP*
	challenges with vaccine availability and timing *Ph, NGP*	availability of vaccine stock and supplies *Ph, NGP*
	financial considerations and operational expenses *Ph*	impact of covid-19 on flu vaccine uptake *Ph, NGP*
	impact of covid fatigue on flu vaccination acceptance *Ph*	Integration of Technology in Healthcare Processes *Ph, Ph*
	IT infrastructure challenges and data management issues *Ph*	prior coordination efforts with care homes
	logistical challenges with vaccine transport and storage *Ph, NGP, GP*	planning and preparation *Ph*
	non-registered care home staff with the GP practice *NGP, GP*	
	room availability and suitability *Ph, NGP, NPh*	
	staffing shortages *Ph*	
	time constraints in clinic setup and scheduling *Ph, NGP, GP, PGP*	
	traveling distance *Ph*	
	lack of planning and preparation for the clinics *Ph, GP*	
	limited number of vaccination clinics *Ph*	

Note: pharmacists (pharmacy)^{Ph}, Nurse (GP)^{NGP}, General practitioner (GP)^{GP}, Nurse (pharmacy)^{NPh}, Paramedic (GP)^{PGP}

Table 18: Barriers and Enablers to the Delivery of In-Care Home Vaccination Clinics. (continued)

Theoretical domain	Barriers (B)	Enablers (E)
Social influence (Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours)	lack of communication and coordination with care home manager *Ph, NGP, NPh, PGP*	care home managers encouragement to get the vaccination *Ph*
		effective communication and coordination with care home managers *Ph, NGP, GP*
		influence of peer behaviour on vaccination acceptance *Ph, NGP*
		prior relationship with the care home manager and staff *Ph, NGP, GP*
		supportive managers and organizational structure *Ph*
		staff's receptivity and acceptance of flu vaccine *Ph, NGP*
Knowledge (An awareness of the existence of Something)	limited staff awareness about the vaccination clinics *Ph, NGP, NPh, PGP*	staff's awareness about the vaccination clinics *Ph, NGP, GP*
	care home staff's decisions and attitudes towards flu vaccination *Ph*	
Emotion (A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event)	dissatisfaction with vaccine uptake among care home staff *Ph, NGP, GP*	positive experience in communication and support from care home staff and managers *Ph, NGP, GP*
		satisfaction about the success of the intervention *Ph, NGP*
		positive perception of intervention and clinics *Ph, NGP, NPh, PGP*
Intention (A conscious decision to perform a behaviour or a resolve to act in a certain way)		willingness to continue and expand the clinics *Ph, NGP, GP*
Optimism (The confidence that things will happen for the best or that desired goals will be attained)		positive perspective regarding the effectiveness and benefits of vaccination clinics *Ph, NGP, GP*
		Enthusiastic about the benefits of vaccines *Ph, NGP*
Belief about capability (Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use)	impact on workload and time management *Ph, NGP, NPh*	manageable workload and self-efficacy *Ph, NGP, GP*
		confidence in their ability to efficiently set up and run the clinics *Ph, NGP, GP, NPh*

Note: pharmacists (pharmacy)^{Ph}, Nurse (GP)^{NGP}, General practitioner (GP)^{GP}, Nurse (pharmacy)^{NPh}, Paramedic (GP)^{PGP}

Table 18: Barriers and Enablers to the Delivery of In-Care Home Vaccination Clinics. (continued)

Theoretical domain	Barriers (B)	Enablers (E)
Reinforcement (Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus)		financial Incentive [Ph, NGP, PGP]
Skills (An ability or proficiency acquired through practice)		prior experience in vaccination clinics [Ph, NGP, PGP]
		advanced clinical competence in administering vaccinations [Ph]
Social professional role and identity (A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting)		alignment with healthcare goals and vision [Ph, NGP]

Note: pharmacists (pharmacy)[Ph], Nurse (GP)[NGP], General practitioner (GP)[GP], Nurse (pharmacy)[NPh], Paramedic (GP)[PGP]

4.3.2.1 Environmental context and resources

Challenges in Paperwork Streamlining and Administrative Tasks (B)

Many vaccine providers mentioned several challenges in paperwork streamlining and administrative tasks related to the delivery vaccination clinics in care homes. These challenges include burdensome paperwork requirements, frustrations with redundant paperwork, and difficulties in coordinating paperwork flow and ensuring forms are returned through appropriate channels. These challenges pose barriers to the efficient delivery of vaccination clinics in care homes and highlight the need for improvements in administrative procedures and communication channels within care home settings.

> *"paperwork was a bit onerous. And I'm sure I've been asked to fill the same paperwork in more than once, but I just did it again. So I think the paperwork could be a bit more streamlined."* 06-pharmacists (community pharmacy).

The importance of optimizing paperwork workflows for more convenient and straightforward use was stressed by many vaccine providers. Some recommendations were presented concerning the need to simplify and reduce paperwork, which could be adopted to save the completion time and effort. For example, vaccine providers mentioned the opportunities to combine the number of documents, minimize the need to print them, and ensure easier access to paperwork in digital formats.

> *"the other being serious is the – make the paperwork easier. We shouldn't have to – yes, I did have to get signatures, so we do have to print things out, but the less that is printed out the better for all of us, we don't want paper."* 06-pharmacists (community pharmacy).

Challenges with Vaccine Availability and Timing (B)

Some vaccine providers highlight challenges related to vaccine availability and timing, which are considered barriers to the delivery of vaccination clinics. These challenges include difficulties in coordinating vaccine obtaining, particularly towards the end of the influenza season. Pharmacists mention struggles with obtaining sufficient vaccine quantities early in the season, and towards the end of the season, leading to potential issues with meeting demand and ensuring adequate vaccine preparedness.

"This was the second time you'd asked us to do it. the first time, we hadn't been able to organise it because we didn't have the stock flu." 15-Nurse (GP practice).

The vaccine providers emphasized the importance of efficient stock management to ensure adequate vaccine availability throughout the season, particularly at the beginning when stock issues are more common. Proactive planning and ordering were noted as effective strategies to prevent shortages and minimize disruptions to clinic operations. Additionally, the providers acknowledged the need for coordination efforts, especially later in the season when obtaining influenza vaccines becomes more challenging.

"Like I said, later in the season it is harder to get flu vaccines so it is a little bit more difficult to have enough prepared. But, yes that was the only bit, a little bit of co-ordination that was needed." 11-pharmacists (community pharmacy).

Financial Considerations and Operational Expenses (B)

Some pharmacists highlight challenges related to financial expenses as barriers to delivering vaccination clinics in care homes. Private investors in care homes may prioritize minimizing costs, potentially leading to reluctance in allocating funds for vaccination programs. Pharmacists may face difficulties in obtaining necessary resources due to financial constraints imposed by investors.

"You know, they think everything should be for free because they're running on private sort of equity investors that don't want to pay any money, so inevitably their job is to try and find as much as they can for very little money" 05-pharmacists (community pharmacy).

Additionally, there are added costs associated with providing vaccination services in care homes, as pharmacists may need to arrange for additional coverage to accommodate their absence.

"if it's to continue next year I'd have to review how we manage that, in effect it would mean I would need to get a pharmacist to cover my shift so that I can do it at the care home. Interviewer: Understandable.
Respondent: So there's an added cost to it" 09-pharmacists (community pharmacy).

These financial challenges underscore the importance of adequate resources and budget allocation within care home environments to support the successful delivery of vaccination clinics. The vaccine providers suggested that resolving payment issues promptly could alleviate this barrier and facilitate smoother delivery of vaccination clinics.

> *"What I've just said, purely – I mean two things, one is tongue in cheek, which is pay quicker"* 06-pharmacists (community pharmacy).

Impact of COVID-19 on* influenza *Vaccination Acceptance (B)

The vaccine providers highlight barriers related to COVID fatigue impacting influenza vaccination acceptance in care homes. Some home staff express reluctance to receive the influenza vaccine due to having already received multiple COVID-19 vaccinations, leading to confusion and resistance.

> *"I think some of it comes down to COVID fatigue, "I've already had three jabs, I'm not having another one," that was a common theme. I had to explain, "It's nothing to do with COVID this vaccine." They were just like, "Look, I've been stabbed enough, thank you very much."* 04-pharmacists (community pharmacy).

Conversely, COVID-19 impacted on influenza vaccine uptake and serving as an enabler to engaging with vaccination clinics in care homes. Many vaccine providers suggest that the COVID-19 pandemic has led to increased acceptance and uptake of influenza vaccinations among home staff, with people becoming more aware of the importance of vaccinations. Additionally, there is a recognition of the role of influenza vaccinations in protecting both oneself and vulnerable individuals, such as elderly and those being cared for.

> *"I think people have got a little bit more just generally accepting of vaccinations, definitely. I think the impact of the COVID pandemic has made people perhaps just take into account the frailty of life a little bit as well"* 012-Nurse (GP practice).

IT Infrastructure Challenges and Data Management Issues (B)

Two vaccine providers reported difficulties related to IT include GP surgeries not receiving vaccination notifications due to email address issues, delaying timely information transfer.

Moreover, IT difficulties like internet connectivity and incomplete data transfer via phone. These issues hindered access to patient details and medical records, impacting the delivery efficiency of vaccination clinics.

> *"So challenges, there basically are many IT issues, so with things from like maybe no internet connectivity, sometimes the phone didn't copy everything now."* 07-pharmacists (community pharmacy).

One vaccine provider suggested transitioning data collection sheets into online web forms to streamline the process and facilitate submission. This shift towards online forms would make data collection more efficient, reduce the need for manual entry, and enable easier access to information through mobile devices or computers.

> *"I would probably change some of the data collection sheets but I would just make them more into an online kind of web form that we could sort of submit."* 04-pharmacists (community pharmacy).

Late Timing of the Intervention Delivery (B)

The delayed initiation of the intervention is viewed as a barrier to successful vaccination clinics and most vaccine providers express concerns that the clinics were conducted too late in the influenza season, impacting the effectiveness and uptake of vaccinations. Issues include clinics being scheduled towards the end of the season, leading to fewer opportunities for vaccination and reduced interest among care home staff.

> *"unfortunately for us it was quite late in the season, so we kind of got the go ahead towards the end of February, beginning of March, which is almost regarded as end of season."* 09-pharmacists (community pharmacy).

Most of the vaccine providers emphasized the importance of earlier involvement and initiation of the vaccination provision to maximize effectiveness and uptake. Suggestions included starting the clinics at the beginning of the influenza season, ideally in September or October, to ensure timely protection for staff and residents. By initiating the program earlier, vaccine providers believed they could overcome issues related to low uptake and missed opportunities for vaccination.

"think if we started earlier, generally the flu season starts in September/October, that would be the ideal time to get those staff vaccinated" 011-pharmacists (community pharmacy).

Logistical Challenges with Vaccine Transport and Storage (B)

Some vaccine providers reported some logistical issues related to vaccine transport and storage for vaccination clinics in care homes. The vaccine providers mention difficulties in coordinating vaccine delivery while maintaining the cold chain, ensuring vaccines remain at the correct temperature during transportation, and adhering to time constraints for vaccine storage outside of refrigeration. Additionally, concerns are raised about the complexities of transporting vaccines between pharmacies and care homes, including the need for efficient transportation processes and adherence to storage guidelines.

"What was difficult was, you know, coordinating getting the vaccine, keeping the cold chain, you know, all of that sort of stuff." 05-pharmacists (community pharmacy).

Some recommendations focused on ensuring that care homes have adequate facilities for storing vaccines during clinics. They emphasized the importance of considering the logistics of vaccine transport and storage, particularly for longer clinics.

"Interviewer: Yes, and you didn't have access to a fridge in the space that was set up in the care home for you?

Respondent: To be fair, it maybe was my fault, I didn't ask in the care home at that time, I should have asked. It was not a problem, I think I was still within time, but I just thought like this is something to consider as well when you're doing that. And maybe the care home need to be – I'm not too sure whether they have facilities if you're doing a long clinic to store them." 08- General practitioner (GP practice).

Non-Registered Care Home Staff with the GP Practice (B)

Vaccine providers from general practice discussed an issue in the process of vaccinating care home staff who are not registered patients with the practice. This necessitates temporary registration for vaccination, resulting in additional administrative burden and time-consuming procedures for both the vaccine providers and the care home staff.

"So the only problem we had is, because obviously a lot of the care staff don't live in this area, so they're not registered with this practice. So we had to put them on as temporary patients to actually then vaccinate them." 02-Nurse (GP practice).

Room Availability and Suitability (B)

The delivery of and engagement with vaccination clinics in care homes faced many challenges primarily related to the availability and suitability of rooms. These challenges included limited clinical space, with vaccinations often being conducted in areas like sitting rooms or dining rooms rather than dedicated clinical rooms. Such arrangements led to disruptions caused by shared spaces and reduce the quality of the clinical environment. Concerns about privacy and dignity were also raised, particularly for women staff. Logistical issues, such as conducting vaccinations in shared spaces, further complicated the process and hindered the smooth operation of clinics.

"The negative was I think people felt a bit awkward, so they were a bit worried taking out their arm, especially with the women sometimes they had to pull up their top a bit, and it was a bit awkward. So I kind of waited until no one was around, and then quickly did it" 10-pharmacists (community pharmacy).

Staffing Shortages (B)

Some vaccine providers expressed concerns about the allocation of their time and resources towards conducting influenza clinics. Limited availability of clinical staff due to their primary responsibilities within the NHS or pharmacy settings hindered the provision of influenza vaccinations in care homes. The need for staff coverage during clinic hours and the requirement for additional staff to cover their shifts highlighted the pressure on resources and staffing capacities.

"So obviously for us we had to actually sort of backfill the, you know, the whole thing really. So from our perspective, obviously I run a pharmacy and I'm accountable for a pharmacy day-to-day, so therefore when I was doing the clinic, then I had to be covered." 05-pharmacists (community pharmacy).

Time Constraints in Clinic Setup and Scheduling (B)

Vaccine providers identified time constraints as a significant barrier to the successful delivery of vaccination clinics in care homes. They stated that the limited availability of time and busy schedules posed challenges in scheduling and setting up clinics. In addition, finding time for residents' clinic reviews during other responsibilities proved to be a struggle. The vaccine providers emphasized the importance of advance planning and scheduling of appointments to address staffing shortages, highlighting how significantly time constraints affected the delivery of the clinics.

> *"I think number one would be time, to find the time to do it"* 08-General practitioner (GP practice).

Limited Number of Vaccination Clinics (B)

The vaccine providers suggest offering multiple opportunities for vaccination and discussion to increase participation and engagement among care home staff. The recommendation involved initiating the program with an effective first visit scheduled for August or early September. During this initial visit, providers would inform staff about the upcoming influenza vaccination clinics, including the dates of subsequent clinics, the benefits of vaccination, and potential risks. This approach would allow staff time to consider their decision. Subsequent sessions would involve actual vaccination, followed by additional follow-up sessions to accommodate staff who require more time to decide. By offering multiple opportunities for vaccination and discussion, vaccine providers aim to increase participation and engagement among care home staff.

> *"there will be people that are ready to take it away, have it straight away, but then there will be people that want to have a think about it. Then, you have the next session where you actually come in and just do vaccinations, and then you do a couple more follow-ups where you say, "We have got more clinics or we can have a couple more open sessions where we can discuss those with you." So, I think that would be the most effective way to get more people on board."* 011-pharmacists (community pharmacy).

"So that's the only thing that I would say is maybe if I had assigned days, and if there was more assigned days so that we could have more of a potential of people to come in." 10-pharmacists (community pharmacy).

Traveling Distance (B)

One vaccine provider highlighted that the time spent traveling posed a challenge. This suggests that the geographical distance between the healthcare provider's location and the care home contributed to the difficulty of delivering vaccination clinics.

"it took two hours out of the day, that was the only – that was the only issue." 10-pharmacists (community pharmacy).

Lack of planning and preparation for the clinics (B)

The vaccine providers expresses difficulty in managing the vaccination process efficiently due to uncertainty about the number of staff interested in receiving the vaccine. This uncertainty creates logistical challenges, particularly in handling and transporting vaccines, which could lead to wastage if not managed properly. They emphasized that arriving at the care home without this information can cause inefficiencies and potential resource wastage.

"As I said, we don't always know when we go into the care home how many are needed. So it is – you could go in with 15–20 and that not be enough, or sometimes you could go in and nobody wanted it but you have arranged for 15–20 vaccines. So, having an idea before going into the care home how many people exactly want the vaccine would be useful forward preparation." 011-pharmacists (community pharmacy).

Accessibility and convenient of care home location (E)

Some vaccine providers reported that the care homes were located near their respective facilities, making the driving distance short. This proximity facilitates easier transportation of vaccine providers and resources to the care homes, reducing logistical challenges associated with long travel times. Being close to the care homes minimizes the time and resources spent on travel, which generally facilitate the delivery of the clinics.

"It wasn't too bad, it's about five miles from the pharmacy, so it's pretty local for me." 09-pharmacists (community pharmacy).

Availability of suitable location for the vaccination clinics (E)

The importance of having appropriate spaces within care homes for vaccination clinics is frequently emphasized by many vaccine providers. Suitable locations are vital in ensuring the efficient organization of clinics and encouraging engagement with the clinics. Thus, the availability of suitable spaces is an important resource that supports the successful delivery and engagement with vaccination clinics.

"Yes, it wasn't a clinical area, but I had enough space to lay out my drugs, which I'd got in a cool bag, so I had space to work in, and people had space to come in and sit down. So it was a dedicated area for the clinic" 014-Nurse (GP practice).

Availability of vaccine stock and supplies (E)

The availability of vaccine stock and supplies is important for the successful delivery of vaccination clinics in care homes. Many vaccine providers mentioned that having a reliable and sufficient supply of vaccines ensures that clinics can be conducted without interruption. Thus, the availability of vaccine stock and supplies is essential for facilitating successful vaccination clinics in care homes.

"The vaccine stock, we have within our care hub anyway. Because we were routinely providing them to care homes with the COVID vaccination we actually did have enough stock anyway" 012-Nurse (GP).

Integration of Technology in Healthcare Processes (E)

The integration of technology in healthcare processes optimizes resource utilization and enhances workflow efficiency. With the help of electronic devices and software modules, vaccine providers can streamline data management, reduce paperwork, and ensure accurate record-keeping during vaccination clinics. Therefore, the integration of technology emerges as a valuable resource in facilitating the successful delivery of vaccination clinics in care homes.

"*No because I was using our pharm outcomes module, so I just – outcomes for health, so I just did it – I took my laptop and recorded – I always record as I go along, I'm not into writing it down and then redoing it after because it's a waste of time."* 06-pharmacists (community pharmacy).

Prior coordination efforts with care homes (E)

The FluCare coordination between the vaccine providers and care homes promotes collaboration between vaccine providers and care homes. This coordination established a clear communication channels and assigning specific tasks. Therefore, prior coordination efforts are beneficial for facilitating the successful delivery of vaccination clinics.

"I quite liked the, obviously that you were paired. I liked that, you know, I was given a task rather than, you know, just go and try and touch base with any random care homes" 05-pharmacists (community pharmacy).

Planning and preparation (E)

Some vaccine providers emphasized the importance of planning and preparation for conducting vaccination clinics in care homes. They highlight the need for adequate resources, such as vaccination kits and trained personnel, as well as proper organization and coordination of logistics. The vaccine providers express that with the right resources and advance notice of clinic dates, they can efficiently organize and conduct the clinics. This demonstrates how the prior planning and preparation contribute to the successful delivery of vaccination clinics in care homes.

"I mean I think knowing the clinic and the dates and setting up the right time, it has been fine. I mean we have a lot of workload in the pharmacy and the company anyway, but knowing that we were – if we know the dates well in advance we can work around it, and just finding the right people to do it, it is fine. So yes, it is fine as long as there is enough notice given." 011-pharmacists (community pharmacy).

4.3.2.2 Social influence

Lack of Communication and Coordination with Care Home Manager (B)

Effective communication and coordination with care home managers are crucial for the successful delivery of vaccination clinics. Some vaccine providers express frustration with disinterest care home managers, who are not responsive or engaged in facilitating clinic arrangements. Difficulties in contacting managers and aligning schedules cause delays in setting up clinics. Moreover, resistance to additional clinic days and unclear communication from care home managers worsen the situation, leading to confusion and inefficiencies in vaccination clinic planning.

> *"So it took me a little while to set them up. The Care Home Manager didn't seem to be very engaged and said, you know, it wasn't one of the priorities, like the things of it?"* 01-Nurse (community pharmacy)
>
> *"But there were people that I could still maybe convince to have a flu vaccination, but she didn't – the care home manager didn't think so, so that's why she asked that I – she said that she didn't think that there was a point of me coming anymore."* 10-pharmacists (community pharmacy).

Vaccine providers suggested building relationships with care home managers from the beginning to facilitate smoother planning and increase attendance at the clinics. Providing advance advice and information to care homes about what to expect before the vaccine providers arrives was recommended to ensure better preparation and planning on the part of the care home staff. Additionally, establishing clear communication channels to inform care home staff about the vaccine providers availability and schedules of visits of can help ensure readiness among care home staff.

> *"I mean I would just give a bit more advice to the care homes before we come so they know what to expect and then it will probably run smoother. Because they don't know, they didn't know what they were expecting or what they were – you know, to plan it I think. They didn't, they just didn't do it. You know, if they'd known what it was going to entail before I got there, they could have told more staff about it, got more staff to come in, rather than just doing the few that were on shift."* 01-Nurse (community pharmacy)

Care home managers encouragement to get the vaccination (E)

Some vaccine providers highlighted the influence of care home managers in encouraging vaccination uptake among care home staff. Care home managers who effectively communicated the importance of vaccination and personally engaged with staff played a significant role in facilitating the vaccination process. Their involvement and persuasion techniques, such as personal connections and emphasizing the importance of vaccination for resident safety, positively influenced staff members' decision to get the vaccine. This demonstrates the impact of social influence in promoting engagement with the vaccination clinics.

> *"it's because the manager was saying it's for the care home, we want to make sure that all, everyone is vaccinated because of all the residents. So it was a little – it was more that than them thinking about themselves to be honest. I think she was very convincing, yes."* 10-pharmacists (community pharmacy).

Effective Communication and Coordination with Care Home Managers (E)

Care home managers who maintained open lines of communication, responded promptly to inquiries, and facilitated smooth arrangements for the vaccination clinics played an important role in ensuring their successful delivery. Their proactive approach and receptiveness to the intervention positively influenced staff engagement and supported the effective delivery of the clinics.

> *"The communication was really good because I spoke to the manager and the nurse, the lead nurse, in charge, so I was able just to give them timeframes of when I was available and we slotted in quite well there."* 02-Nurse (GP practice).

Influence of Peer Behavior on Vaccination Acceptance (E)

Some vaccine providers mention that observing colleagues or peers receiving the vaccination can positively impact the willingness of others to get vaccinated. The concept of "herd mentality" is mentioned, suggesting that individuals may be more willing to accept vaccination when they see others doing so without experiencing negative consequences. This

peer influence enhances staff engagement with vaccination clinics and ultimately supports the successful delivery of the intervention.

> *"What was good, the young girl who didn't want the flu at all, came with a colleague who said watch me have it and you'll see, and having seen her friend have it, she went OK if that's all it is, and then her friend stood on the other side of her talking, and I just said to her, right let me just see where about I'm going to do that, and while I was saying that I'd done it."* 06-pharmacists (community pharmacy).

Prior Relationship with the Care Home Manager and Staff (E)

The familiarity and established relationship between vaccine providers and care home manager and staff positively influence a smooth delivery of vaccination clinics. In these instances, the existing relationship between vaccine providers and care home staff facilitates coordination and communication, ultimately enhancing the engagement with the clinics and supporting the delivery of clinics.

> ***"****Possibly, especially with it being a dementia care home because the residents have seen me before and obviously the staff are used to me as well, so it was a – it really was go in, set-up, we'll leave you to it, because they know – I don't know whether they would have done with somebody they didn't know, so I don't know, yeah."* 02-Nurse (GP).

Supportive Managers and Organizational Structure (E)

Some pharmacists mention that their managers' support and the organizational structure of the company contribute to the successful delivery of vaccination clinics. This support ensures that pharmacists have the necessary resources, time, and assistance to run vaccination clinics effectively and safely. The positive influence of supportive managers and organizational structures promotes a helpful environment for vaccine providers to engage in community service activities, such as providing vaccination services in care homes.

> *"In my case from the company, to having always them to help us out when we have these opportunities to provide the service for the community."* 07-pharmacists (community pharmacy).

Staff's Receptivity and Acceptance of* influenza *Vaccine (E)

The staff members are described by some vaccine providers as eager, willing, and motivated to have the vaccination. They are shown as having a generally positive attitude towards the vaccination efforts conducted in care homes. The vaccine providers also mention specific instances where care home staff were enthusiastic about the vaccination clinics and appreciated the opportunity to receive the influenza vaccine. These expressions of receptivity and acceptance from staff indicate a positive social influence within care homes, where peers may encourage each other to participate in vaccination clinics, contributing to motivating the vaccine providers to deliver vaccination clinics.

"I think that the staff generally were quite receptive when I was there, which was good" 05-pharmacists (community pharmacy).

4.3.2.3 Knowledge

Limited Staff Awareness About the Vaccination Clinics (B)

Many vaccine providers encountered a common barrier to engagement with vaccination clinics in care homes which is a lack of awareness about the vaccination clinics. This lack of awareness results from inadequate communication and coordination efforts between care home managers and staff. Care home managers often fail to inform their staff about the clinics, resulting in confusion and missed opportunities for vaccination. Some staff members were unaware of the nature of the clinic, mistaking it for a COVID vaccination clinic due to the timing of the year. This lack of knowledge among care home staff challenges engagement with the vaccination clinics.

> *"the only staff that came to it were the staff that were on shift when I was there, nobody else extra came in. If they were there, they got it done, if they weren't, they didn't. They didn't really tell anybody about it, so nobody knew about it."* 01-Nurse (community pharmacy)

To overcome this barrier effectively, the vaccine providers proposed promoting the clinics through various channels like leaflets and posters, ensuring staff are informed before the

visits. Advanced communication methods such as notifications, emails, or face-to-face meetings were recommended to provide details about the clinics and vaccination benefits. Additionally, a personal approach involving educational sessions and discussions was suggested to encourage staff and address concerns.

> *"I think we could do a bit more promoting on just having an open discussion before even starting the actual flu jab sessions, so that they could discuss and have a think about it and discuss any queries and concerns and then maybe even give them a few weeks to decide, "Right this is the date and this one works for me.""* 011-pharmacists (community pharmacy).

Staff's awareness about the vaccination clinics (E)

Some vaccine providers highlighted the importance of effective communication and staff awareness in facilitating the delivery of vaccination clinics in care homes. Various strategies were employed by care home manger to ensure that care home staff were well-informed about the clinics, including sending messages through Facebook, briefing staff appropriately, and notifying them in advance of the vaccine providers visit. This proactive approach ensured that staff members were prepared and ready to participate. Dissemination knowledge among care home staff positively contributes to the engagement with vaccination clinics.

> *"They did an excellent way of communicating it to the staff because they sent it through, I think it was on Facebook, to all their staff members to say when I was actually going."* 02-Nurse (GP practice).

> *"Well, it was easy for me, and I've got to say, a) primarily because of the manager of the home who had briefed her staff appropriately, the welcome and warmness I was greeted, the willingness to partake by staff"* 06-pharmacists (community pharmacy).

4.3.2.4 Emotion

Dissatisfaction with Vaccine Uptake among Care Home Staff (B)

Many vaccine providers expressing disappointment and frustration at the low turnout for the vaccination clinics. They express a desire for more staff to participate in the vaccination clinics and get vaccinated but note that turnout was lower than expected. These expressions of

dissatisfaction reflect negative emotions, which may hinder the delivery of any future vaccination clinics in care homes.

> *"it was a shame that I couldn't get more people to do vaccinations, I didn't get as many as I would have hoped for unfortunately."* 10-pharmacists (community pharmacy).

Positive experience in Communication and Support from Care Home Staff and Managers (E)

Many vaccine providers expressed satisfaction with the effective communication channels between themselves and care home managers and staff. They highlighted the proactive approach, receptivity, and eagerness of care home staff to cooperate with the vaccine providers, contributing to positive feelings overall. These positive interactions indicate feelings of satisfaction, support, and positivity among the vaccine providers, which, in turn, create a favourable environment for the vaccination efforts.

> *"Very positive, they have a really positive attitude to the services, the care home manager was very interested"* 07-pharmacists (community pharmacy).

Satisfaction and Positive Perception of Intervention and Clinics (E)

Most of the vaccine providers reflect a high level of satisfaction and positive perception regarding the intervention and vaccination clinics in care homes. The vaccine providers express satisfaction with various aspects of the intervention, such as the ease of communication, smooth operation of clinics, positive feedback from care home staff, and overall effectiveness of the intervention.

Vaccine providers' positive feelings are apparent in statements where they view the FluCare as a valuable research effort, perceive the process as easy and well-accepted, express readiness to continue their involvement in the intervention, and emphasize the advantages of offering vaccination services directly to care home staff.

> *"I was going to say, I don't actually work in a care home so … if the programme was to continue, absolutely. I think it is a very positive programme completely."* 012-Nurse (GP practice).

"Pretty satisfied – I was surprised in the first place of anybody wanting vaccination at that time of the season, so I was quite surprised, and yes." 09-pharmacists (community pharmacy).

Satisfaction about the success of the Intervention (E)

The vaccine providers express varying degrees of satisfaction, ranging from being generally satisfied with the outcome to feeling happy and acknowledging job satisfaction. They express a positive emotional response towards the clinics, indicating that they perceive the intervention as effective. The satisfaction expressed by the vaccine providers reflects a positive emotional state associated with the delivery of the vaccination clinics. This positive emotion may serve as an enabler, motivating continued engagement and participation in similar interventions in the future.

"there is a job satisfaction thing, and I think you can probably see that in me, I've spent my whole life doing that." 06-pharmacists (community pharmacy).

4.3.2.5 Intention

Willingness to Continue and Expand the Clinics (E)

Many vaccine providers express a clear willingness and intention to continue and expand the vaccination clinics in care homes. The vaccine providers indicate their readiness to participate in future programs and their support for expanding the initiative to reach more care homes. The intention demonstrated by the vaccine providers to continue the clinics will facilitate the uptake and expansion of the vaccination clinics in care homes.

"*I said to her, "In the future, you don't have to worry about getting your GP to come out and only do the residents, I'll come and do residents and staff.""* 04-pharmacists (community pharmacy).

4.3.2.6 Optimism

Positive Perspective Regarding the Effectiveness and Benefits of Vaccination Clinics (E)

Most of the vaccine providers view the vaccination clinics positively, recognizing its potential to protect vulnerable residents and contribute to community health outcomes. Also, the vaccine providers express optimism about the impact of the clinics, emphasizing the proactive approach to healthcare and the potential to reach staff who may not otherwise have access to vaccinations.

> *"From my point of view, the thing that really went well is that we vaccinated those people that we probably wouldn't have got vaccinated otherwise, and that in turn protects the general public, and the members of staff themselves, and their families, but most importantly, it's an added layer of protection for the residents in the home."* 014-Nurse (GP).

Enthusiastic about the benefits of vaccines (E)

Many vaccine providers express optimism about vaccination, highlighting its benefits such as disease protection and public health promotion. Their optimistic outlook boosts confidence in vaccines' effectiveness and motivation for intervention uptake. This attitude encourages active involvement in vaccination interventions.

> *"Yeah, I think everybody should have it. I think obviously it's, you know, I'm quite big on being proactive rather than reactive, so I think proactively making sure that everybody has them is important"* 05-pharmacists (community pharmacy).

4.3.2.7 Belief about capability

Impact on Workload and Time Management (B)

Some vaccine providers were concerned about the impact of vaccination clinics on workload and time management. The vaccine providers expressed that delivering multiple vaccinations, especially during busy periods, increases their workload. They mention challenges such as the time required for preparation and managing clinical time effectively. Additionally, some express doubts about their capability to handle the additional workload efficiently, particularly in terms of setting up clinics and managing staff participation. The perceived

burden on workload and time management could acts as a barrier to effective delivery of vaccination clinics in care homes.

> *"Again, it didn't impact a lot because we were at the end of the flu season so we had done most of our flu vaccines here already. If we had done it earlier on, it probably would have impacted more because I would have been busier at work with the flu jabs"* 01-Nurse (community pharmacy)

Manageable Workload and Self-Efficacy (E)

Conversely, some vaccine providers described a manageable workload and confidence in delivering vaccination clinics within care homes. They reported that the clinics integrated smoothly into their existing routines and did not significantly interfere with their other duties. Moreover, they expressed confidence in their ability to coordinate practical tasks such as scheduling, rescheduling, and handling associated paperwork. This sense of self-efficacy and control over the logistics supported the successful delivery of vaccination clinics in care homes.

> *"To be honest it didn't really interfere with any of my workload because I tend to be in and out of the care home anyway, so we just put extra clinics on."* 02-Nurse (GP practice).

Confidence in Ability to Efficiently Set up and Run the Clinics (E)

Some vaccine providers express that the administrative aspects and operational procedures of the clinics were managed smoothly without encountering significant difficulties. They also emphasized the ease and simplicity of organizing and delivering the clinics, indicating that they found the process manageable and straightforward. Some vaccine providers mention that they would be willing to continue or expand the clinics if given the opportunity, reflecting their belief in their capability to handle such tasks effectively. The confidence of the vaccine providers in their ability to efficiently set up and run vaccination clinics served as an enabling factor for their successful delivery and sustained engagement in care home settings.

"I don't think there was much that would have made it easier, you know, I didn't find it particularly difficult, it was just the prep work." 05-pharmacists (community pharmacy).

4.3.2.8 Reinforcement

Financial Incentive (E)

Many vaccine providers discussed the importance of financial incentives as a facilitator for the delivery of vaccination clinics in care homes. The vaccine providers acknowledge the financial benefits associated with participating in the clinics, such as reimbursement for time and expenses. They express that financial incentives make the clinics financially viable and motivate them to participate. Additionally, some pharmacists mention that the financial aspect is crucial from a business perspective, ensuring that expenses are covered and potentially generating income for the pharmacy. vaccine providers' responses indicate that financial incentives serve as a reinforcement mechanism, encouraging participation and ensuring the sustainability of vaccination clinics in care homes.

" so if going forward if there is reimbursement for our costs as pharmacists plus the additional you can claim through the NHS, I'd be more than willing to do that knowing that my cost has been covered." 09-pharmacists (community pharmacy).

4.3.2.9 Skills

Prior Experience in vaccination Clinics (E)

The interviews underscore the significance of the vaccine providers' prior experience in vaccination clinics as an important factor enabling the delivery of vaccination clinics in care homes. The vaccine providers highlighted their familiarity with the process, referencing past experiences in delivering vaccines to various settings such as care homes, factories, and private businesses. They expressed confidence in their abilities to organize the clinics effectively, citing readiness in terms of having the practical knowledge. Additionally, some vaccine providers mentioned their routine involvement in vaccination programs, indicating a consistent practice that has equipped them with the skills required for vaccination clinics. The skills acquired through prior experience, facilitating the delivery of vaccination clinics in care homes.

"I mean, like I said, because it's something we've done in the past and obviously during the pandemic I was also delivering vaccines to sort of carers like during COVID and this sort of stuff. So I've had a lot of experience in that area. I think some pharmacies and some GP surgeries might struggle but I had all the kit and I had a vaccine porter, you know, so for us it was just about just organising the visit and that kind of thing." 04-pharmacists (community pharmacy).

Advanced Clinical Competence in Administering Vaccinations (E)

A pharmacist demonstrates extensive experience and expertise gained over many years of administering influenza vaccine. The pharmacist describes challenging situations, including dealing with needle phobias and administering vaccinations to difficult cases, such as children and adults with severe anxieties. A high level of proficiency and confidence in administering vaccines, considered as an enabling factor for their participation in vaccination clinics in care homes.

"I've just spent two years running a clinic, I have done the hardest to deal with children, adults, horrendous needle phobic, I've had 100s faint on me. I went into one home for protected children, and the lady who ran it said, "You won't be able to do those three boys, the doctor can't do it, the hospital can't do it," 10 minutes later they were done." 06-pharmacists (community pharmacy).

4.3.2.10 Social professional role and Identity

Alignment with Healthcare Goals and Vision (E)

Many vaccine providers express a sense of duty and responsibility towards vaccinating as many people as possible, emphasizing the importance of their role in promoting public health. They view vaccination as an integral part of their professional practice. They perceive their involvement in vaccination clinics as a natural extension of their professional roles and responsibilities, reinforcing their sense of identity as healthcare providers dedicated to promoting wellness and disease prevention. Uptake of vaccination clinics was facilitated by the perception that an intervention was consistent with vaccine providers' social/professional role or identity.

"*Oh it fits very well, it's a perfect fit, we do nursing home and residential home patients, we do an awful lot of people in the pharmacy, so it's an absolutely natural fit.*

Interviewer: Yes, I understand that.

Respondent: Call it a natural extension." 06-pharmacists (community pharmacy).

4.4 Discussion

This research aimed to explore and report the barriers and enablers perceived by vaccine providers in delivering vaccination clinics in care homes, with a focus on gaining a theoretical understanding of these factors. In the present study, several key barriers to delivering vaccination clinics have been identified. These barriers include difficulties associated with delivering the influenza vaccine late in the influenza season, time constraints within clinical settings and scheduling, challenges in accessing vaccine supplies, complications with intervention paperwork, a shortage of staff, finding suitable locations for conducting vaccinations, and staff attitudes toward the influenza vaccine (Environmental context and resources). Additional barriers include a lack of coordination and communication with care home managers (Social influence), insufficient awareness about the vaccination clinics among care home staff (Knowledge), and dissatisfaction regarding the number of staff who have been vaccinated (Emotion).

The main factors enabling the delivery of the vaccination clinics include the perception among vaccine providers that it aligns with their existing practice (Social/professional role and identity). They also express confidence in their previous experience in vaccine clinics (Skills) and belief in their ability to run the clinics (Belief about capability). Vaccine providers show enthusiasm about the benefits of the vaccination clinics (Optimism) and express satisfaction with the intervention (Emotion), with many indicating a willingness to continue the service in the future (Intention). Furthermore, active involvement and encouragement from care home managers were important enablers (Social influence).

Vaccine providers perceive that providing vaccines for staff in care homes is integrated with their regular work activities. Since 2020, community pharmacists have been authorized to vaccinate care home staff[101], making vaccination clinics within care homes a significant advantage compared to external locations. This approach makes accessing the influenza vaccine more convenient for staff.

The late timing of clinics delivery was perceived as an important barrier to engagement and successful delivery, which was categorized within the "Environmental context and resource" domain since time is considered a resource. This barrier arose because some vaccine providers were recruited by FluCare by the end of November or December. Late timing results

in difficulties in ensuring vaccine supply, contacting care homes to arrange schedules for delivering vaccination clinics. In addition, the late timing of the intervention resulted in time constraints and gave the vaccine providers only a short period to prepare for the clinics, which may result in an increased workload. Consistent with the literature, a 2019 systematic review exploring barriers and enablers to implementation of community pharmacy innovations found that the lack of time and workload constraints was the most reported barrier[284]. The vaccine providers in this study consistently recommended delivering the vaccine earlier to achieve greater uptake among care home staff. Unlike vaccine providers from general practice, pharmacists reported that the lack of available staff made it challenging for pharmacies to deliver the clinics which is also consistent with finding from the 2019 systematic review.

A notable distinction between GP staff and pharmacy staff is that GP staff were unsure how to deal with care home staff who are not registered with the surgery. Another contrast between GP staff and pharmacy staff is that pharmacy staff emphasized the importance of reimbursement to encourage them to deliver the influenza vaccine. While financial incentives are also relevant for general practices, this emphasis was particularly pronounced among pharmacy staff due to their need to remain profitable. Especially for independent pharmacies with their limited financial resources, it may be more challenging to offer this service without a clear financial incentive. This study supports previous findings that show that financial incentives to be an enabler of implementation of community pharmacy interventions[285].

In the present study, vaccine providers reported that engagement and awareness among care home staff about the clinics were key drivers of successful delivery of vaccination clinics. Additionally, when care home staff's attitude toward the influenza vaccine or decisions had the potential to adversely affect their health and wellbeing, they sometimes avoided getting the influenza vaccine. These findings are congruent with a systematic review in 2022 reported that care home staff engagement with the intervention is a key driver to successful implementation while the negative attitudes towards the intervention spread skepticism about its value within the care homes[270].

In the FluCare project, the care homes received multi-component intervention including an educational material (videos, posters, and leaflets). It could be argued that some care home

staff not adequately exposed to the education materials before delivering the influenza vaccine which led to lack of awareness about the clinics[167].

The role of leadership and management culture within care homes in facilitating the successful delivery of clinics was critical. One key challenge highlighted by vaccine providers is poor communication with care home managers or their lack of active involvement, which often acts as a barrier to successful delivery of vaccination clinics. Conversely, consistent leadership from care home managers is identified as a facilitator for the successful delivery of the clinics. These findings are consistent with previous research which highlight the importance of care home manager involvement and support in the success of intervention and integration work between care homes and health care services[270,273,286]. In addition, vaccine providers indicate that care home managers significantly influence the uptake of the influenza vaccine which aligns with the systematic review in Chapter 2, which associated encouragement from care home managers with an increased likelihood of staff receiving the influenza vaccine.

In the current study, vaccine providers were able to deliver the vaccination clinics successfully due to their high levels of skills and confidence in their abilities. Their capabilities and skills also affected how effectively they could collaborate. Healthcare staff who can work together across different organizations and professional boundaries were considered crucial for the success of partnerships between local healthcare organizations and care homes[266].

Enthusiasm about the benefits of vaccines for care home staff and residents helps facilitate the uptake of interventions. Shoemaker et al.'s review identified that positive attitudes towards immunizations and pharmacists' beliefs that they "are part of the healthcare system" support the uptake and sustainability of immunization services[285]. This explains why most of the pharmacists expressed their support for the continuation of the vaccination clinics. The belief that one would have a positive emotional experience, such as satisfaction, or enjoyment, could facilitate the implementation of the intervention[284,287]. Most of the vaccine providers expressed satisfaction and had a positive experience with the clinics, which mirrors previous findings that providing immunizations was observed to improve job satisfaction[285].

The paperwork and recordkeeping requirements for the FluCare study were found to be challenging. These processes need to be simplified to make the delivery of the clinics easier[270,273]. Vaccine providers had positive attitudes toward the vaccination clinics, recognizing the importance of adopting this intervention. However, adoption would be facilitated by integrating the vaccination clinics into the workflow of vaccine providers in care homes. This could be achieved by combining the clinics with other activities, such as vaccinating care home staff and residents simultaneously, pharmacists delivering medication, or conducting clinical reviews of residents.

The information gained from the vaccine providers regarding the barriers and enablers to delivering vaccination clinics will guide the next steps of this research. Specifically, the findings will be used to suggest interventions aimed at enhancing the delivery of vaccination clinics. The next chapter will use a systematic approach to identify these interventions, ensuring that they effectively address the specific delivery challenges identified in this chapter settings[134]. These proposed interventions will focus on supporting vaccine providers and optimizing clinic delivery within care homes.

4.4.1 Strength and limitations

The study had several strengths. Firstly, the vaccine providers came from a range of contexts, ensuring a diverse sample that captured a wide range of perspectives, suggesting that the results may be applicable to other healthcare professionals. Despite a limited number of participants, data saturation was achieved, indicating comprehensive coverage of the topic. The interview process was robust, with all interviews conducted by two researchers, ensuring thorough data collection and minimizing the risk of missing important information. Additionally, the study applied the Theoretical Domains Framework (TDF) to identify barriers and enablers, providing a theory-based understanding of the factors involved in delivering the clinics.

However, the study also had limitations. A key limitation is that the identification of barriers and enablers was based solely on interviews with vaccine providers engaged in the FluCare project. This may have introduced selection bias, as these participants were likely more motivated and optimistic about delivering the intervention compared to under-resourced or

overworked providers not participating in FluCare. The absence of direct input from care home managers who play a central role in scheduling, organising, and promoting clinics as well as other stakeholders such as care home staff and administrative coordinators, limited the breadth of perspectives captured.

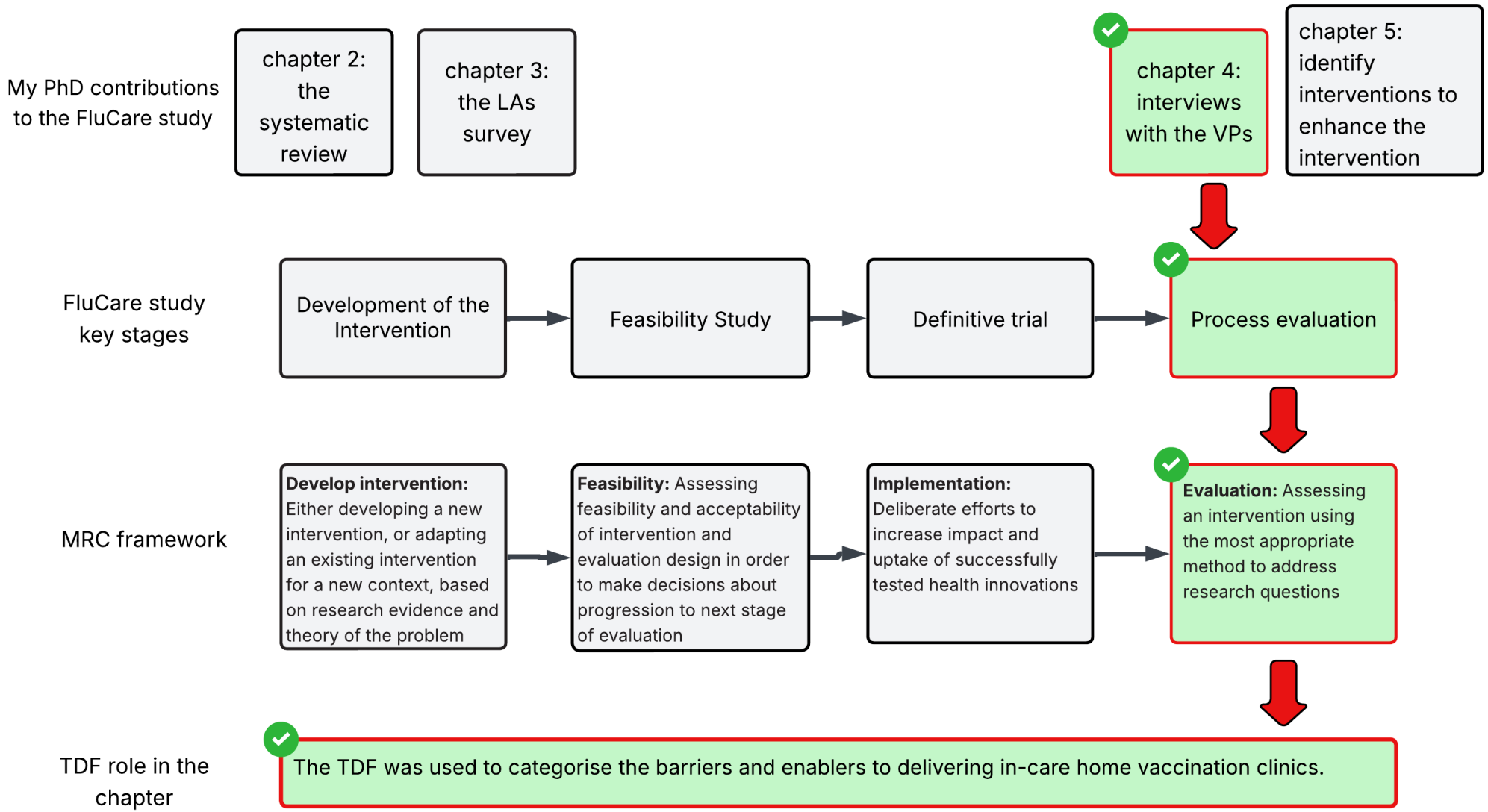
In addition, the number of participants was lower than planned because some vaccine providers who could not deliver the influenza vaccine declined to participate, believing they had nothing to contribute. This may have resulted in a biased sample by not capturing data on the challenges these providers faced. These factors mean that some important barriers may have been overlooked, particularly those affecting less well-resourced or less engaged vaccine providers. Nevertheless, these strengths and limitations provide context for the study's findings and suggest areas for future research to involve a broader range of stakeholders to validate and refine the proposed interventions.

4.5 Conclusion

The study explored the perspectives of vaccine providers who delivered influenza vaccination clinics in care homes as part of the FluCare intervention. The findings highlight the importance of addressing these barriers and utilising the identified enablers to optimize the delivery of vaccination clinics in care home settings. More successful delivery may be achieved by employing approaches including streamlining paperwork, strengthening cooperation between healthcare practitioners and care homes, making use of technology, early planning and preparation, and offering financial support. Additionally, promoting positive attitudes towards vaccination, encouraging care home manager involvement, and utilising the skills and experience of vaccine providers can further facilitate the adoption and sustainability of these clinics.

These insights are directly relevant to refining and enhancing the FluCare intervention. By addressing these barriers and integrating the identified enablers into the intervention design, future vaccination clinics delivery can be more effective and sustainable. The next chapter will build on these findings by exploring strategies to further improve the FluCare intervention, ensuring it meets the practical needs of care home settings and delivers better public health outcomes. Figure 7 summarises the contribution of Chapter 4 to the FluCare project, including its role within the MRC framework (evaluation stages) and how TDF was applied to identify key barriers and enablers influencing intervention delivery.

Figure 7: Chapter 4 Contribution to FluCare Project, MRC Framework, and TDF Role.



Note: LA = Local Authority; VPs = Vaccine Providers; TDF = Theoretical Domains Framework; MRC = Medical Research Council.

Chapter 5: Identifying behaviour change techniques to enhance the implementation of in-care homes influenza vaccination clinic

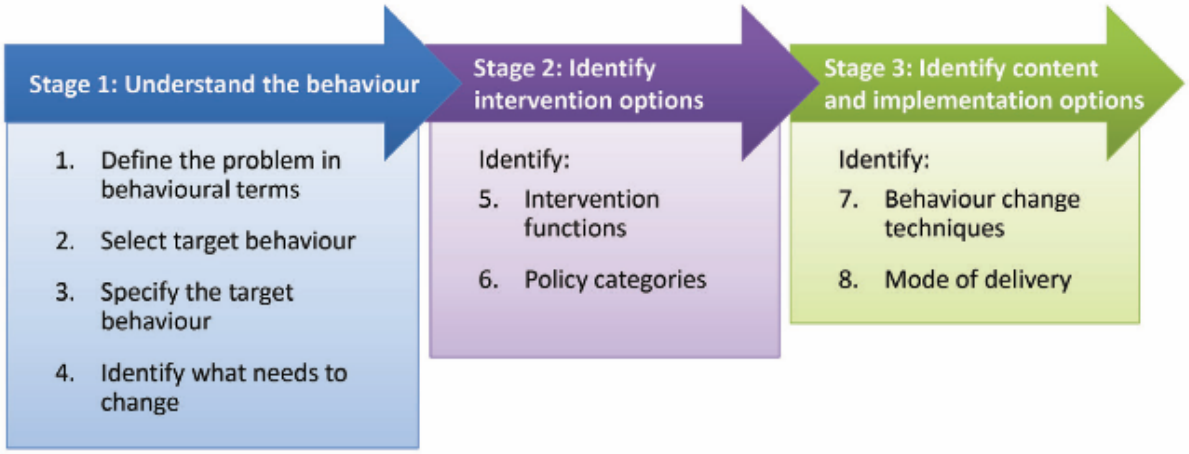
5.1 Introduction

As shown in Chapter 2, access to the influenza vaccine has been identified as a key enabler for increasing vaccination uptake among care home staff. Interventions to improve access to the influenza vaccine may be associated with higher vaccination rates among care home staff, as highlighted in Chapter 3. Additionally, previous research demonstrated that interventions aimed at improving access to the influenza vaccine can significantly improve influenza vaccination rate among care home staff[92,93,95]. The FluCare intervention further demonstrated that vaccination rates improved in care homes that hosted at least one vaccination clinic[161]. However, this intervention needs to be refined to ensure successful delivery in the extension of the FluCare study.

Previous research has identified several factors that could influence collaboration between care homes and other healthcare organizations including lack of knowledge among care home staff and time constrains[270,286]. For the FluCare study, it is therefore critical to prioritise the barriers and enablers most likely to influence both the engagement with and delivery of vaccination clinics. Prioritizing these factors will help in identifying the interventions that can support the delivery of vaccination clinics for the extended FluCare study which will recruit community pharmacists to deliver the vaccination clinics.

This chapter focuses on identifying interventions aimed at enhancing the delivery of vaccination clinics in care homes, as well as exploring methods to develop interventions that will facilitate the adoption of these clinics. Based on the theoretical domain framework (TDF) proposed by Michie et al., the intervention development process involved identifying target behaviours, mapping barriers and enablers to theoretical domains, and selecting appropriate intervention functions and behaviour change techniques (BCTs)[134]. As identified in Chapter 4, barriers to the successful delivery of vaccination clinics could significantly obstruct the effectiveness of these interventions and contribute to their potential failure. Building upon the findings from Chapter 4, this chapter will follow the process of intervention development as recommended by Michie et.al[134]. The stages and steps involved in designing an intervention, as outlined by Michie et al illustrated in figure 8.

Figure 8: Behaviour change intervention design process[134].



In accordance with the Medical Research Council (MRC) guidance on developing and evaluating complex interventions, it is important to understand the behavioural determinants, how participants interact with the interventions and the causal mechanisms that lead to change[153]. This understanding helps to refine the interventions, ensuring they are effective and adaptable across different care home settings. Following this approach, this chapter seeks to identify interventions that address the practical and behavioural challenges associated with delivering vaccination clinics in care homes.

5.1.1 Aim

The aim of this chapter is to identify interventions that address the identified barriers and utilise enablers in order to enhance the delivery of vaccination clinics in care homes.

5.1.2 Objectives

- To identify the TDF domains that may enhance the delivery of in-care vaccination clinics.
- To identify the intervention functions, policy categories, and BCTs that may facilitate the delivery of in-care home vaccination clinics.

5.2 Methods

5.2.1 Approach to identifying Behaviour Change Techniques (BCTs)

Behaviour change techniques (BCTs) can be defined as the active components of an intervention designed to change specified behaviours[134]. This chapter presents a systematic, theory-informed process to identify interventions aimed at enhancing the delivery of influenza vaccination clinics in care homes. The identification of BCTs was guided by the Theoretical Domains Framework (TDF), which provided a structured approach for identifying key behavioural determinants, prioritising modifiable barriers and enablers, and selecting appropriate intervention components. As mentioned in chapter 1, the TDF was chosen because it combines multiple behaviour change theories into a single, practical framework and has been widely used in healthcare settings, particularly where behaviours are not fully understood[146–149].

Identifying behaviour change techniques (BCTs) requires a systematic approach, supported by a well-defined rationale and clear reporting of the development process[134]. To improve the delivery of vaccination clinics in care homes, this chapter will follow three key stages, each with associated steps [134,180], as outlined below:

1. **Stage 1: Understand the Behaviour.**
   - Who needs to change their behaviour, and how?
   - Which barriers and enablers should be addressed using a theoretical framework?
2. **Stage 2: Identify Intervention Options.**
   - This stage determines intervention components that can address identified barriers and enhance enablers. This stage involves selecting relevant intervention functions and policy categories that align with the identified barriers and enablers.
3. **Stage 3: Identify Content and Implementation Options.**
   - This stage focus on the specific behaviour change techniques (BCTs) and practical methods to deliver the intervention.

Below is a detailed description of the methods used within each stage and step, outlining the processes undertaken by the PhD candidate to identify and refine the interventions. This includes how evidence from previous chapter was applied to inform decision-making throughout the development process.

5.2.1.1 Stage 1: Understand the Behaviour.

5.2.1.1.1 Step 1: Who needs to change their behaviour, and how?

To identify the target behaviour necessary for effective delivery of vaccination clinics in care homes, interview data collected from vaccine providers (Chapter 4) were revisited and analysed by the PhD candidate. The analysis focused on practical delivery challenges reported by participants, particularly relating to the roles of vaccine providers and care home managers.

Following the Michie et al. guidance, the specification process of a target behaviour considered: who needs to perform the behaviour, what they need to do differently to achieve the desired change, when and where they would do it, how often it should be done, and with whom it should be carried out. This structured approach ensured that the behaviour was clearly defined and measurable[134].

The interviews with the vaccine providers highlighted several behavioural and contextual barriers, including lack of communication between stakeholders, delayed scheduling of clinics, and limited staff awareness of vaccination clinics. Based on these findings, the PhD candidate identified the groups whose behaviour needed to change and outlined candidate behaviour that could be targeted through the identification of potential interventions. This target behaviour identify who needs to do what differently to achieve the desired outcome of improved vaccination clinic delivery.

The process of defining this behaviour was informed by the recommendations emerging from the FluCare process evaluation study and existing evidence related to clinic delivery from the interviews with the vaccine providers[163]. The behaviour was selected based on its modifiability, relevance to the barriers identified, and alignment with the broader goals of improving clinic timing, frequency, and coordination[163]. Additionally, findings from the FluCare study supported the identification of this behaviour by highlighting how late scheduling and limited coordination affected the overall success of the vaccination clinics[161].

5.2.1.1.2 Step 2: Identifying Which Barriers and Enablers Should Be Addressed Using a Theoretical Framework

As mentioned in Chapters 1, the TDF was selected for this thesis to guide the development and evaluation of the intervention. In this stage, the prioritisation of barriers and enablers focused

on those most relevant to the target behaviour identified in Step 1[134]. Identifying the most important barriers or enablers should involve the use of a combination of different evaluation techniques[288].

Three key factors were considered by the PhD candidate to identifying the most relevant barriers and enablers as recommended by Atkins et. al.[149]:

1. Frequency of beliefs (i.e. density of coding): This refers to how often specific barriers or enablers were mentioned by vaccine providers during the interviews. In Chapter 4, the barriers and enablers were identified as sub-themes through the analysis of interview data. The density of coding here refers to the number of times each sub-theme was coded across the dataset, indicating how commonly it was raised by participants. If certain barriers (such as late time of delivery) were frequently expressed (e.g., mentioned by more than 50% of participants based on sub-theme coding), they were considered more relevant because they represent common issues affecting the delivery of the clinics in relation to the target behaviour.
2. Presence of conflicting beliefs: This factor looks at whether there are contradictory beliefs within the TDF domain. For example, some vaccine providers might believe that they had enough support from care home manager, while others mentioned they had not. These conflicting beliefs highlight areas where clarity and social support may be needed to resolve the contradictions and improve the delivery of vaccination clinics.
3. Vaccine providers' expression of importance: This factor considers whether vaccine providers explicitly expressed the importance of a particular barrier or enabler. If vaccine providers clearly stated that certain aspects (such as lack of knowledge from care home staff) were critical to successful or failure of delivery, these beliefs would be prioritised for consideration in the identification of behaviour change techniques.

While the findings were mapped onto the TDF in Chapter 4, the focus there was on categorising barriers and enablers to the delivery. In this chapter, the emphasis shifts to prioritising the most relevant domains for intervention identification in the context of the target behaviour described earlier**.** This step builds on the previous analysis to identify key areas for targeted intervention strategies.

5.2.1.2 Stage 2: Identify Intervention options

5.2.1.2.1 Identify intervention functions

Intervention functions are general categories that represent broad areas where an intervention can be designed or implemented. Intervention functions include training, education, persuasion, incentivisation, coercion, restriction, environmental restructuring, modelling, and enablement[134]. The TDF domains were aligned with potentially effective intervention functions, as outlined in the intervention design guide[134]. The PhD candidate mapped the intervention functions to each prioritized TDF domain from the previous stage and assessed them using the APEASE criteria to ensure only feasible and relevant strategies were advanced to later stages of the design process. The APEASE criteria provide a structured method for selecting the most appropriate interventions[134]. APEASE helps identify interventions that are likely to be most effective by evaluating six key factors:

- Affordability
- Practicability
- Effectiveness and cost-effectiveness
- Acceptability
- Side-effects/safety
- Equity

To improve the success of interventions, their components should meet these criteria. While effectiveness is emphasized, other factors are also important as they significantly influence the adoption and practicality of the intervention. In addition, applying APEASE helps to narrow down a list of potentially effective intervention functions. Table 19 (APEASE Criteria – reproduced from Michie et al[134]) provides definitions and decision-making guidance on how to assess proposed interventions across these six criteria. This evaluation determines the potential suitability of each intervention function for further exploration in this chapter.

In addition, linking theoretical domains to intervention functions helps identify a more targeted, systematic approach to designing effective interventions[134]. It also provides a clear pathway

toward achieving sustainable and meaningful behavioural change. Moreover, this linkage supports the next step in the development process, identifying policy categories, behaviour change techniques (BCTs), and modes of delivery, ensuring that the interventions are both structured and feasible to implement in practice. This approach supports a systematic pathway for intervention design, ensuring that only those functions that are likely to be effective, acceptable, and feasible are carried forward to later stages[134].

Table 19: The APEASE criteria for designing and evaluating interventions.

APEASE criteria	Definition
Affordability	Interventions often have an implicit or explicit budget. It does not matter how effective, or even cost-effective it may be if it cannot be afforded. An intervention is affordable if within an acceptable budget it can be delivered to, or accessed by, all those for whom it would be relevant or of benefit.
Practicability	An intervention is practicable to the extent that it can be delivered as designed through the means intended to the target population. For example, an intervention may be effective when delivered by highly selected and trained staff and extensive resources but in routine clinical practice this may not be achievable.
Effectiveness and cost-effectiveness	Effectiveness refers to the effect size of the intervention in relation to the desired objectives in a real world context. It is distinct from efficacy which refers to the effect size of the intervention when delivered under optimal conditions in comparative evaluations. Cost- effectiveness refers to the ratio of effect (in a way that has to be defined, and taking account of differences in timescale between intervention delivery and intervention effect) to cost. If two interventions are equally effective then clearly the most cost-effective should be chosen. If one is more effective but less cost-effective than another, other issues such as affordability, come to the forefront of the decision making process.
Acceptability	Acceptability refers to the extent to which an intervention is judged to be appropriate by relevant stakeholders (public, professional and political). Acceptability may differ for different stakeholders. For example, the general public may favour an intervention that restricts marketing of alcohol or tobacco but politicians considering legislation on this may take a different view. Interventions that appear to limit agency on the part of the target group are often only considered acceptable for more serious problems
Side-effects/ safety	An intervention may be effective and practicable, but have unwanted side-effects or unintended consequences. These need to be considered when deciding whether or not to proceed.
Equity	An important consideration is the extent to which an intervention may reduce or increase the disparities in standard of living, wellbeing or health between different sectors of society.

Note: APEASE = Affordability, Practicability, Effectiveness and cost-effectiveness, Acceptability, Side-effects/safety, and Equity.

5.2.1.2.2 Step 2: Identify Policy Categories

Policy categories refer to decisions made by authorities that facilitate and support the implementation of interventions. Michie et al. guidance connect policy categories to intervention functions that are expected to be suitable and effective in supporting each intervention function[134]. The intervention functions determined in the previous step were applied to identify the policy categories that could effectively support the intervention.

The PhD Candidate linked intervention functions and the corresponding policy categories as identified by Michie et al.[134], and suggested examples of how each policy category could be applied in the context of delivering vaccination clinics in care homes. It is important to note that the APEASE criteria were not applied at this step, as choosing policy categories requires expertise in the field, and a future study will be needed to evaluate these choices.

5.2.1.3 Stage 3: Identify Content and Implementation Options.

5.2.1.3.1 Step 1: Identify Behaviour Change Techniques (BCTs)

A BCTs is described as an active component of an intervention intended to change behavior[134]. After identifying the intervention functions and policy categories for improving the delivery of vaccination clinics in care homes, the next step is to determine the most appropriate behaviour change techniques (BCTs) that align with these functions. Additionally, the best mode of delivery for these interventions will be selected to ensure successful implementation of the interventions. The PhD candidate mapped the TDF domains prioritized for change to specific BCTs using the table developed by Michie et al. (2014), which links TDF domains to corresponding BCTs[134].

5.2.1.3.2 Step 2: Identifying Modes of Delivery

The mode of delivery is a dimension of interventions that refers to how the intervention is implemented or communicated to the target people. It includes various methods such as face-to-face, digital media, phone, or group sessions[134]. Mode of delivery influences the effectiveness of the intervention by determining the way it reaches the people and should align with APEASE criteria. Other important dimensions of intervention design include[134]:

- Content (what should be delivered during the intervention, such as education or reminders).
- Provider (who delivered the intervention, such as vaccine providers or care home managers).
- Setting (where the intervention was delivered).
- Recipient (to whom the intervention was targeted, such as care home staff or managers).
- Intensity (the number of contacts or sessions through which the intervention was delivered).
- Duration (the length of time over which the intervention was delivered).
- Fidelity (the extent to which the intervention was delivered as originally intended).

The PhD candidate provided examples of intervention components designed to address the prioritised barriers and enhance the prioritised enablers for delivering influenza vaccination clinics. During the interviews, vaccine providers were also asked to share recommendations for improving the delivery of these clinics (Chapter 4). These recommendations were reviewed and used to inform some of the intervention components examples presented in this chapter. The suggested intervention components collectively aim to address the target behaviour identified earlier in the development process, with some examples drawn directly from the recommendations provided by vaccine providers in Chapter 4.

5.2.2 Initial Appraisal of BCTs

In order to eliminate inappropriate behaviour change techniques (BCTs), the APEASE criteria were applied to all examples of proposed intervention components. This initial appraisal aimed to reduce unnecessary burden on future implementation efforts by filtering out BCTs that were clearly unsuitable for the vaccine providers and care home context. The appraisal was conducted by the PhD candidate in collaboration with two members of the FluCare team: SS, a behavioural scientist with experience in developing interventions informed by the Theoretical Domains Framework (TDF) and Behaviour Change Techniques (BCTs), and AP, a behavioural economist with expertise in strategies to increase vaccination uptake**.** The findings from Chapter 4, particularly the prioritised barriers and enablers identified through interviews with vaccine

providers, were used to assess whether each intervention component was relevant and applicable in this context. The team reviewed each BCT and its associated intervention component, assessing its feasibility, acceptability, and relevance using the APEASE criteria. BCTs that did not address any of the prioritised barriers/enablers, or that were judged as impractical or unacceptable, were excluded from further consideration. This step ensured that only BCTs with the greatest potential for acceptability and effectiveness were carried forward for further consideration in the intervention design process.

5.2.3 Ensuring Rigour in the Development Process

To ensure rigour and transparency in the intervention development process, several strategies were applied. First, the mapping of qualitative findings to TDF domains (Chapter 4) was supported by expert input from a behavioural scientist (SS). Sub-themes were systematically categorised as barriers or enablers and aligned with TDF domains, with any discrepancies resolved through discussion to ensure clarity and consistency (chapter 4). The prioritisation of domains was based on guidance developed by Atkins et al., which recommends considering the frequency of belief statements, the presence of conflicting beliefs, and the perceived importance expressed by participants[149]. This approach ensured that the most relevant and impactful behavioural determinants were selected for intervention. Second, decisions related to intervention functions, policy categories, and BCT selection were guided by evidence-based resources including the TDF to BCT mapping matrix developed by Michie et al[134]. Application of the APEASE criteria further strengthened decision making by systematically evaluating each potential intervention component for its acceptability, practicability, effectiveness, affordability, side-effects, and equity. Finally, key stages of the intervention identification including the selection of behaviour change techniques (BCTs) were reviewed collaboratively with two members of the FluCare study team (AP and SS) to verify the relevance and feasibility of selected intervention components. This collaborative process added an additional layer of judgement and helped ensure that decisions were appropriate for the target setting.

5.3 Results

5.3.1 Stage 1: Understand the behaviour

5.3.1.1 Step 1: Who needs to change their behaviour, and how?

Analysis of the interviews with vaccine providers (Chapter 4) combined with findings from the FluCare process evaluation study, identified one target behaviour to enhance the delivery of vaccination clinics in care homes: “Care home managers and vaccine providers coordinate to schedule and deliver vaccination clinics earlier in the influenza season to maximise staff participation.” This behaviour combines two key elements from the data: scheduling clinics early in the season, ideally by September, to allow delivery within the optimal vaccination window and meet the recommended four clinics per care home, and maintaining proactive, regular coordination between vaccine providers and care home managers to ensure joint planning, timely communication, and agreement on clinic arrangements.

In addition, the FluCare findings showed that most clinics (80%) occurred after February 2023, outside the optimal period, which was linked to reduced staff engagement, lower uptake, and diminished intervention impact. Earlier scheduling, supported by consistent coordination, is expected to improve uptake and the overall success of vaccination clinics delivery. Following the Michie et al. guidance, the target behaviour was specified in terms of who needs to perform it, what they need to do differently, when and where it should be carried out, how often it should be done, and with whom it should be performed[134]. In this case, the behaviour requires care home managers and vaccine providers to work together to plan and deliver vaccination clinics earlier in the season, ideally by September, within care homes, on a sufficient number of visits to provide four clinics per care home in a season, and in close collaboration with each other.

This specified behaviour is modifiable, addresses the key barriers identified, and aligns with the broader goal of improving clinic timing, frequency, and coordination.

5.3.1.2 Step 2: Which barriers and enablers should be addressed using a theoretical framework?

Ten out of the 14 theoretical domains of the TDF were mentioned by at least nine vaccine providers (chapter 4). Two domains were mentioned by all vaccine providers, *Environmental context and resources* and *Social influences*. The least frequently mentioned domains were *Skills* and *Beliefs about capability.*

The domains of *Social professional role and identity* and *Skills* were not prioritized as key domains for intervention, despite being identified as strong enablers. This is because both GP practices staff and community pharmacists expressed that administering vaccinations is already aligned with their professional responsibilities and skills. Similarly, *Beliefs about capabilities* is not considered a priority because both GP practices staff and community pharmacists expressed confidence in their ability to efficiently set up and run the clinics, as well as in managing their workload and demonstrating self-efficacy.

The *Optimism* and *Intention* domains were also not prioritized because vaccine providers already expressed strong positive attitudes. Most vaccine providers were optimistic about the benefits and effectiveness of the clinics, and their intention to support and continue vaccination efforts was clear. Since these domains do not pose significant barriers, there is less need for targeted intervention in these domains, allowing focus to shift toward domains that present more significant challenges to implementation.

The *Emotion* domain was not prioritized as a key focus for intervention development despite its high frequency. While factors such as dissatisfaction with vaccine uptake among care home staff were reported by some participants, this dissatisfaction was primarily related to other factors such as the late timing of the clinics or limited knowledge about the vaccination clinics. These barriers can be better addressed by focusing on other domains, such as *Environmental context and resources* and *Knowledge*, which directly influence these concerns.

Table 20 presents an illustration of the barriers and enablers associated with each TDF domain, along with the frequency of their occurrence as reported by vaccine providers.

Table 20: Barriers and enablers to delivering influenza vaccination clinics across TDF domains, and the frequency of mentions by vaccine providers.

Theoretical domain (No of VPs out of 17)	Barriers	No of VPs	Enablers	No of VPs
Environmental context and resources (17)	Late Timing of the Intervention delivery	13	Availability of vaccine stock and supplies	8
	Time Constraints in Clinic Setup and Scheduling	10	Availability of suitable location for the vaccination clinics	7
	Challenges in Paperwork Streamlining and Administrative Tasks	8	Prior coordination efforts with care homes	4
	Room Availability and Suitability	7	Planning and preparation	4
	Staffing Shortages	7	Impact of COVID-19 on Flu Vaccine Uptake	3
	Lake of planning and preparation for the clinics	6	Accessibility and convenient of care home location	3
	Challenges with Vaccine Availability and Timing	5	Integration of Technology in Healthcare Processes	2
	Logistical Challenges with Vaccine Transport and Storage	5		
	Non-Registered Care Staff with the Practice	3		
	Impact of COVID Fatigue on Flu Vaccination Acceptance,	3		
	Financial Considerations and Operational Expenses	3		
	Limited Number of Vaccination Clinics	2		
	IT Infrastructure Challenges and Data Management Issues	2		
	Traveling Distance	1		
Social influence (17)	Lack of Communication and Coordination with care home manager	8	Effective Communication and Coordination with care home Managers	14
			Staff's Receptivity and Acceptance of Flu Vaccine	9
			Prior Relationship with the care home manager and Staff	5
			care home managers encouragement to get the vaccination	4
			Influence of Peer Behavior on Vaccination Acceptance	4
			Supportive Managers and Organizational Structure	4

Table 20: Barriers and enablers to delivering influenza vaccination clinics across TDF domains, and the frequency of mentions by vaccine providers. (Continued)

Theoretical domain (No of VPs out of 17)	Barriers	No of VPs	Enablers	No of VPs
Emotion (16)	Dissatisfaction with Vaccine Uptake among Care Home Staff	7	Positive Perception of Intervention and Clinics	14
			Positive experience in Communication and Support from Care Home Staff and Managers	9
			Satisfaction about the success of the Intervention	5
Knowledge (16)	Limited Staff Awareness About the Vaccination Clinics	10	Staff's awareness about the vaccination clinics	13
Intention (15)			Willingness to Continue and Expand the Clinics	15
Optimism (13)			Positive Perspective Regarding the Effectiveness and Benefits of Vaccination Clinics	13
			Enthusiastic about the benefits of vaccines	10
Social professional role and identity (11)			Alignment with Healthcare Goals and Vision	11
Belief about capability (9)	Impact on Workload and Time Management	4	Manageable Workload and Self-Efficacy	6
			Confidence in their Ability to Efficiently Set up and Run the Clinics	6
Skills (9)			Prior Experience in vaccination Clinics	9
			Advanced Clinical Competence in Administering Vaccinations	1
Reinforcement (8)			Financial Incentive	8
Memory, attention and decision Processes (0)				
Behavioural regulation (0)				
Beliefs about consequences (0)				
Goals (0)				

Note: VP(s) = Vaccine Provider(s); TDF = Theoretical Domains Framework.

The domains of *Environmental Context and Resources*, *Social Influence, Knowledge, and Reinforcement* were prioritised for intervention development due to their strong influence on the implementation of vaccination clinics. This prioritisation was based on the density of coding, presence of conflicting beliefs, and participants' perceived importance, as described in the methods.

The domain Environmental Context and Resources—particularly the sub-theme of *Late Timing of Intervention Delivery*—was the most frequently reported barrier. This issue was raised by 13 out of 17 vaccine providers, who consistently highlighted that initiating vaccination clinics too late in the influenza season undermined the effectiveness of the intervention. The delayed timing was seen to reduce staff vaccination opportunities and created challenges related to logistical planning, vaccine availability, and staff engagement.

Another key barrier was the lack of effective communication and coordination with care home managers, identified under the *Social Influence* domain. This barrier was raised by 8 vaccine providers, indicating moderate frequency in the coding. It often led to disorganisation, late scheduling of clinics, and insufficient staff awareness. Effective communication with care home managers was seen as essential, as their active involvement plays an important role in encouraging staff to participate in vaccination programmes. However, this sub-theme also appeared as an enabler, identified by 14 vaccine providers, reflecting a notable contrast within the same domain. When communication was well-structured and organised, it helped address many logistical challenges and improved staff engagement, significantly contributing to the success of the clinics.

Limited staff awareness about the vaccination clinics, mapped to the *Knowledge* domain, was identified as a barrier by 10 vaccine providers, indicating a relatively high frequency in the coding. Many care home staff were either unaware of the clinics or lacked understanding about the importance of influenza vaccination, which obstructed their participation. Ensuring that staff are well-informed about the timing, purpose, and benefits of vaccination clinics is critical for increasing uptake. Improving knowledge through targeted education and communication efforts is likely to address this barrier effectively.

The *Reinforcement* domain was also prioritised, as it was frequently mentioned by community pharmacists and strongly emphasised as important. Many noted that financial incentives, particularly reimbursement, would serve as a key enabler in encouraging them to deliver vaccination clinics. Reimbursement was seen not only as a way to offset operational costs but also as a meaningful reward for their efforts, highlighting its perceived importance in supporting delivery. Addressing this factor could significantly improve participation and commitment from community pharmacists in running the clinics.

All four prioritised domains relate directly to the target behaviour: coordinating between care home managers and vaccine providers to plan and deliver vaccination clinics earlier in the influenza season. Late timing, poor communication, and limited awareness act as barriers, while structured communication and appropriate incentives serve as key enablers. These findings form the basis for identifying targeted intervention options in the next stage.

5.3.2 Stage 2: Identify Intervention Options.

5.3.2.1 Step 1: Identify intervention functions.

Table 21 presents the intervention functions mapped to each of the prioritised TDF domains and evaluates their alignment with the APEASE criteria, as guided by Michie et al.[134]. This mapping facilitated a targeted and systematic approach to intervention design and provided a foundation for identifying effective and implementable strategies. It also offered a clear pathway for achieving sustainable and effective change and facilitated the transition to the next steps of intervention development process, which involves identifying suitable policy categories, behaviour change techniques (BCTs), and modes of delivery.

The PhD excluded two intervention functions at this stage due to their failure to meet the APEASE criteria (Restriction and Coercion). For example, although coercion met some APEASE criteria, it was excluded due to concerns over acceptability, as it could negatively impact morale among care home managers and vaccine providers, leading to resistance. Instead, the focus shifted to more acceptable and feasible options, such as identifying interventions to improve implementation rather than relying on coercive measures that could undermine the intervention's long-term sustainability.

The following intervention functions were identified as the strongest candidates for improving vaccination clinic delivery in care homes:

- Education
- Incentivization
- Training
- Environmental restructuring
- Modelling
- Enablement

These selected intervention functions apply to the target behaviour outlined earlier in this chapter. By addressing shared barriers and enablers, these intervention functions contribute to a clear strategy for delivery improvement. The next step focuses on how these functions can be supported through relevant policy categories to ensure practical and contextually appropriate implementation.

Table 21: Prioritized TDF domains, their proposed intervention functions, and an assessment of whether each intervention function meets the APEASE criteria.

Prioritized TDF domains	Intervention function and definition [134]	Does the intervention function fit the APEASE criteria with regard to vaccination clinics implementation?	Comments
Environmental context and resources	**Training**: Imparting skills	**Yes**	Likely to be affordable, practical, and highly effective, with no side effects or equity concerns. Generally acceptable if it enhances staff competence in clinic implementation.
	Restriction: Using rules to reduce the opportunity to engage in the target behaviour (or to increase the target behaviour by reducing the opportunity to engage in competing behaviors)	**No**	It may limit flexibility for care home managers and vaccine providers in running vaccination clinics. Restricting behaviours could reduce engagement and create resistance.
	Environmental restructuring: Changing the physical or social context	**Yes**	Potentially effective and practical if using prompts/cues or reminders such as posters.

Table 21: Prioritized TDF domains, their proposed intervention functions, and an assessment of whether each intervention function meets the APEASE criteria. (Continued)

Prioritized TDF domains	Intervention function and definition [134]	Does the intervention function fit the APEASE criteria with regard to vaccination clinics implementation?	Comments
Environmental context and resources (Continued)	**Enablement**: Increasing means/ reducing barriers to increase capability (beyond education and training) or opportunity (beyond environmental restructuring)	**Yes**	Likely to be affordable, practical, and highly effective, with minimal risks. Generally acceptable and equitable, such as give the vaccine providers and managers a flexible time to implement the vaccination clinics.
Social influence	**Restriction**: Using rules to reduce the opportunity to engage in the target behaviour (or to increase the target behaviour by reducing the opportunity to engage in competing behaviour)	**No**	It may limit flexibility for care home managers and vaccine providers in running vaccination clinics. Restricting behaviours could reduce engagement and create resistance.
	Environmental restructuring: Changing the physical or social context	**Yes**	It is feasible to find a substitute vaccine provider, or the manager can delegate the task to another staff member in the care home to ensure implementation.
	Modelling: Providing an example for people to aspire to or imitate	**Yes**	Modelling is likely to be affordable, practical, and effective, with no notable side effects or equity concerns. For example, provide examples for the benefits and positive outcome for implementing vaccination clinics.

Table 21: Prioritized TDF domains, their proposed intervention functions, and an assessment of whether each intervention function meets the APEASE criteria. (Continued)

Prioritized TDF domains	Intervention function and definition [134]	Does the intervention function fit the APEASE criteria with regard to vaccination clinics implementation?	Comments
Social influence (Continued)	**Enablement**: Increasing means/ reducing barriers to increase capability (beyond education and training) or opportunity (beyond environmental restructuring)	**Yes**	likely to be affordable and practical, particularly through flexible scheduling or providing resources.
Knowledge	**Education**: Increasing knowledge or understanding	**Yes**	education is affordable, especially with digital tools, and easy to implement within training sessions or meetings.
Reinforcement	**Training**: Imparting skills	**Yes**	Training for care home managers and vaccine providers is affordable, especially if delivered online or through existing programs. It is practical and effective in building necessary skills for managing flu clinics.
	Incentivisation: Creating an expectation of reward	**Yes**	Incentives for care home managers and vaccine providers are affordable, depending on the type (e.g., certificates or financial rewards). They are practical, especially if integrated into existing systems, and often effective in motivating participation.

Table 21: Prioritized TDF domains, their proposed intervention functions, and an assessment of whether each intervention function meets the APEASE criteria. (Continued)

Prioritized TDF domains	Intervention function and definition [134]	Does the intervention function fit the APEASE criteria with regard to vaccination clinics implementation?	Comments
Reinforcement (Continued)	**Coercion**: Creating an expectation of punishment or cost	**No**	Coercive measures are often less acceptable due to potential negative perceptions , possibly leading to resistance or reduced morale.
	Environmental restructuring: Changing the physical or social context	**Yes**	effective and practical such as adding objects to the environment .

Note: TDF = Theoretical Domains Framework; APEASE = Affordability, Practicability, Effectiveness and cost-effectiveness, Acceptability, Side-effects/safety, and Equity.

5.3.2.2 Step 2: Identify policy categories

The intervention functions that determined in the previous step (Education, Incentivization, Training, Environmental restructuring, Modelling, Enablement) were used to determine the policy categories that could effectively support their delivery. Table 22 outlines the proposed intervention functions, the corresponding policy categories as identified by Michie et al.[134], and an explanation of how each policy category could be applied in the context of delivering vaccination clinics in care homes. Table 22 shows that certain policy categories were identified repeatedly across various intervention functions, suggesting that these categories may play a key role in supporting multiple aspects of the intervention. This recurrence strengthens their potential suitability in the delivery of vaccination clinics in care homes intervention. For example, the policy category "*Communication/marketing"* could support the intervention functions Training, Education and Modelling by using leaflets to raise awareness and demonstrate best practices.

These policy categories will serve as a foundation for the next step, which involves selecting behaviour change techniques (BCTs) and deciding how the intervention content will be delivered in practice. It is important to note that the APEASE criteria were not applied at this stage, as selecting policy categories requires input from experts in the field, such as healthcare managers who have the authority to implement or influence policy decisions.

Table 22: identification of the policy categories which could support the implementation of vaccination clinics.

Intervention function and definition	policy categories and definition[134]	Examples of policy categories in the context of vaccination clinics implementation
Training: Imparting skills	**Communication/marketing:** Using print, electronic, telephonic or broadcast media	Develop video tutorials or guidance document for care home managers and vaccine providers on how to effectively manage vaccination clinics.
	Guidelines: Creating documents that recommend or mandate practice. This includes all changes to service provision	Create guidelines outlining the steps for care home managers and vaccine providers to follow when organizing vaccination clinics.
	Regulation: Establishing rules or principles of behaviour or practice	Implement a policy that offers financial rewards to vaccine providers who meet or exceed vaccination targets in care homes.
	Legislation: Making or changing laws	making it a legal requirement for care home staff to have received influenza training.
	Service provision: Delivering a service	trains vaccine provider on how to organize and run clinics within care homes.
Environmental restructuring: Changing the physical or social context	**Guidelines**	Develop national guidelines encouraging care homes to establish on-site vaccination clinics and allocate dedicated spaces within their facilities for vaccination.
	Fiscal measures: Using the tax system to reduce or increase the financial cost	Offer incentives to care homes that consistently maintain high vaccination rates among staff and incentives for vaccine providers who vaccinate specific number of staff.
	Regulation: Establishing rules or principles of behaviour or practice	As above.
	Legislation: Making or changing laws	Introduce legislation that provides additional government funding for care homes that achieve specific vaccination targets, enabling them to allocate resources for creating a more supportive vaccination environment. This could include funding for on-site vaccination clinics, staff education sessions.

Table 22: identification of the policy categories which could support the implementation of vaccination clinics. (Continued)

Intervention function and definition	policy categories and definition[134]	Examples of policy categories in the context of vaccination clinics implementation
Environmental restructuring: Changing the physical or social context (Continued)	**Environmental/social planning**: Designing and/ or controlling the physical or social environment	Provide structural plans for care homes to arrange for a minimum number of vaccination clinics during the influenza season.
Enablement: Increasing means/ reducing barriers to increase capability (beyond education and training) or opportunity (beyond environmental restructuring)	**Guidelines:** Creating documents that recommend or mandate practice. This includes all changes to service provision	As above.
	Fiscal measures: Using the tax system to reduce or increase the financial cost	As above.
	Regulation: Establishing rules or principles of behaviour or practice	As above.
	Legislation: Making or changing laws	As above.
	Environmental/social planning: Designing and/ or controlling the physical or social environment	As above.
	Service provision: Delivering a service	As above.
Modelling: Providing an example for people to aspire to or imitate	**Communication/marketing**: Using print, electronic, telephonic or broadcast media	As above.
	Service provision: Delivering a service	As above.
Education: Increasing knowledge or understanding	**Communication/marketing**: Using print, electronic, telephonic or broadcast media	Create brochures, emails, or online videos explaining the importance of influenza vaccinations to care home staff and residents.
	Guidelines: Creating documents that recommend or mandate practice. This includes all changes to service provision	As above.
	Regulation: Establishing rules or principles of behaviour or practice	Implement a policy that requires all care home staff to complete an educational module on the benefits of flu vaccination.
	Legislation: Making or changing laws	As above.

Table 22: identification of the policy categories which could support the implementation of vaccination clinics. (Continued)

Intervention function and definition	policy categories and definition[134]	Examples of policy categories in the context of vaccination clinics implementation
Education: Increasing knowledge or understanding (Continued)	**Service provision**: Delivering a service	Offer educational seminars or workshops to care home managers on how to run an effective vaccination campaign.
Incentivisation: Creating an expectation of reward	**Communication/marketing**: Using print, electronic, telephonic or broadcast media	As above.
	Guidelines: Creating documents that recommend or mandate practice. This includes all changes to service provision	As above.
	Fiscal measures: Using the tax system to reduce or increase the financial cost	As above
	Regulation: Establishing rules or principles of behaviour or practice	As above.
	Legislation: Making or changing laws	Introduce legislation that provides additional government funding for vaccine providers and for care homes that achieve specific vaccination target.
	Service provision: Delivering a service	Offer vouchers or gift cards as incentives for care home staff who participate in flu vaccination clinics.

5.3.3 stage 3: Identify Content and Implementation Options.

5.3.3.1 Step 1: Identifying behaviour change techniques (BCTs)

Following the identification of intervention functions and corresponding policy categories, this step involved selecting specific Behaviour Change Techniques (BCTs) to target the prioritised barriers and enablers to delivering vaccination clinics in care homes. The four TDF domains prioritised in this chapter, *Environmental Context and Resources*, *Social Influence*, *Knowledge*, and *Reinforcement*, were systematically mapped to corresponding BCTs using the mapping table developed by Michie et al. (2014), which links TDF domains to established BCTs[134]. A total of 36 BCTs were identified as relevant to the prioritised domains. These were selected based on their theoretical alignment and potential to address the identified barriers and enhance the key enabler. Table 23 presents a summary of the barriers and enablers to the delivery of vaccination clinics, the four prioritised TDF domains, and the associated BCTs.

This mapping ensures that the proposed intervention components are evidence-based and capable of addressing the specific behavioural challenges associated with delivering vaccination clinics in care homes and addressing the target behaviour. Each BCT corresponds with one or more intervention functions, including Education (Ed), Persuasion (P), Incentivization (I), Coercion (C), Training (T), Restriction (R), Environmental Restructuring (EnR), Modelling (M), and Enablement (En).

Table 23: Barriers, Prioritized TDF Domains, and Linked Behaviour Change Techniques (BCTs) for Improving Vaccination Clinic Implementation.

Barrier and enabler	**Late Timing of the Intervention Implementation**	**Lack of Communication and Coordination with care home Manager**	**Limited Staff Awareness About the Vaccination Clinics**	**Financial Incentive**
Prioritised TDF domain	**Environmental Context and Resources**	**social influence**	**knowledge**	**Reinforcement**
Linked BCTs	Restructuring the physical environment [EnR] Discriminative (learned) cue[Ed, I, EnR] Prompts / cues[Ed] Restructuring the social environment[EnR, En] Avoidance / changing exposure to cues for the behaviour[En]	Social comparison[P] Social support or encouragement (general)[En] Information about others' approval[Ed, P] Social support (emotional)[En] Social support (practical)[En] Vicarious reinforcement[En] Restructuring the social environment [EnR, En] Modelling or demonstrating the behaviour[T, M] Identification of self as role model[P, En] Social reward[I,	Health consequenceS[Ed, P] Biofeedback[P] Antecedents[E] Feedback on behaviour[E, P, I, C]	Threat[C] Self-reward[I, T, En] Differential reinforcement[i] Incentive[I] Thinning[I] Negative reinforcement[I] Shaping[I] Counter conditioning[I] Discrimination training[I] Material reward[I] Social reward[I] Non-specific reward[I] Response cost (behaviour cost)[C] Anticipation of future rewards or removal of punishment[C, I] Punishment[C] Extinction[C] Classical conditioning(Associative learning)[EnR]

Note: Intervention functions — Education (Ed), Persuasion (P), Incentivization (I), Coercion (C), Training (T), Restriction (R), Environmental restructuring (EnR), Modelling (M), Enablement (En). TDF = Theoretical Domains Framework; BCTs = Behaviour Change Techniques.

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5.3.3.2 Step 2: Identifying modes of delivery

Table 24 provides details of the BCTs for each prioritised barrier and enabler, along with examples of intervention components that could overcome those barriers and enhance the enabler of delivering the influenza vaccination clinics. Where relevant, intervention components also reflect and build on recommendations highlighted in the chapter 4, including suggestions made by vaccine providers on how to overcome delivery barriers. This integration ensures that the intervention components is grounded in empirical findings as well as theoretical guidance. The suggested intervention components collectively address the target behaviour identified in this chapter. While some BCTs have broad application, others are more specific to particular aspects of this behaviour. The delivery options selected for these BCTs aim to support effective implementation that meets both the strategic and practical needs of care home managers and vaccine providers.

Table 24: Barriers, Prioritized TDF Domains, and Linked Behaviour Change Techniques (BCTs) for Improving Vaccination Clinic Implementation.

BCTs and definition[134]	Example for the intervention components
Late Timing of the Vaccination Clinics (Environmental Context and Resources)	
Restructuring the physical environment: Change, or advise to change the physical environment in order to facilitate performance of the wanted behavior or create barriers to the unwanted behaviour.	Suggest that care home managers to set up a dedicated, permanent vaccination area within the care home that is always ready to be used. This would include storage for vaccines, a pre-arranged layout for clinic activities, and essential paperwork. This reduces the time needed to set up clinics once vaccines become available, allowing for earlier scheduling and implementation.
Discriminative (Learned) Cue: Identify an environmental stimulus that reliably predicts that reward will follow the behavior	Recommend vaccine providers and care home managers to use specific reminders that prompt them to begin scheduling clinics at the start of the influenza season. This could be in the form of automated reminders sent at specific times (e.g., one month before influenza season starts) to ensure early coordination and preparation.
Prompts / Cues: Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behavior. The prompt or cue would normally occur at the time or place of performance	Recommend care home managers to use visual or digital cues, such as posters, email reminders or text messages, to remind staff about the date and time of visit vaccination. visual prompts (poster) can be placed in areas within the care home, such as staff rooms or workstations.
Restructuring the Social Environment: Change, or advise to change the social environment in order to facilitate performance of the wanted behavior or create barriers to the unwanted behavior	Advise care home managers and vaccine providers to organizing pre-season planning meetings or calls. This restructuring of social interactions facilitates alignment among them, ensuring consensus on early clinic scheduling and implementation.
Avoidance / Changing Exposure to Cues for the Behavior: Advise on how to avoid exposure to specific social and contextual/physical cues for the behavior, including changing daily or weekly routines	Advise care home mangers to focus on preventive planning and exposure to proactive cues that encourage early action, such as setting specific deadlines for clinic planning in advance of the influenza season. This could be done by developing guideline for the implementation and include this information.
Lack of Communication and Coordination with care home Manager (Social influence)	
Social Comparison: Draw attention to others' performance to allow comparison with the person's own performance	Share success stories and vaccination clinic statistics from other care homes where managers were more actively engaged. Highlight how care homes with better coordination between managers and vaccine providers achieved higher vaccination rates and more efficient clinics. This could be done by sending emails or electronic documents about this stories.

Table 24: Barriers, Prioritized TDF Domains, and Linked Behaviour Change Techniques (BCTs) for Improving Vaccination Clinic Implementation. (Continued)

BCTs and definition[134]	Example for the intervention components
Lack of Communication and Coordination with care home Manager (Social influence) (Continued)	
Social Support or Encouragement (General): Advise on, arrange or provide social support (e.g. from friends, relatives, colleagues,' buddies' or staff) or non- contingent praise or reward for performance of the behavior. It includes encouragement and counselling, but only when it is directed at the behavior	Provide ongoing encouragement to care home managers (or vaccine providers) by emphasizing the importance of their role in promoting the health of care home staff and residents. Regular reminders and supportive emails or messages could reinforce the idea that their active involvement in clinic arrangements is importnat for the success of the intervention.
Information About Others' Approval: Provide information about what other people think about the behavior. The information clarifies whether others will like, approve or disapprove of what the person is doing or will do	Provide care home staff or managers with feedback from residents and their families, emphasizing how much they appreciate the effort in getting the vaccines and organizing vaccination clinics to protect vulnerable populations.
Social Support (Emotional): Advise on, arrange, or provide emotional social support (e.g. from friends, relatives, colleagues, 'buddies' or staff) for performance of the behavior	Offer emotional support by providing care home managers (or vaccine providers) with opportunities to express their concerns about clinic arrangements. This could be done through regular check-ins or offering to ask if they face any challenges.
Vicarious Reinforcement: Prompt observation of the consequences (including rewards and punishments) for others when they perform the behavior	Highlight examples of care homes (pharmacies) where the vaccination clinics led to positive outcomes, such as high vaccination rates in care homes and build relationship with care homes to supply them with medications.
Restructuring the Social Environment: Change, or advise to change the social environment in order to facilitate performance of the wanted behavior or create barriers to the unwanted behaviour.	As above
Modelling or Demonstrating the Behaviour (Demonstration of the behavior**):** Provide an observable sample of the performance of the behaviour, directly in person or indirectly e.g. via film, pictures, for the person to aspire to or imitate.	Use experienced care home managers (or vaccine provider) who have successfully coordinated clinics as role models. They can share their strategies during meetings or on the internet, to demonstrate how to effectively collaborate with vaccine providers (or care home managers).
Identification of Self as Role Model: Inform that one's own behavior may be an example to others	Encourage care home managers to see themselves as role models within their care settings. Emphasize that their proactive involvement in vaccination clinics sets a positive example for their staff and can improve overall care home health. This could be done by emails or letters in the internet.

Table 24: Barriers, Prioritized TDF Domains, and Linked Behaviour Change Techniques (BCTs) for Improving Vaccination Clinic Implementation. (Continued)

BCTs and definition[134]	Example for the intervention components
Limited Staff Awareness About the Vaccination Clinics (knowledge)	
Social Reward: Arrange verbal or non-verbal reward if and only if there has been effort and/or progress in performing the behavior	Provide recognition or incentives for care home managers (or vaccine providers) who successfully support vaccination clinics. This could take the form of formal recognition (e.g., certificates, public acknowledgment in newsletters) or informal rewards, such as social appreciation from healthcare authorities.
Health Consequences: Provide information (e.g. written, verbal, visual) about health consequences of performing the behavior	Provide care home staff with clear information about the health benefits of flu vaccination and the risks of not being vaccinated. This can be done through posters, leaflets, or digital communications highlighting how getting vaccinated can protect not only themselves but also the vulnerable residents they care for.
Biofeedback: Provide feedback about the body (e.g. physiological or biochemical state) using an external monitoring device as part of a behavior change strategy	share positive outcomes such as reduced absenteeism or increased protection during influenz season. This could be done by sending emails or newsletters.
Antecedents: Provide information about antecedents (e.g. social and environmental situations and events, emotions, cognitions) that reliably predict performance of the behaviour	Create and distribute clear, early communication to inform staff about the exact date and time of the vaccine provider's visit. This could include posters in staff areas, emails, messages or announcements during team meetings.
Feedback on Behaviour: Monitor and provide informative or evaluative feedback on performance of the behavior (e.g. form, frequency, duration, intensity)	provide feedback on staff participation. Highlight how many staff members were vaccinated and how their participation contributed to the overall health and safety of the care home. For example, use 'fluometer,' in care homes to track and display vaccination rates for care home staff.
Financial Incentive (Reinforcement)	
Threat: Inform that future punishment or removal of reward will be a consequence of performance of an unwanted behaviour (may include fear arousal).	While typically used to address barriers, in this context, threat could involve reminding care home manager (or vaccine providers) of the potential financial risks if they do not support the vaccination clinics, such as risk of influenza outbreaks and mortality caused by influenza.
Self-reward: Plan to reward self in future if and only if there has been effort and/or progress in performing the behavior	Encourage care home manager (or vaccine providers) to view implementation of the vaccination clinics as an opportunity to reward themselves, either financially or personally. They can allocate part of the reimbursement for personal or professional development, which can reinforce continued involvement in the clinics.
Differential Reinforcement: Arrange reward for performance of an alternative to the unwanted behaviour	Provide financial incentives for care home managers or vaccine providers who meet vaccination targets, such as vaccinating a certain number of care home staff or conducting multiple clinics.

Table 24: Barriers, Prioritized TDF Domains, and Linked Behaviour Change Techniques (BCTs) for Improving Vaccination Clinic Implementation. (Continued)

BCTs and definition[134]	Example for the intervention components
Financial Incentive (Reinforcement) (Continued)	
Incentives (outcome): Inform that a reward will be delivered if and only if there has been effort and/or progress in achieving the behavioural outcome	Offer financial incentives for vaccine providers who are willing to travel to multiple care homes or offer vaccinations during more challenging times, such as early in the influenza season. These incentives can further motivate them to participate and expand clinic outreach and reach night shift staff.
Thinning (Reduce reward frequency): Arrange for rewards to be made contingent on increasing duration or frequency of the behavior	reduce the amount of financial reimbursement over time as the vaccination clinics become more established and require fewer resources.
Negative reinforcement (Remove punishment): Arrange for removal of an unpleasant consequence contingent on performance of the wanted behavior	Frame the reimbursement as a way to avoid financial loss for the time and resources spent on the vaccination clinics. Ensures that vaccine providers remain motivated to participate, knowing that they will not face any financial burdens from their involvement in the clinics.
Shaping (Reward approximation): Arrange for reward following any approximation to the target behavior, gradually rewarding only performance closer to the wanted behavior	Provide financial rewards as vaccine providers demonstrate improved performance or engagement with the vaccination clinics, such as completing a certain number of clinics or vaccinating a set number of care home staff.
Counter Conditioning (Reward incompatible behavior): Arrange reward for responding in a manner that is incompatible with a previous response to that situation	Shift the focus of financial reimbursement from just a business transaction to one that highlights its role in supporting public health. Emphasize the long-term benefits for care home managers or vaccine providers and their businesses. This approach could encourage a sense of responsibility and personal satisfaction, motivating continued participation.
Discrimination Training (Situation-specific reward): Arrange for reward following the behavior in one situation but not in another	vaccine providers could receive a reward (such as financial incentives or recognition) when they deliver vaccinations to care homes early, but not when the clinics are scheduled late in the season.
Material Reward: Arrange for the delivery of money, vouchers or other valued objects if and only if there has been effort and/or progress in performing the behavior	offer physical rewards such as additional resources, equipment, or technology to support the vaccine providers' work.
Social Reward: Arrange verbal or non-verbal reward if and only if there has been effort and/or progress in performing the behavior	As above.
Non-Specific Reward: Inform that a reward will be delivered if and only if there has been effort and/or progress in performing the behavior	Offer generalized rewards for participation, such as vouchers or gift cards, in addition to financial reimbursement.
Response Cost (Behavior cost): Arrange for withdrawal of something valued if and only if an unwanted behavior is performed	Emphasize the opportunity cost of not participating in the vaccination clinics, such as missed reimbursement and the potential loss of future work opportunities.

Table 24: Barriers, Prioritized TDF Domains, and Linked Behaviour Change Techniques (BCTs) for Improving Vaccination Clinic Implementation. (Continued)

BCTs and definition[134]	**Example for the intervention components**
Financial Incentive (Reinforcement) (Continued)	
Anticipation of Future Rewards or Removal of Punishment: Arrange for future rewards or removal of punishments will be a consequence of undertaking the desired behaviour.	Encourage vaccine providers (or care home manager) by highlighting potential future rewards, such as ongoing funding opportunities or the removal of certain administrative burdens if they continue participating in the vaccination clinics.
Punishment: Arrange for aversive consequence contingent on the performance of the unwanted behavior	consider penalties for vaccine providers who fail to meet the agreed number of clinic sessions without a valid reason, such as withholding part of the reimbursement.
Extinction (Remove reward): Arrange for discontinuation of contingent reward following performance of the unwanted behavior	Phase out financial reimbursement if vaccine providers or managers fail to meet performance expectations over time, ensuring that those who are less engaged do not continue to receive financial reimbursement.
Classical Conditioning (Associative learning): Present a neutral stimulus jointly with a stimulus that already elicits the behavior repeatedly until the neutral stimulus elicits that behavior	Pair financial reimbursement with positive outcomes, such as increased professional recognition or a sense of accomplishment.

Note: BCTs = Behaviour Change Techniques; TDF = Theoretical Domains Framework.

5.3.4 Initial Appraisal of BCTs

Table 25 presents the intervention components that were excluded from consideration at this stage, along with the rationale for their exclusion. The appraisal was conducted by the PhD candidate in collaboration with two members of the FluCare team (AP and SS), using the APEASE criteria to assess the suitability of each BCT. BCTs associated with the "Coercion" intervention function for example, *Threat*, *Response Cost*, *Punishment*, and *Extinction* were excluded from further consideration. These techniques were not recommended by vaccine providers during the interviews in Chapter 4. They were also considered unacceptable due to concerns that they could foster adversarial relationships, reduce morale, and hinder collaboration between care home managers and vaccine providers. Their inclusion was viewed as likely to undermine trust and compromise the long-term sustainability of the intervention. By excluding BCTs that lacked support from the qualitative findings and were inconsistent with the views of vaccine providers, the final selection focused on techniques judged to be both feasible and acceptable within the care home context. The included BCTs, summarised in Table 24, included strategies such as prompts and cues, social support, feedback, and provision of health-related information. These approaches were considered most appropriate for enhancing the delivery of vaccination clinics, as they align with the prioritised TDF domains and address the key barriers and enablers identified in earlier stages of the analysis.

Table 25: Behaviour Change Techniques (BCTs) excluded through initial appraisal, with examples of intervention components and reasons for exclusion based on the APEASE criteria.

BCTs and definition	Example for the intervention components	Rationale for exclusion based on the APEASE criteria
Restructuring the physical environment: Change, or advise to change the physical environment in order to facilitate performance of the wanted behavior or create barriers to the unwanted behavior	Set up a dedicated, permanent vaccination area within the care home that is always ready to be used. This would include storage for vaccines, a pre-arranged layout for clinic activities, and essential paperwork. This reduces the time needed to set up clinics once vaccines become available, allowing for earlier scheduling and implementation.	this BCT may not be affordabile and practical, especially for care homes with limited space and resources, because of the cost required to change
Threat: Inform that future punishment or removal of reward will be a consequence of performance of an unwanted behaviour (may include fear arousal).	While typically used to address barriers, in this context, threat could involve reminding care home manager (or vaccine providers) of the potential financial risks if they do not support the vaccination clinics, such as risk of influenza outbreaks and mortality caused by influenza.	warning care home managers and vaccine providers about potential financial risks or the consequences of flu outbreaks, may create negative perceptions and resistance.
Response Cost (Behavior cost): Arrange for withdrawal of something valued if and only if an unwanted behavior is performed	Emphasize the opportunity cost of not participating in the vaccination clinics, such as missed reimbursement and the potential loss of future work opportunities.	Withdrawing valued resources or benefits can be seen as punitive. This approach may affect relationships between care homes and vaccine providers and lead to decreased long term cooperation.
Punishment: Arrange for aversive consequence contingent on the performance of the unwanted behavior	Although less desirable in this context, consider penalties for vaccine providers who fail to meet the agreed number of clinic sessions without a valid reason, such as withholding part of the reimbursement.	Unacceptable to most stakeholders., and likely to harm relationships and reduce future participation. Could be seen as unfair, particularly if circumstances beyond control prevent implementation.
Extinction (Remove reward): Arrange for discontinuation of contingent reward following performance of the unwanted behavior	Phase out financial reimbursement if vaccine providers or managers fail to meet performance expectations over time, ensuring that those who are less engaged do not continue to receive financial reimbursement.	Likely to be poorly received, as it could be seen as punitive and result in decreased motivation and future participation.

Table 25: Behaviour Change Techniques (BCTs) excluded through initial appraisal, with examples of intervention components and reasons for exclusion based on the APEASE criteria. (Continued)

BCTs and definition	Example for the intervention components	Rationale for exclusion based on the APEASE criteria
Shaping (Reward approximation): Arrange for reward following any approximation to the target behavior, gradually rewarding only performance closer to the wanted behavior	Provide incremental financial rewards as vaccine providers demonstrate improved performance or engagement with the vaccination clinics, such as completing a certain number of clinics or vaccinating a set number of care home staff.	Acceptable/effective: Too complicated an incentive structure.
Self-reward: Plan to reward self in future if and only if there has been effort and/or progress in performing the behavior	Encourage care home manager (or vaccine providers) to view implementation of the vaccination clinics as an opportunity to reward themselves, either financially or personally.	Likely to be ineffective.
Biofeedback: Provide feedback about the body (e.g. physiological or biochemical state) using an external monitoring device as part of a behavior change strategy	After staff members are vaccinated, share immediate positive outcomes such as reduced absenteeism or increased protection during influenza season.	Likely to be ineffective. The data on this is weak.
Negative reinforcement (Remove punishment): Arrange for removal of an unpleasant consequence contingent on performance of the wanted behavior	Framing reimbursement as a way to offset the time and resources spent on vaccination clinics helps ensure that vaccine providers can participate without financial losses.	Likely to be ineffective.
Material Reward: Arrange for the delivery of money, vouchers or other valued objects if and only if there has been effort and/or progress in performing the behavior	Offer physical rewards such as additional resources, equipment, or technology to support the vaccine providers' work.	Likely to be ineffective.
Counter Conditioning (Reward incompatible behavior): Arrange reward for responding in a manner that is incompatible with a previous response to that situation	Reframe financial reimbursement as more than just a business and highlight its role in supporting broader public health goals.	Not effective for pharmacies. They are already vaccinating many populations
Classical Conditioning (Associative learning): Present a neutral stimulus jointly with a stimulus that already elicits the behavior repeatedly until the neutral stimulus elicits that behavior	Linking financial reimbursement to positive outcomes, such as enhanced professional recognition or a sense of achievement.	Likely to be ineffective.

Note: BCT = Behaviour Change Technique; APEASE = Affordability, Practicability, Effectiveness and cost-effectiveness, Acceptability, Side-effects/safety, and Equity.

5.4 Discussion

This chapter focused on identifying interventions to enhance the delivery of vaccination clinics for care home staff. This chapter identified key barriers and enablers affecting the successful delivery of these clinics and mapped them to intervention function, policy categories and BCTs using the TDF.

The methods used in this chapter were focused on identifying interventions to enhance the implementation of vaccination clinics specifically within the context of the FluCare study. These interventions were designed to address the immediate challenges and barriers identified during the study, rather than aiming for nationwide adoption of the intervention. Some of the proposed interventions aim to improve the delivery of vaccination clinics directly under the FluCare study. Additionally, while this chapter provides initial insights into potential policy categories, broader structural and systemic changes would be necessary to facilitate national adoption. For example, implementing national policies that incentivize in-care home vaccination clinics for care home staff and ensuring that pharmacist and GPs are financially supported to deliver these services. To achieve this, further studies would be required to select policy categories and BCTs that are most likely to support national adoption.

One of the most significant findings was the influence of Environmental Context and Resources on the implementation of vaccination clinics. Similar to other healthcare interventions, the time constraints were identified as major barriers to the implementation[289]. Vaccine providers frequently cited this as key factors impeding clinic implementation and staff engagement. While large-scale restructuring of the care home environment may not be feasible at this stage, smaller-scale interventions such as prompts and cues can be introduced to improve clinic scheduling. For example, sending reminders to notify care home managers at the start of the influenza season can help ensure that clinics are scheduled earlier. Reminders in the form of prompts and cues have been shown to significantly improve the provision of preventive healthcare services[290]. This would also address the issue of late timing, which was a significant barrier in previous delivery of the FluCare intervention. Additionally, these reminders can help improve the vaccination rate among care home staff by ensuring timely communication and encouraging

participation[92,194,212]. By beginning clinic planning earlier in the season, care home managers can maximize participation by providing sufficient notice to care home staff.

A key barrier identified in the study was social influence, particularly the role that care home managers can play in delivering vaccination clinics. In many studies, staff participation is influenced by their perceptions of management support and leadership involvement[192,194,196,201,202,204,207,212,215,216,226,230]. By actively promoting the vaccination process, care home managers can create a culture that encourages staff to prioritize their own health and well-being.

Feedback on behaviour is another powerful tool in reinforcing positive actions. Providing care home managers with regular feedback on vaccination rates and overall success could serve as a motivational tool. For example, tracking the number of vaccinated staff and providing this information to both management and the staff could highlight the positive impact of the clinics[217].

This chapter builds on earlier findings from Chapter 2, where the systematic review identified that a lack of awareness about the availability of the influenza vaccine was a significant barrier to vaccine uptake. In this chapter, the focus shifts to the specific context of vaccination clinics, revealing that a lack of awareness about these clinics was a key barrier to engagement. Many staff members were either unaware of the clinics or did not fully understand the health benefits of vaccination, both for themselves and the residents. This knowledge gap can directly impact clinic attendance and overall vaccination rates.

Raising awareness about the availability of the influenza vaccine could improve engagement with the vaccination clinics, as staff are more likely to participate when they are informed about both the timing and benefits of the vaccination[195]. Educational interventions should be focused on marketing and communicating the vaccination clinics. These interventions can include visual prompts such as posters and leaflets that provide clear information about the timing of the vaccine providers visits and the benefits of influenza vaccination.

Another enabler identified in the study was the use of financial incentives to encourage vaccination clinic participation. Offering rewards to care home managers and vaccine providers for meeting vaccination targets is a practical strategy that could work in care

homes[194,211,229]. Incentives could include financial incentives or public recognition for care homes that achieve high vaccination rates among staff.

Proposed Interventions for FluCare study

The methods used in this chapter led to the development of feasible and practical interventions that used by the FluCare research team to enhance the clinics delivery. The PhD candidate in collaboration with process evaluation member (TK) developed clinic guides for care home managers and community pharmacists (Appendix 14-15) to ensure a coordinated and effective approach to organizing the clinics.

Care home managers play an important role in the successful delivery of the FluCare intervention. In the care home manager clinics guide (Appendix 14), the managers asked to organize between two and five influenza clinics, depending on the size of the care home, by coordinating with community pharmacists. Managers are also responsible for setting reminders for clinic dates and communicating these to staff through various channels, including emails, posters, and verbal announcements. In addition, care home managers are asked to encourage staff participation, monitoring vaccination uptake, and providing feedback to the FluCare research team. Their involvement is essential to ensure a smooth and efficient vaccination process.

The community pharmacists' clinic guide (Appendix 15) encourages pharmacists to take an active role in arranging influenza clinics in care homes. This includes reaching out to care home managers to plan the clinics and following up with managers. Pharmacists are also advised to use reminders to help follow up with care homes. During the clinics, pharmacists are expected to encourage staff attendance by using posters and reminders, keep care home managers and staff informed about upcoming clinics, and report on clinic outcomes to care home managers and the FluCare research team. The guide also emphasizes the importance of using an equipment checklist to ensure clinics run smoothly and providing feedback on any barriers encountered to support continuous improvement in clinics delivery.

These guides are designed to promote collaboration between care home managers and community pharmacists, making the vaccination process more efficient, improving care home staff participation, and increasing the overall success of the clinics.

5.4.1 Strength and limitations

The method used to identify intervention components is effective in improving the implementation of vaccination clinics for care home staff. By following the systematic approach outlined by Michie et al. (2014)[134], the intervention specifically addresses the barriers identified by vaccine providers. The use of the TDF in this chapter identified several BCTs that are practical and feasible in the care home setting. The application of the APEASE criteria ensured that the interventions selected are not only theoretically grounded but also likely to be effective. A further strength is that the intervention was informed by both qualitative data collected in earlier phases of the PhD, allowing the design to reflect real-world barriers and enablers identified by vaccine providers. In addition, the PhD candidate received formal training (Appendix 10) through two structured courses: (1) an online course titled *Developing and Testing Complex Healthcare Interventions*, designed for Pharmacy PhD students, and (2) the UCL Summer School course on *Introduction to Behaviour Change: Principles & Practice*. These courses strengthened the rigour and theoretical grounding of the intervention development process and supported the accurate application of behavioural frameworks such as the TDF**.** FluCare research team (AP and SS) involvement at key points, such as the review of selected BCTs and intervention components added further rigour and helped ensure the feasibility and relevance of the proposed strategies for use in care home settings.

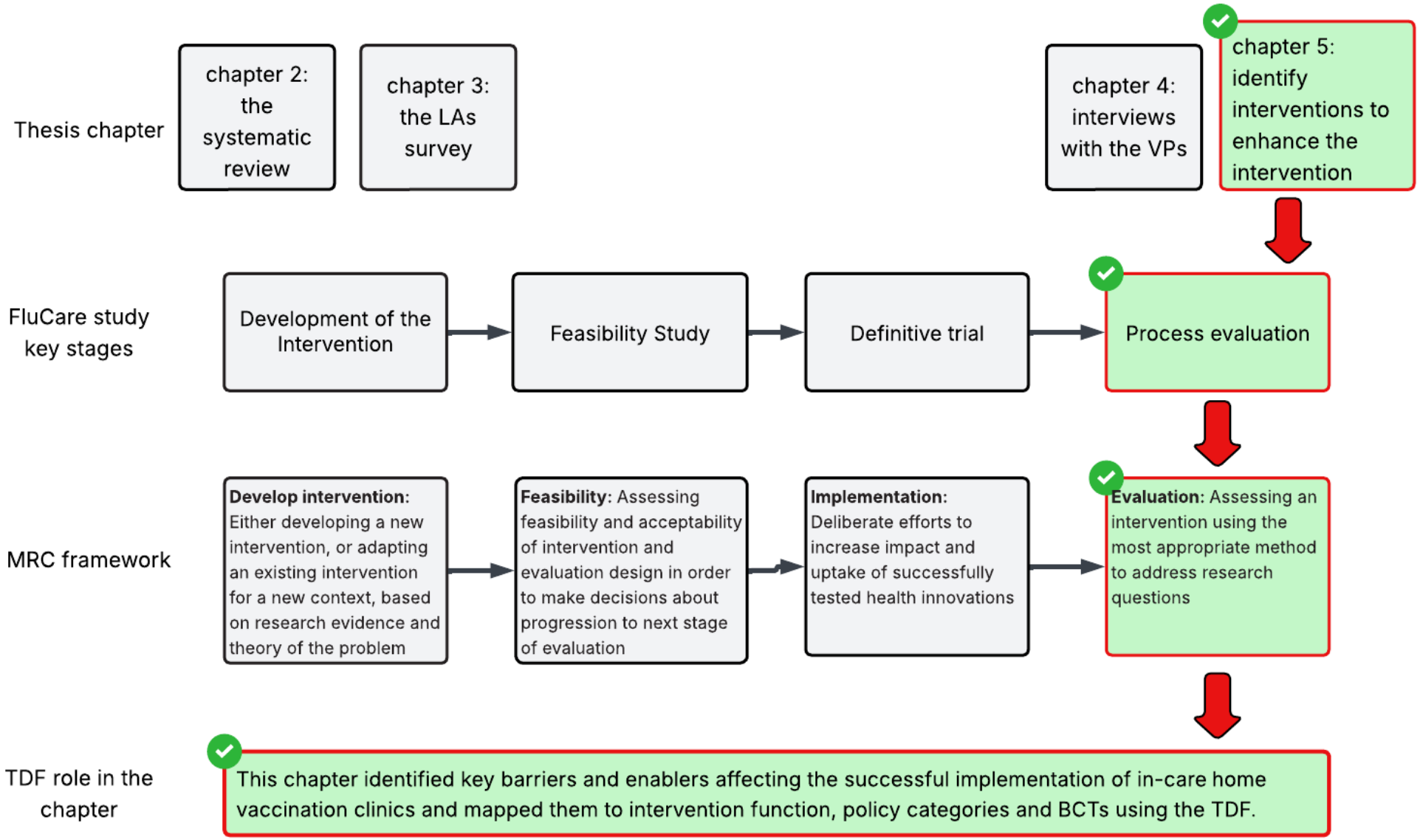
However, this chapter has limitations that should be acknowledged. The vaccine providers recruited for the Flucare study were those who were actively engaged with the FluCare project. This introduces a potential selection bias, as their perspectives may be more positive and optimistic compared to those of under-resourced or overworked pharmacies not participating in FluCare, who might have reported greater barriers or less enthusiasm toward delivering vaccination clinics**.** Chapter 4 primarily focused on the perspectives of vaccine providers to identify barriers and enablers for delivering vaccination clinics. While their insights were valuable, this creates a major limitation in that vaccine provider data was used, in part, to understand how to potentially change care home manager behaviour, without obtaining direct input from care home managers themselves. Their roles in scheduling, organizing, and promoting clinics are critical to successful delivery. Additionally, the identification of intervention components was conducted as a desk-based exercise by the PhD

candidate with supervision from the supervisory team. Furthermore, the mapping of identified barriers and enablers to behaviour change techniques (BCTs) was undertaken by a single researcher (the PhD candidate), which may have introduced some bias despite efforts to ensure consistency and transparency. This approach served as a practical step to sense-check next steps and guide future research. However, a more robust methodological approach, involving a wider and more diverse range of stakeholders, such as care home managers, care home staff, administrative coordinators, and public health representatives, will be necessary in future research to refine these interventions and validate their feasibility in care home settings.

5.4.2 Conclusion

Successfully delivering vaccination clinics in care homes requires a comprehensive approach that addresses environmental and social challenges. This chapter presented a structured strategy to enhance the FluCare intervention by targeting key barriers, such as delays in scheduling and limited communication, which obstruct the efficient delivery of vaccination clinics. The identified interventions, focusing on earlier scheduling and improved communication strategies, are evidence-based and directly support the FluCare intervention. Future studies should evaluate these interventions and refine them based on feedback from stakeholders. Collaborating with care home managers and vaccine providers to co-design these interventions will be essential to ensure they are feasible and acceptable. Additionally, future research should explore ways to integrate the proposed interventions into healthcare policies, including developing a policy document and an implementation guide for care homes to support the national dissemination of the intervention. Figure 9 summarises the contribution of Chapter 5 to the FluCare project. It shows how this chapter aligns with the MRC framework stages of process evaluation and highlights the role of the TDF in mapping barriers and enablers to intervention components and BCTs

Figure 9: Chapter 5 Contribution to FluCare Project, MRC Framework, and TDF Role.



Note: LA = Local Authority; VPs = Vaccine Providers; TDF = Theoretical Domains Framework; MRC = Medical Research Council; BCTs = Behaviour Change Techniques.

Chapter 6: Discussion

6.1 Introduction

This discussion chapter brings together the key findings from the previous chapters of the thesis, contextualising them within the broader literature and reflecting on their implications for practice and research. The overarching aim of this thesis was to explore the development of evidence-based interventions to improve influenza vaccination uptake among care home staff.

To achieve this, the thesis applied two complementary frameworks: the Medical Research Council (MRC) guidance for developing and evaluating complex interventions[135], and the Theoretical Domains Framework (TDF)[148]. The MRC framework provided a structured process for intervention development and evaluation, while the TDF supported a behavioural analysis of the barriers and enablers influencing influenza vaccine uptake and delivering vaccination clinics. This integrated approach ensured that the FluCare intervention was both theoretically informed and practically applicable.

The TDF was used to identify behavioural influences through a systematic review and qualitative interviews with vaccine providers. A national survey of local authorities was also conducted to assess existing initiatives aimed at improving vaccination uptake in care homes. These studies collectively informed the development and refinement of the intervention in line with MRC guidance.

This chapter begins with a summary of the main findings of the thesis, followed by a discussion of the contributions made by the studies to the existing body of knowledge and to the FluCare study. It then addresses the strengths and limitations of the research. Finally, recommendations for future research are outlined, including suggestions for further development and evaluation of the proposed interventions.

6.2 Overview of the thesis

Chapter 1: The introduction chapter of thesis provided a comprehensive review of the literature on the importance of improving influenza vaccination rates among care home staff. It highlighted the critical role of vaccination in reducing morbidity and mortality, particularly among vulnerable groups such as older people. The chapter explores various interventions aimed at increasing vaccination rates among health and social care workers.

The introduction chapter also explored the current state of influenza vaccination, including its safety and efficacy, and discussed the expanding role of community pharmacists in vaccination efforts, noting their growing impact on public health initiatives. It also discussed policy initiatives aimed at increasing influenza vaccine uptake among care home staff, including initiatives allowing pharmacists to administer NHS influenza vaccines to care home staff. Several barriers and enablers influencing vaccination uptake, particularly within care home settings, were identified and discussed.

The chapter then introduces the FluCare study, which aims to estimate the effectiveness and cost-effectiveness of a complex intervention designed to increase influenza vaccination rates among care home staff. It also outlined the theories and frameworks used to guide the development and evaluation of such interventions, aligning with the Medical Research Council (MRC) guidance for complex interventions. The MRC framework provided the overall structure for the thesis, supporting a systematic approach to intervention development, process evaluation, and refinement. The TDF was highlighted as a key framework in exploring and developing the intervention.

To address the overarching aim of this thesis and support the FluCare study's development and evaluation, three distinct studies were conducted, each contributing to the thesis's objectives.

Chapter 2: The first study in this thesis was a systematic review aimed to identify the barriers and enablers that influence influenza vaccine uptake among care home staff. The barriers and enablers were mapped to the TDF domains, providing a structured understanding of the barriers and enablers in this context. The systematic review highlighted several key barriers to vaccine uptake, including doubts about the effectiveness and safety of the influenza

vaccine, concerns about side effects, and the perception that the vaccine is unnecessary or ineffective *(Beliefs about consequences**).*** Additionally, financial constraints, the lack of free vaccines, and lack of accessibility to influenza vaccine were common barriers *(Environmental context and resource)*. The systematic review also highlighted widespread misconceptions about the influenza vaccine and a general lack of knowledge about its benefits, risks, and importance *(Knowledge**)***. Furthermore, lack of support and encouragement from managers and employers was identified as a significant barrier to influenza vaccine uptake *(Social influences**).***

Conversely, the systematic review identified several enablers that could facilitate vaccine uptake. These included the availability of free on-site vaccination clinics *(Environmental context and resources),* encouragement and support from managers *(Social influences),* and the use of reminders to staff about the vaccine and clinic schedules *(Memory, Attention, and Decision Processes).*

These findings were important in designing the FluCare intervention, emphasizing the importance of addressing both organizational and individual barriers to influenza vaccine. The systematic review provided a comprehensive synthesis of factors influencing vaccine uptake, offering critical insights for developing targeted interventions. By mapping the barriers and enablers to the TDF, the review laid a foundation for identifying Behaviour Change Techniques (BCTs) that were subsequently incorporated into the FluCare intervention. These BCTs aimed to address the specific barriers faced by care home staff, ensuring the intervention was evidence-based and responsive to their needs.

Chapter 3: The second study in this thesis was a cross-sectional survey aimed to identify the initiatives implemented by local authorities to enhance influenza vaccination uptake among care home staff. To achieve a high response rate, the survey was distributed to all local authorities in England using a freedom of information request (FOI).

The findings showed that the most commonly implemented interventions were educational interventions (91.4%) and interventions to improve access to influenza vaccine (63.8%). In contrast, incentive interventions targeting care homes (14.3%) and staff (9.5%) were less frequently reported. Regression analysis suggested that certain interventions, such as

informing staff about vaccination goals and policies and the overall availability of interventions to enhance access to the vaccine may be associated with higher staff vaccination rates, although none reached conventional levels of statistical significance. However, a low number of local authorities conducted evaluations of these interventions, with only 18.1% (n=19) reporting that they had evaluated their initiatives. This lack of evaluation underscores the need for more robust assessment methods to ensure interventions are effective.

The results suggest that future efforts should focus on educational and expanding access to vaccination and ensuring continuous evaluation to refine and improve interventions. The study's findings offer a valuable foundation for designing targeted, evidence-informed strategies to increase vaccination uptake among care home staff and align with MRC guidance by contributing to the development phase of complex interventions.

Chapter 4: The third and final study in this thesis focused on identifying the barriers and enablers that affect the delivery of in-care home vaccination clinics for care home staff, specifically within the context of the FluCare trial. Interviews with vaccine providers (community pharmacists and GP practice staff) showed several barriers and enablers to effective clinic delivery. The findings indicate that the late initiation of vaccination clinics during the influenza season was a significant barrier, leading to logistical challenges such as limited vaccine supply and reduced staff engagement *(Environmental context and resource).* Furthermore, lack of awareness about the clinics obstructed participation in the vaccination clinics *(Knowledge).* Lastly, poor communication and coordination with care home managers contributed to inefficiencies in delivering and setting up the vaccination clinics *(Social influences).*

Support and encouragement from care home managers, particularly through effective communication, played a key role in facilitating smoother clinic delivery and increasing staff engagement *(Social influences).* In addition, early planning and preparation, such as initiating vaccination clinics earlier in the influenza season, were identified as key enablers for addressing many of the logistical and engagement challenges *(Environmental context and resource).* Furthermore, providing financial incentives and reimbursement would encourage more vaccine providers, especially independent pharmacists, to participate in the clinics

(Reinforcement). Overall, the chapter emphasizes the importance of addressing these barriers and utilizing the identified enablers to enhance the delivery of vaccination clinics within care homes.

Chapter 5: Based on the results of the third study (chapter 4), Chapter 5 introduced a systematic approach to identify potential interventions aimed at enhancing the delivery of vaccination clinics for the FluCare study extension. This approach involved identifying key barriers and enablers, and using the Theoretical Domains Framework (TDF) to propose tailored interventions. It prioritized three main barriers— delayed timing of intervention implementation, lack of communication and coordination with care home managers, and limited staff awareness about the vaccination clinics—and one enabler, financial incentives. The process outlined in the chapter identified intervention functions (e.g., education), policy categories (e.g., guidelines), and a full range of BCTs that could enhance the delivery of vaccination clinics. In the context of the FluCare study, an intervention was identified to enhance coordination, communication, and overall clinic delivery through guides for care home managers and vaccine providers (Appendix 14-15).

6.3 Contribution of the PhD to the FluCare study

Developing an intervention to support influenza vaccination uptake for care home staff

During the intervention development phase, researchers need to consider several key actions, such as understanding the problem, involving stakeholders, designing and refining the intervention, and using existing evidence[291].

The systematic review (Chapter 2) played a key role in the development of the FluCare intervention by identifying critical barriers and enablers to influenza vaccination among care home staff. This provided strong evidence base and ensured the intervention was theoretically grounded, aligning with the Medical Research Council (MRC) guidance for developing complex interventions. The systematic review helped in identifying the specific barriers (e.g., insufficient understanding of the vaccine, its efficacy, or misconceptions about the vaccine, perceiving the vaccine as ineffective and unsafe, fear of influenza vaccine and its side effects, and experiencing limited accessibility to the vaccine) and enablers (e.g., free

onsite influenza vaccine, encouragement and support from workplace, and reminders) that influence influenza vaccine uptake among care home staff. This information is essential for designing an intervention that directly addresses these factors, ensuring the intervention is relevant and effective in overcoming the key barriers faced by the care home staff[291].

The FluCare research team mapped the identified barriers and enablers onto Behaviour Change Techniques (BCTs), ensuring the intervention was systematically underpinned by theory. For instance, access to the vaccine is a significant barrier, the FluCare research team focused on improving logistical arrangements, such as offering on-site vaccinations. The systematic review in this thesis conducted as part of the FluCare study plays an important role in the development of the intervention by providing a detailed understanding of the barriers and enablers to influenza vaccine uptake among care home staff.

By gathering insights from local authorities (chapter 3) responsible for public health initiatives, the local authorities survey offers an overview of the strategies currently implemented to support influenza vaccination uptake among care home staff. This enables the FluCare study to build on real-world practices, making the intervention relevant and tailored to specific needs.

The local authority survey identified that influenza vaccination uptake among care home staff remains low. Local authorities in England have implemented interventions, but these interventions have not led to significant improvements in uptake. The survey results provide more evidence, in addition to the existing evidence, that low vaccination uptake among care home staff is a critical issue that needs to be addressed through targeted interventions[70]. Additionally, involving stakeholders throughout the intervention development process is essential to guide the next steps in designing a practical intervention[291]. By engaging local authorities, the local authority survey gathers a data would helping to shape a future intervention that is tailored to the specific needs and contexts of care homes. The local authority survey found that some interventions may associated with higher vaccination rate. Educational interventions were the most commonly used by local authorities. However, these interventions alone did not significantly improve vaccination rates[93,96]. MRC guidance recommends drawing on existing evidence to inform intervention design[135,139]. Existing systematic reviews on the effectiveness of interventions on vaccination rates[97,98], along with

the survey findings, indicate that multifaceted approaches—combining education with improved access and incentives—could be more effective in raising vaccination rates among care home staff.

Overall, the systematic review offers a comprehensive understanding of the barriers and enablers to influenza vaccination uptake, while the local authority survey plays a role in identifying the existing practices and innovations in local authorities' efforts to improve influenza vaccination uptake among care home staff. Together, they form the foundation for designing an evidence-based, theory-informed intervention that is tailored to the challenges to influenza vaccine uptake among care home staff.

Identifying behaviour change techniques (BCTs)

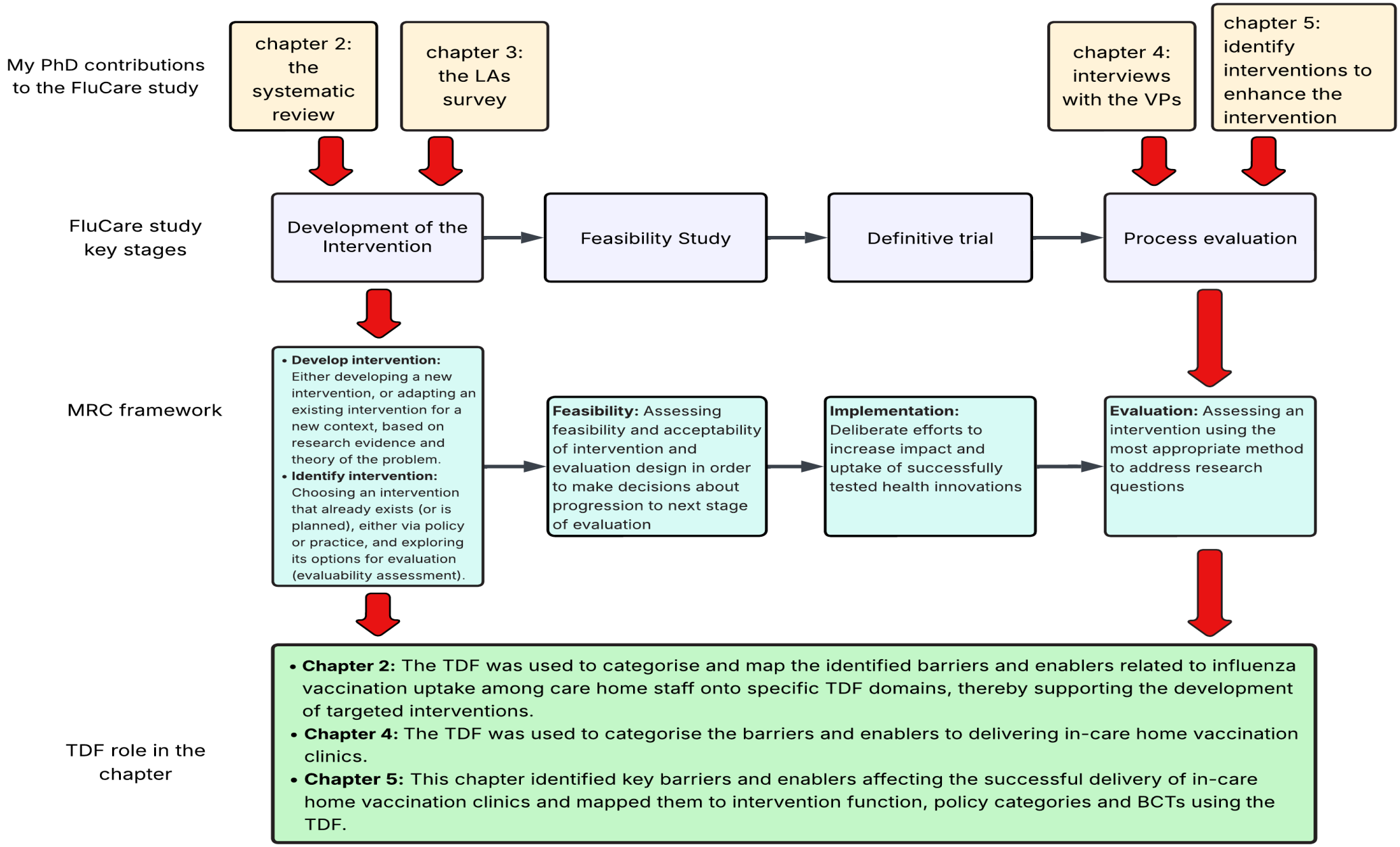
The interviews with the vaccine providers at the end of the FluCare definitive trail (Chapter 4) played an important role in informing future modifications to the FluCare intervention, as recommended by the MRC guidelines for complex interventions[153]. These interviews were essential in identifying the key barriers and enablers to the delivery of vaccination clinics in care homes. By mapping these findings onto the TDF domains, the PhD candidate was able to systematically categorize and analyze the factors influencing the intervention's effectiveness.

The systematic approach outlined in chapter 5 identified the key barrier and enablers to delivery, intervention functions, policy categories, and comprehensive BCTs. This process highlighted the key challenges faced by vaccine providers, such as communication with care home managers and the timing of clinics. Based on these findings, interventions were developed, including guides for care home managers and vaccine providers to streamline the organization and delivery of vaccination clinics. Furthermore, the complete range of BCTs proposed in Chapter 5 offers a foundation for future research to identify the most effective BCTs to facilitates successful delivery and sustainability of the intervention.

Figure 10 provides a visual summary of the contribution of each thesis chapter to the development and refinement of the FluCare intervention. It illustrates how each chapter aligns with specific stages of the FluCare study and the MRC framework, and highlights the role of the Theoretical Domains Framework (TDF) where applicable. This integrated visual clearly shows how the systematic review (Chapter 2), the local authority survey (Chapter 3),

the qualitative study with vaccine providers (Chapter 4), and the intervention development (Chapter 5) each informed the development, evaluation, and refinement of the FluCare study.

Figure 10: Thesis Contribution to FluCare Project, MRC Framework, and TDF Role.



Note: LA = Local Authority; VP = Vaccine Provider; TDF = Theoretical Domains Framework; MRC = Medical Research Council; BCTs = Behaviour Change Techniques.

6.4 Contributions of PhD to the Body of Knowledge and Their Implications

Key contribution of this thesis is the application of the TDF to map the barriers and enablers influencing influenza vaccination uptake among care home staff. By integrating behaviour change theory into the context of healthcare interventions in care homes, the research provides a structured framework for identifying and addressing specific behavioral determinants. Notably, the systematic review conducted as part of this thesis was the first review to examine the barriers and enablers of influenza vaccine uptake specifically among care home staff. While previous systematic reviews have examined factors influencing vaccination uptake in other healthcare settings, this review specifically focused on care home staff, filling an important gap and providing a foundation for designing targeted interventions in similar contexts.

In addition, this PhD thesis makes a contribution through the survey of local authorities, which was the first study to explore the interventions implemented by local authorities in England to improve influenza vaccination uptake among care home staff. The survey provides valuable insights into local authorities-led initiatives, highlighting commonly adopted approaches such as educational campaigns and efforts to improve access to vaccinations. Notably, while some local authorities have implemented interventions such as onsite vaccination clinics, many may still face barriers to effective evaluation of the interventions. The survey's findings underscore the need for targeted support to strengthen local authorities' initiatives, particularly by establishing mechanisms for continuous evaluation. Additionally, identifying educational and access-enhancing interventions as potentially effective interventions provides a foundation for future research and policy to focus on strategies that improve knowledge and vaccination accessibility. The survey establishes a baseline for understanding the role of local authorities in supporting vaccination efforts within care homes, offering valuable and context-specific evidence to guide the design and implementation of future interventions.

The interviews with vaccine providers represent the first study to evaluate how vaccination clinics were delivered in care homes. While previous research has focused on interventions to improve vaccination rate in care homes, little attention has been given to assessing how

these clinics were delivered. This study fills that gap by emphasizing the value of process evaluation in understanding the factors that contributes to the success of vaccination clinics. By gathering direct feedback from vaccine providers, the research provides valuable insights into the barriers and enablers that impact the delivery. These insights highlight the importance of evaluating implementation to ensure vaccination clinics run effectively and achieve their intended goals. This study underscores the need for continuous evaluation to refine and improve the delivery of vaccination services in care homes.

Implications to practice

This PhD thesis emphasizes the need for stronger collaboration between vaccine providers and care home managers to improve influenza vaccination rates among care home staff. Effective communication strategies and the establishment of shared goals can promote a more coordinated delivery of the intervention and encouraging greater staff participation in vaccination clinics. By promoting open communication and aligning objectives, care homes can achieve higher vaccination uptake among staff, ultimately protecting the health and safety of vulnerable residents. A coordinated delivery can also streamline the organization of vaccination clinics, optimize the use of resources, and improve the efficiency and long term sustainability of public health initiatives in care home settings.

In terms of practical applications, the proposed interventions, such as guides for care home managers and vaccine providers, are designed to improve coordination, scheduling, and communication, ultimately leading to better clinic delivery and higher vaccination rates. These contributions extend beyond the specific context of FluCare, providing a valuable framework for future public health interventions aimed at increasing vaccination uptake in other populations.

6.5 Strength and limitations of the PhD

The strengths and limitations of each study were discussed within their respective chapters (Chapters 2–5); however, there are also overarching strengths and limitations associated with the thesis.

Strengths

The strengths of this research is its theory-driven approach, particularly through the use of the TDF, which provided a solid foundation for developing and evaluating interventions. This theoretical approach was complemented by alignment with the Medical Research Council (MRC) guidance on developing complex interventions, ensuring the work followed a systematic, evidence-based development process. This theoretical framework enabled the identification of key barriers and enablers related to vaccination uptake and delivering vaccination clinics, resulting in practical, evidence-based interventions to improve the vaccination rate and proposed interventions to enhance the delivery of vaccination clinics.

In addition, a strength of this thesis is the active engagement and collaboration with the FluCare team throughout key stages of the research. This included the development of the survey, the protocol for the process evaluation, and the analysis of interview data. This collaborative approach ensured that the research was closely aligned with the practical needs and objectives of the FluCare intervention, which enhanced the relevance and applicability of the findings.

In this thesis, a mixed-methods approach was adopted to address the overarching research aim. This approach combined evidence from a systematic review of published literature, identified current practice through a cross-sectional survey of local authorities, and analysed responses from qualitative interviews with vaccine providers. One of the key advantages of using mixed methods is that it leverages the strengths of both qualitative and quantitative methodologies, effectively countering the limitations associated with each method when used independently.

Finally, as part of my doctoral training, I completed formal training in intervention development, including training sessions on applying behavioural theory, selecting behaviour change techniques (BCTs), and using frameworks such as TDF. This training further enhanced the rigour and quality of the intervention design process.

Limitations

This research has some limitations that should be acknowledged. Firstly, interviews were conducted exclusively with vaccine providers, excluding care home managers. The inclusion of care home managers could have offered a more comprehensive understanding of the practical and organisational challenges involved in delivering vaccination clinics within care home settings.

Secondly, the process of identifying intervention components was primarily researcher-led, with limited involvement from a broader range of stakeholders. Greater engagement with practitioners, policymakers, and care home staff during this phase may have enhanced the perceived feasibility and acceptability of the proposed intervention components.

Another limitation relates to the sample size and diversity of the vaccine providers who participated. With only 27 vaccine providers taking part in the FluCare study, purposive sampling was not feasible. As a result, the sample may not fully represent the diversity of views and experiences across all vaccine providers, which could limit the richness of qualitative insights.

Lastly, the generalisability of the findings is constrained by the study's focus on vaccine providers and its reliance on local authority survey data. Input from care home staff, managers, and other relevant stakeholders—who also play critical roles in vaccination delivery—was not included. This restricts the study's ability to fully capture the complexities of vaccination implementation in real-world care home environments.

Future research should aim to incorporate a wider range of stakeholder perspectives during both the data collection and intervention development phases, and consider co-design approaches to enhance relevance, buy-in, and potential for successful implementation.

6.6 Recommendations for future research

This research has highlighted several areas for future investigation to further enhance vaccination initiatives in care home settings. Key recommendations include:

Broaden data sources through additional surveys

Future studies should also consider conducting surveys with other relevant organisations, such as Clinical Commissioning Groups (CCGs) or similar regulatory and support bodies, to gain broader insights into interventions implemented across England and the structural and systemic factors affecting influenza vaccination uptake among care home staff. This could help identify wider contextual influences and inform more comprehensive intervention strategies.

Broaden stakeholder engagement

Future research should include a wider range of stakeholders, such as care home managers and staff, to gain a more understanding of the factors influencing vaccination clinics. Engaging these groups would offer valuable insights into the barriers and enablers they encounter, helping researchers to design interventions that are more closely aligned with the needs and challenges of care home settings.

Interviews with key stakeholders

Following the FluCare study, conducting interviews with Directors of Public Health from local authorities and Chief Officers from Community Pharmacy Committees would be helpful. These interviews could provide valuable insights into current vaccination efforts, stakeholders' perspectives on the outcomes of the FluCare intervention, and recommendations for implementing the intervention on a wider scale.

Using the Nominal Group Technique (NGT) for selecting Behaviour Change Techniques (BCTs)

Future research could explore the use of the Nominal Group Technique (NGT) to identify and select the most suitable BCTs for implementing vaccination clinics[292]. This structured, group

based method facilitates collaborative decision making by allowing participants to brainstorm ideas independently and then work together to reach a consensus on the most feasible, acceptable, and context appropriate techniques. Involving diverse stakeholders, such as vaccine providers, care home managers, and others, through NGT could help ensure that the selected BCTs are practical and acceptable, improving the chance of successful adoption and implementation of the interventions.

Evaluate Mediators of Change: For the FluCare study, future research should focus on identifying and evaluating the key factors that influence the success of vaccination clinics. These include:

- **Coordination and Communication:** Assess whether the intervention has led to better communication and collaboration between care home managers and vaccine providers.
- **Staff Engagement and Awareness:** Explore how well staff are informed about the vaccination clinics by looking at vaccination rates and conducting surveys to measure their awareness about the clinics.
- **Leadership Support:** Explore how support from care home managers influence staff vaccination rates. This could involve conducting interviews or surveys to understand the role of encouragement in motivating staff.

6.7 Conclusion

This thesis provides valuable insights by combining systematic review, quantitative survey, and qualitative interviews. The systematic review identified the barriers and enablers influencing influenza vaccine uptake at individual and organizational levels. It highlighted the complexity of factors affecting vaccine uptake among care home staff and stressed the importance of using multi-component interventions. The review emphasized that combining strategies, such as improving access to vaccines and providing educational materials, is important to effectively address the factors influencing the vaccine uptake.

The survey of local authorities showed that many are already implementing initiatives to increase vaccination rates among care home staff. One of the key findings was that improving access to the influenza vaccine presents as an opportunity to improve influenza vaccination rate.

Interviews with vaccine providers involved in the FluCare intervention offered insights into the barriers and enablers of running vaccination clinics in care homes. These interviews underscored the importance of early planning, improve collaboration between vaccine providers and care home managers, and financial support as key strategies for improving clinic implementation and participation.

In conclusion, implementing successful vaccination clinics in care homes requires a comprehensive strategy that addresses individual and organizational barriers. This thesis proposed evidence-based interventions that could enhance the implementation of the clinics. Future research should focus on testing these interventions and refining them based on input from key stakeholders. Collaborating with care home managers, vaccine providers, and policymakers to co-design these interventions will ensure they are feasible, acceptable, and sustainable. Ultimately, this approach will help improve vaccination rates in care homes, protecting both staff and residents.

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Appendices

Appendix 1: Systematic review protocol

Title

A systematic review of barriers and enablers associated with uptake of influenza vaccine among care home staff.

Review questions

- What are the barriers and enablers associated with influenza vaccine uptake among care home staff?
- What strategies exist to improve influenza vaccine uptake among care home staff?

Aim

To inform the future design and development of a care home staff intervention, we aim to provide a comprehensive synthesis of the available evidence exploring the reported barriers and enablers that affect the influenza vaccination uptake of care home staff.

Objectives.

- To identify all factors that influenced influenza vaccination of care home staff.
- To describe interventions used to improve influenza vaccine uptake
- To classify reported barriers, enablers and interventions using theoretical domain framework (TDF).

A scoping search was performed prior to this systematic review to refine the search strategy and data extraction process.

Search strategy.

Two methods will be used to search for eligible studies to be included in the systematic review:

1. Electronic database search:

The search will be undertaken on the following databases:

- PubMed Central.
- CINAHL (EBSCO).
- PsycINFO (EBSCO).
- AMED (EBSCO).
- MEDLINE (Ovid).
- EMBASE (Ovid).

- IBSS (International Bibliography of the Social Sciences).
- SCOPUS.

2. Citation search

The reference lists of studies identified as eligible for inclusion as a result of the electronic database search will be searched to identify any additional studies that meet the inclusion criteria.

The search strategy of this systematic review was built from a scoping search. The search terms for the "PICO" element were identified and built from the scoping search. The "PICO" elements are as follow:

Population	care home staff
Intervention:	influenza vaccination
Comparator	not applicable
Outcome:	barriers, enablers, beliefs, perception.

The search strategy comprises a combination of controlled vocabulary (MeSH terms) and keywords. We will modify the Mesh terms for each database that we will search. The search strategy will use Boolean operators "AND, OR" to combine the search terms and "NOT" to exclude irrelevant terms. The search strategy of the systematic review is as follows:

Population: (((nursing home[MeSH Terms]) OR (long term care[MeSH Terms])) OR (facilities, skilled nursing[MeSH Terms])) OR (residential facilities[MeSH Terms])) OR ((care or hospice or rest or elderly or geriatric or aged) AND (home* or facilit* or setting* or institution* or organisation*))) AND ((health care provider[MeSH Terms]) OR (staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar* or assistant* or aide*))).

AND

Intervention: ((influenza or flu) AND (vaccin* or immuniz* or immunis* or inoculation* or shot* or jab)).

Comparator: not applicable.

AND

Outcome: Barrier* obstacle* or knowledge or attitude* or behavi* or refusal or Rejection or belief* or doubt* or hesitan* or distrust or trust or mistrust or rumo* or misinformation* or misconception* or view* or opinion* or objector* or reject* or controvers* or oppos* dilemma or criticis* or Perception* or experience*) OR (Enabler* or facilitat* or Motivat* or Intervention* or encourag* or promot* or enhanc* or advocate or support* or improv* or increas* or utilisation or utilization

NOT

(H1N1[Title]) OR (swine[Title]) OR (avian[Title]) OR (child*[Title]) OR (pediatric*[Title]) OR (adolescen*[Title]) OR (neonatal*[Title]) OR (cancer[Title]) OR (diabet*[Title]) OR (molecul*[Title]) OR (conference[Title]) OR ("systematic review"[Title]) OR (quickstats[Title]) OR (news[Title]).

Inclusion and exclusion criteria:

Types of study to be included/excluded

Inclusion:

- Primary research studies.
- Quantitative, qualitative or mixed-method studies that identify the barriers and enablers to care home staff vaccination.
- Studies written in English.
- No date restriction will be added.

Exclusion:

- Systematic reviews
- Conference reports
- Editorials, letters, commentaries and abstracts.

Participants/population

Inclusion:

- All health or social care workers involved in the care of care homes residents, which include administration staff, full time, part time workers.
- If the data of care home staff are reported separately.

Exclusion:

- Studies with multiple participants from different settings will be excluded if care home staff are less than 50% of participants.

Interventions

Inclusion:

This systematic review is limited to the studies that focused on influenza vaccination of care homes staff.

- Studies will be included if they explore barriers and enablers perceived by care home staff.
- Studies report barriers and enablers to care homes staff influenza vaccination.

Exclusion:

- Studies focused on pandemic influenza vaccines, e.g., H1N1 vaccines, Covid-19 vaccines.

Method:

Study selection:

Three steps will be applied to search for eligible studies:

1. Titles of the studies will be screened by two independent reviewers for eligibility after removal of duplications using bibliographic manager software Endnote. Titles that are clearly irrelevant will be excluded, while relevant or unclear titles will be included for abstract screening. Reasons for exclusion will be recorded.
2. Abstracts of the selected titles will be retrieved and exported to an Excel spreadsheet. The abstracts will be reviewed independently by two reviewers. Any disagreement after discussion during abstracts screening, or if an abstract shows insufficient data, the full text will be retrieved to assess its eligibility.
3. Full texts of potentially eligible studies will be assessed against inclusion criteria. Any discrepancies between the reviewers will be resolved through discussion, or if necessary, a third reviewer will be involved to reach a consensus. Reference lists of included studies will be searched to identify any additional potential eligible studies.

Reasons for exclusion will be recorded at all stages. During the three stages, Cohens Kapp will be calculated to assess the level of agreement.

Data extraction

The data of the eligible studies will be extracted by the first reviewer (FA) in piloted data extraction form in Microsoft Excel. The second reviewer will double check the extracted data for accuracy.

The first reviewer will extract the following data from the eligible studies:

- Author
- country
- type of care home (with or without health care professionals)
- ownership of care home (for profit, non-profit)
- type of participants (managers, administrators, supporting staff, care assistants, nurses, physicians etc.)
- number of participants
- research question/aim, study design
- theoretical approach
- data analysis method
- reported barriers and/or enablers.

The extracted data will include participants' quotes and authors interpretations from qualitative studies and quantitative findings from surveys, alongside summaries of results. Any disagreement in the extracted data will be discussed to reach an agreement. The extracted data will be mapped independently by two reviewers to the TDF domains. The two reviewers will continuously compare the coding to TDF domains. Any discrepancies in the coding will be resolved by discussion or involving an expert in the TDF.

Risk of bias/quality assessment.

The Critical Appraisal Skill Program (CASP) for qualitative studies[188], whereas the Centre for Evidence-Based Management (CEBMa) critical appraisal for surveys will be used for quantitative studies[189]. A narrative summary of the trustworthiness of the included studies will be provided because both tools do not have scoring matrix. No

studies will be excluded from the review based on the quality of the study. We will discuss the study weakness if it has an impact on data synthesis.

Strategy for data synthesis

Narrative data synthesis will be guided by the theoretical domain framework (TDF) as a prior framework to summarize the evidence. The TDF is a validated framework to inform the synthesis of barriers and enablers and assist in developing interventions in a number of health settings and populations[149]. The TDF has the potential to inform systematic reviews by synthesizing the barriers and enablers across studies according to 14 domains: 1- Knowledge. 2- Skills. 3- social/Professional role and Identity. 4- Beliefs about capabilities. 5- Optimism. 6- Beliefs about consequences. 7- Reinforcement. 8- Intentions. 9- Goals. 10- Memory, attention and decision processes. 11- Environmental context and resources. 12- Social influences. 13- Emotion. 14- Behavioural regulation[150]. TDF will be the lens to capture barriers and enablers influences on care homes staff influenza vaccination. Two independent reviewers will group the extracted data into themes. The themes then will be mapped to TDF domains. We will code whether the extracted data are a barrier or enabler. The data that cannot be mapped to the TDF domains will be mapped to a new theme called "Other". A thematic synthesis will be conducted to classify the data within each domain. We will report each domain's frequency as a percentage of the total number of studies to identify the important domains. Two independent reviewers will meet regularly to compare mapping the data to the TDF domains. Any disagreement in mapping will be discussed to reach an agreement or involve a third reviewer with TDF expertise.

Report:

A PRISMA flow chart will be used to show the number of studies included and excluded during titles, abstracts and full texts screening[185]. A PRISMA flow chart will illustrate the number of duplicated studies and the number of studies included in the review.

Software to manage the references:

The references of all studies identified from the search will be exported to bibliographic software Endnote X9.3.3 where duplicates will be removed. Titles and abstracts of the studies will be exported to Microsoft Excel for titles and abstracts screening.

Appendix 2: Barriers and enablers associated with care home staff influenza vaccination: scoping search

Barriers and enablers associated with care home staff influenza vaccination: scoping search

Introduction

The barriers associated with care home staff influenza vaccination are complex and subject to many factors. Barriers must be addressed and enablers utilised to develop implementation strategies that increase vaccination uptake, ensure the sustainability of interventions and ultimately protect the residents. A systematic review to identify the barriers and enablers associated with care home staff vaccination is therefore needed to inform the development of an appropriate intervention.

To prevent unnecessary duplication of effort, the researcher conducted a preliminary search in the Cochrane database and PubMed, filtered only for systematic reviews to identify any related existing systematic reviews. The international prospective register of systematic review protocols (PROSPERO), Cochrane Library and Joanna Briggs Institute (JBI) "Database of Systematic Reviews and Implementation Reports" were also searched to check that there are no ongoing or upcoming systematic reviews designated to find the barriers and enablers associated with care home staff vaccination.

No scoping or systematic reviews that address the barriers associated with care home staff were located. However, many systematic reviews related to barriers and enablers to vaccines uptake were identified. One systematic review aimed to synthesise qualitative evidence on health care workers' perception of the influenza vaccination[45]. This review considered all health care workers from different care settings and only included two studies related to care homes. Another systematic review explored factors affecting health care workers' acceptance of all types of vaccines[48]. Whilst one systematic review discussed factors affecting influenza vaccination among health care workers in hospitals only[47]. Two systematic reviews concerning factors affecting pandemic influenza vaccination were found[46,50]. Two systematic reviews were located that considered vaccine hesitancy among the general public[176, 294]. To our knowledge,

there is no systematic review that identified the barriers and enablers associated with influenza vaccination of care home staff. There are many systematic reviews aimed to identify the interventions that have been applied in health care settings to improve the uptake of vaccines among health care workers[97,98,232,245]. One systematic review synthesises the interventions that have been applied to improve influenza vaccine uptake among health care workers in long term facilities[96].

Barriers and enablers associated with care home staff vaccination are complex and have not been reviewed systematically before. It is essential that a scoping search be conducted to explore, identify and map the barriers related to low vaccine uptake in care home staff.

Review questions

- What are the barriers and enablers in vaccine uptake among care home staff?
- What strategies exist to improve vaccine uptake among care home staff?

Aim

To inform the development of a systematic review to identify the barriers and enablers to influenza vaccination of care home staff.

Objectives

- To identify the databases to underpin the systematic review.
- To identify the search terms for use within the review.
- To develop the inclusion and exclusion criteria for the systematic review.
- To determine whether there are sufficient papers to enable a systematic review.
- To develop the data extraction tool.
- To identify and test the most appropriate risk of bias assessment tools.

Method

Database identification:

To identify as many relevant studies as possible, the researcher searched the health and social related databases, e.g., PubMed, CINAHL, Scopus, to find all relevant studies using related search terms. MEDLINE and EMBASE are considered to be essential

sources to search for studies. PubMed included because it includes records from journals not indexed for MEDLINE. The initial search identified the systematic reviews of health care workers' vaccination and those of the general public. The systematic reviews were reviewed to identify the databases used within them. The databases were reviewed for suitability to be used in the systematic review.

Some of the identified databases will be excluded from the scoping search as follow:

- The Cochrane database: systematic reviews are an exclusion criterion.
- JBI will be excluded because they focus on systematic reviews and studies protocols.
- ProQuest (Dissertation and Theses) is a database for dissertations and theses.
- There is no access to SocINDEX through UEA library services, so it is excluded.

The researcher decided to run a search in the following databases to ensure their appropriateness for the systematic review:

- PubMed
- MEDLINE
- Embase
- CINAHL
- AMED
- PsycINFO
- IBSS
- LILACS
- IMEMR
- IMSEAR
- WPRIM
- Scopus
- AIM.

Search term identification:

a. Search strategy for the scoping search:

The "PICO" mnemonics (Population, Intervention, Comparator, Outcome) were used to identify the initial key terms for the scoping search (table 1). We chose not to state the outcomes or comparators to develop a search strategy for this scoping search to ensure the search result a broad as possible.

Table 1. PICO elements:

Population	Care home staff
Intervention	Influenza vaccination, immunization
Comparator	Not applicable.
Outcome	Not applicable.

Titles and abstracts of articles related to care home staff vaccination resulting from the initial search were screened to identify any alternative terms used to describe "population and intervention" elements. Authors' keywords from related articles were also identified. Synonyms, abbreviations, US/UK terminology for "population and intervention" were recorded. Table 2 shows the key terms that were used in this scoping search.

Table 2. Key terms for "population and intervention" elements:

Process	Care home	Staff	Vaccination
MeSH	Nursing home, skilled nursing facility, residential facility Long term care facility	personnel, provider, professionals, worker	Immunization, vaccination, Influenza vaccine,
Search terms from systematic reviews and related articles	Long term care facility, Long term care home, Long term care settings, Long term care institution, aged care facility, nursing home, care home, residential care facility, residential aged care home, geriatric home, elderly home	staff, employee, personnel, workers, workforce, practitioner, technicians, health care workers, health care personnel, volunteers, nursing auxiliary, caregivers, health worker, social care workers	Influenza vaccination, flu vaccination, Influenza vaccine, shot, jab, influenza immunization, immunization, seasonal influenza, inoculation,

After identifying search terms, a search strategy for the scoping search were developed using Boolean operators "AND" & "OR" to test the search strategy (table 3).

Table 3. Summary of the search strategy for the scoping search:

population	OR	AND	OR	AND	OR
	Care Nursing "Long term" Residential Elderly Geriatric Aged Skilled		Home Facility Setting Institution		Staff Worker Employee Personnel Professional caregiver workforce practitioner technician auxiliary
intervention	OR	AND	OR		
	Influenza flu		Vaccination, Immunization, Immunization, inoculation, Shot, Jab		

The search strategy for this scoping search were applied in PubMed and CINAHL to test the key terms and to check if the terms add value to the search result. The search strategy for PubMed and CINAHL is detailed in tables 4 and 5.

Table 4. Search strategy of scoping search for PubMed:

General term	PICO Tool	Search #		Results
Care home staff	Population	1	(care or nursing or "long term" or residential or elderly or geriatric or aged or skilled) AND (home* or facilit* or setting* or institution*) AND (staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar*)	252,951
vaccination	Intervention	2	(influenza or flu) AND (vaccine* or immuniz* or immunis* or innoculation* or shot* or jab)	48,293
		1 AND 2	(((care or nursing or "long term" or residential or elderly or geriatric or aged or skilled) AND (home* or facilit* or setting* or institution*)) AND (staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar*)) AND ((influenza or flu) AND (vaccine* or immuniz* or immunis* or innoculation* or shot* or jab))	1,453

Table 5. search strategy of scoping search for CINAHL:

General term	PICO	Search #		Results
Care home staff	Population	1	(care or nursing or "long term" or residential or elderly or geriatric or aged or skilled) AND (home* or facilit* or setting* or institution*) AND (staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar*)	165,591
vaccination	Intervention	2	(influenza or flu) AND (vaccine* or immuniz* or immunis* or innoculation* or shot* or jab)	84,533
		1 AND 2	(((care or nursing or "long term" or residential or elderly or geriatric or aged or skilled) AND (home* or facilit* or setting* or institution*)) AND (staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar*)) AND ((influenza or	809

			flu) AND (vaccine* or immuniz* or immunis* or innoculation* or shot* or jab*))	

b. Search strategy for the systematic review:

Each search term were reviewed to check if it adds value to the search result. The research strategy has been revised constantly to add any new terms and remove unnecessary search terms. In addition to the scoping search strategy, the researcher built the search strategy for the systematic review following two steps:

1. During the titles screening, terms unrelated to the topic were recorded to exclude them in the search strategy using the Boolean operator "NOT".
2. The "Outcome" terms were built during the screening of abstracts and full texts of the included articles. In addition, the identified systematic reviews related to barriers and enablers to vaccination were reviewed to find more terms.

Any additional terms used to describe "Population and Intervention" were recorded during full texts screening. Subject heading or controlled vocabulary (MeSH terms) were used to develop the search strategy of the systematic review.

Inclusion and exclusion criteria identification of the scoping search:

Initial inclusion and exclusion criteria were developed for this scoping search according to the research questions, aim and objective of the scoping search. The inclusion and exclusion criteria of this scoping search were reviewed and refined to develop the inclusion and exclusion criteria for the systematic review. The inclusion and exclusion criteria for the scoping search are as follows.

Inclusion criteria

Type of participants:

- Care home staff (health care workers, social care workers, administration staff, support staff, full time, part time workers).

Intervention:

- All studies that discussed influenza vaccination among care home staff.

Setting:

- Care homes which include long term care accommodation with nursing care or non-nursing care.

Outcome:

- Studies identify the barriers associated with care home staff vaccination.
- Studies identify the enablers associated with care home staff vaccination.
- Studies discussed interventions to improve the influenza vaccination rate.

Types of sources:

- Primary sources, systematic reviews (to identify the key terms, databases and risk of bias tools that have been used in the systematic reviews).
- Qualitative, quantitative, mixed-method studies.
- Not limited to publication date.

Exclusion criteria:

- Studies discussed influenza vaccination of health care workers in other settings e.g., hospitals.
- Papers not written in English.

Study selection

Ten per cent of the scoping search results were screened independently by two reviewers. As this was designed to obtain primary evidence, we excluded abstracts and conference proceedings. Three stages of study selection were adopted:

a) Titles' screening performed through the titles guided by inclusion and exclusion criteria of the scoping search. During titles screening, two reviewers (Faisal and Professor David) recorded the terms not related to the topic to exclude them in the search strategy of the systematic review using the Boolean "NOT".
b) Abstracts' screening conducted by two reviewers (Faisal and Annie). If an abstract showed insufficient data, the full text was retrieved to assess its eligibility or if there was disagreement after discussion during the abstracts screening, the full text was retrieved.
c) Full text assessed by two reviewers (Faisal and Annie) against inclusion and exclusion criteria. During full text screening, the first reviewer (Faisal) recorded any new terms to build the search strategy of the systematic review.

Number of papers for systematic review:

Provided that at least one suitable paper is identified from 10% of the search result, the researchers deemed that there would be a sufficient number of articles for a systematic review.

Development of data extraction tool:

A preliminary data extraction form was developed for the purpose of this scoping search. The data extraction form was designed using Microsoft Excel. The data extraction form includes general characteristics of the studies: authors, year of study, country of study, participants, methodology, data generation method. Two independent reviewers extracted the data for two papers. Factors reported as barriers or enablers to care home staff vaccination were extracted. The extracted data included participants' quotes and authors interpretations and findings from survey studies. The data extraction tool reviewed with my supervisory team to check its suitability. The tool was modified as required.

The researcher extracted the data for two articles to familiarise himself with the data extraction process. In order to code extracted data into the theoretical domains, the researcher will attend a course on behaviour change. A third reviewer with experience using TDF will be consulted to assess the coding of extracted data.

Identify and test the appropriate quality assessment tools:

To identify the most appropriate quality assessment tools, the quality assessment tools used in previous systematic reviews were reported and reviewed for suitability. The systematic review will include all qualitative and quantitative studies. Appropriate tools for the studies' method will be used after deciding which quality assessment tool to use in the systematic review. The first reviewer appraised those studies that met the inclusion criteria for the scoping search to evaluate the tools and assess their suitability. Table 10 shows the quality assessments tools that have been used in the previous systematic reviews.

Results of the scoping search

Database identification:

The initial search identified the systematic reviews of health care workers' vaccination and those of the general public. The systematic reviews were reviewed to identify the databases used within them (table 6). The databases were reviewed for suitability to be used in the systematic review. Table 7 includes a short summary of each database and the topics its covers. The researcher used the search terms identified for the scoping search in the included databases of the scoping search. Appendix 4 shows the search strategy for the databases. Table 8 shows the search results of the databases that searched for the scoping search.

Table 8: Search results for the databases:

Database	PubMed	MEDLINE	Embase	CINHAL	AMED	PsycINFO	IBSS	LILACS	MEMR	IMSEAR	WPRIM	Scopus	AIM
results	1,453	1,240	2,194	815	2	129	862	0	0	0	0	1,152	0

This step helps the researcher to decide which databases to search in the systematic review. Reasons for excluding databases are as follows:

- LILACS, IMEMR, IMSEAR, WPRIM and AIM will not be used in the systematic review because the search revealed no results.
- The search result for AMED is two articles. These articles are not related to the research question.

The other databases related to the systematic review topic revealed search results, so the researcher decided to use them in the systematic review. The following databases will be searched in the systematic review:

- PubMed
- MEDLINE
- Embase
- CINAHL
- PsycINFO
- IBSS
- Scopus.

Table 6. Databases used within related systematic reviews:

	Date	PubMed	MEDLINE	Embase	CINHAL	AMED	PsycINFO	Scopus	Web of Science	The Cochrane Library	ProQuest (Dissertation and theses)	LILACS	IBSS	IMEMR	IMSEAR	AIM	WPRIM	SocINDEX	JBI
Seasonal influenza vaccination of healthcare workers: Systematic review of qualitative evidence[45]	2017	X	√	√	√	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Factors influencing pandemic influenza vaccination of healthcare workers-A systematic review[46]	2012	√	√	√	√	√	√	X	X	√	√	X	X	X	X	X	X	X	X
Influenza vaccination of health care workers in hospitals-A review of studies on attitudes and predictors[47]	2009	√	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Factors Associated with Healthcare Worker Acceptance of Vaccination: A Systematic Review and Meta-analysis[48]	2014	X	√	√	√	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Barriers of influenza vaccination intention and behavior - A systematic review of influenza vaccine hesitancy, 2005-2016[176]	2017	X	√	√	√	X	√	X	√	√	X	√	√	√	√	√	√	X	X
Factors associated with uptake of vaccination against pandemic influenza: A systematic review[50]	2011	√	X	X	X	X	X	X	√	X	X	X	X	X	X	X	X	X	X
Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: A systematic review of published literature, 2007-2012 [293]	2014	X	√	√	√	X	√	X	√	√	X	√	√	√	X	X	X	X	X
Using behavior change frameworks to improve	2016	X	√	√	√	X	√	X	X	√	X	X	X	X	X	X	X	√	√

healthcare worker influenza vaccination rates: A systematic review[232]																		
Assessing Interventions to Improve Influenza Vaccine Uptake Among Health Care Workers[245]	2016	X	√	√	√	X	√	√	√	√	X	X	X	X	X	X	X	X	X
Seasonal influenza vaccination campaigns for health care personnel: systematic review[97]	2010	√	√	√	√	X	X	X	√	√	X	X	X	X	X	X	X	X	X
Interventions to increase seasonal influenza vaccine coverage in healthcare workers: A systematic review and meta-regression analysis[98]	2016	X	√	X	X	X	X	√	X	X	X	X	X	X	X	X	X	X	X
Utility of Healthcare System-Based Interventions in Improving the Uptake of Influenza Vaccination in Healthcare Workers at Long-Term Care Facilities: A Systematic Review [96]	2020	√	X	X	√	X	X	X	√	√	X	X	X	X	X	X	X	X	X
Predictors of seasonal influenza vaccination among healthcare workers in hospitals: a descriptive meta-analysis [174]	2011	√	X	√	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A Systematic Review of Mandatory Influenza Vaccination in Healthcare Personnel[294]	2014	X	√	√	√	X	X	X	X	√	X	X	X	X	X	X	X	√	X

Table 7. Summary of databases used within related systematic reviews:

PubMed	A free search engine for biomedical and life sciences topics. It is offering access to references before they indexed in MEDLINE.
MEDLINE	covers literatures on medicine, public health, health policy, clinical care, life sciences, behavioural sciences, nursing, pharmacy, dentistry, health care, biology, biochemistry and molecular evolution.
EMBASE	Database indexing over 3500 journals in: medicine, pharmaceutical sciences, public health, health policy, environmental health and psychology
CINHAL	A database covers topics in nursing, allied health, biomedicine and health sciences and alternative medicine.
AMED	A specialized database covers topics on nursing, complementary, alternative medicine, occupational therapy physiotherapy, palliative care, rehabilitation, speech and language therapy.
PsycINFO	A database covers topics on psychology, behavioral science, social science, nursing, medicine, education, pharmaceutical sciences, education and linguistics.
Web of Science	Database of more than 12,000 peer-reviewed journal articles and conference proceedings. It covers subjects on the sciences, social science, arts and humanities
The Cochrane Library	A collection of databases (Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials (CENTRAL) and Cochrane Clinical Answers) contains different types of evidence specifically on health care topics.
ProQuest	This database is the world's most comprehensive collection of dissertations and theses from around the world.
LILACS	Latin American & Caribbean Health Sciences Literature database is maintained and updated by more than 600 educational, governmental and health research institutions. It contains more than 880 thousand of peer-reviewed journals, thesis and dissertation in medicine and health sciences. LILACS includes journals of the region that are not indexed by MEDLINE
IBSS	International Bibliography of the Social Sciences is a database that focuses on sociology, anthropology, economic and politics and other related disciplines such as environment, gender and development studies
IMEMR	The Index Medicus for the Eastern Mediterranean Region database covers subjects on public health, medicine and nursing, health management and administration. It includes peer-review journals form Eastern Mediterranean Region
IMSEAR	Index Medicus for South-East Asia Region provides access to health science journals produced by South-East Asia countries. It provides more than 187,000 bibliographic references from 49 scientific journals
WPRIM	Western Pacific Region Index Medicus is a database include selected medical and health journals from Western Pacific Region. It includes 776,000 references from 678 scientific journal
AIM	African Index Medicus gives access to more than 18,000 references on health information published in or related to Africa
socINDEX	A database for sociology research and all sub-disciplines such as criminology, social psychology, racial studies, religion and sociological theory
JBI	Joanna Briggs Institute Evidence-Based Practice is database offer access to evidence on clinical topics
Scopus	Covers topics in life sciences, social sciences, physical sciences and health sciences

Identify key terms:
Table 9 shows the key terms and source of search terms.

Table 9. Search terms for the scoping search and new terms identified during full text screening:

<table>
<tr><td></td><td>Scoping search strategy</td><td colspan="2">Additional search terms from full texts screening and systematic reviews</td></tr>
<tr><td rowspan="2">Population</td><td rowspan="2">(care or nursing or "long term" or residential or elderly or geriatric or aged or skilled) AND (home* or facilit* or setting* or institution*) AND (staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar*)</td><td>Care homes synonyms</td><td>Staff synonyms</td></tr>
<tr><td>Rest home, hospice care,</td><td>caregiver, allied, aides</td></tr>
<tr><td>intervention</td><td>(influenza or flu) AND (vaccine* or immuniz* or immunis* or inoculation* or shot* or jab)))</td><td colspan="2"></td></tr>
<tr><td>outcome</td><td></td><td colspan="2">Barrier* obstacle* or knowledge or attitude* or behavior* or refusal or Rejection or belief* or doubt* or hesitant* or distrust or trust or mistrust or rumor* or rumour* or misinformation* or misconception* or view* or opinion* or objector* or reject* or oppos* or controvers* or oppos* dilemma or criticis* or Perception* or experience*) OR (Enabler* or facilitat* or Motivate* or Intervention* or encourage* or promote* or enhance* or advocate or support* or improv* or increase* or utilization or utilization</td></tr>
</table>

After identifying the search terms for "PICO" elements, the search strategy for the systematic review was developed as follows:

Population: (((nursing home[MeSH Terms]) OR (long term care[MeSH Terms])) OR (facilities, skilled nursing[MeSH Terms])) OR (residential facilities[MeSH Terms])) OR ((care or hospice or rest or elderly or geriatric or aged) AND (home* or facilit* or setting* or institution* or organisation*))) AND ((health care provider[MeSH Terms]) OR (staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar* or assistant* or aide*)))

AND

Intervention: ((influenza or flu) AND (vaccin* or immuniz* or immunis* or inoculation* or shot* or jab))

AND

Outcome: Barrier* obstacle* or knowledge or attitude* or behavi* or refusal or rejection or belief* or doubt* or hesitant* or distrust or trust or mistrust or rumo* or misinformation* or misconception* or view* or opinion* or objector* or reject* or oppos* or controvers* or dilemma or criticis* or perception* or experience*) OR (Enabler* or facilitat* or Motivat* or Intervention* or encourag* or promot* or enhanc* or advocat* or support* or improv* or increas* or utilization or utilisation

NOT

(H1N1[Title]) OR (swine[Title]) OR (avian[Title]) OR (child*[Title]) OR (pediatric*[Title]) OR (adolescen*[Title]) OR (neonatal*[Title]) OR (cancer[Title]) OR (diabet*[Title]) OR (molecul*[Title]) OR (conference[Title]) OR ("systematic review"[Title]) OR (quickstats[Title]) OR (news[Title]).

After combining all search terms, the number of hits is 1,423 in PubMed. The search terms will be modified and adapted according to the databases.

Inclusion criteria:

According to the research question, aim and objectives of the systematic review, the inclusion and exclusion criteria of the scoping search have been adjusted and modified. The researcher developed the following inclusion and exclusion criteria for the systematic review:

Type of participants:

- All health or social care workers, involved in the care of care home residents, including administration staff, full time and part time workers.
- Care home staff for whom data are reported separately.

Intervention:

This systematic review is limited to the studies that focused on influenza vaccination of care home staff.

- Studies will be included if they explore the participants' experience, perspective, beliefs and attitudes toward influenza and influenza vaccines.
- Studies will be included if they explore barriers and enablers perceived by care home staff.
- Studies reports barriers and enablers to influenza vaccine among care homes staff.

Setting:

- Studies in care homes which include long term care accommodation with nursing care or non-nursing care.

Outcome:

- Studies identification of the barriers and enablers to the uptake of the influenza vaccine among care home staff.
- Studies identify reasons among care home staff for influenza vaccine acceptance or non-acceptance.

Types of sources:

- Primary research studies.
- Studies with a qualitative component (e.g., interviews, focus group) or surveys reporting any barriers and/or enablers of influenza vaccine uptake among care home staff.

Exclusion criteria:

- Studies that mainly focus on health care workers other than care home staff.
- Care home staff for whom data are not reported separately.
- Papers not written in English.

Study selection:

Agreement on inclusion at each stage are as follows:

- Title screening: 85% ($\kappa = 0.55$)
- Abstract screening: 81% ($\kappa = 0.52$)
- Full text screening: 63% ($\kappa = 0.26$)

Reasons for exclusion during the three stages were recorded to adjust the inclusion and exclusion criteria of the systematic review. Any differences of opinion regarding the eligibility of included studies have been resolved by discussion. PRISMA Extension for Scoping Reviews reported the number of included and excluded studies at each screening stage (figure 1).

Papers to enable a systematic review:
A total of 762 out of 5838 titles have been screened. After screening the full texts, 11 papers met the inclusion criteria. This number shows that there are enough papers available to undertake a systematic review.

Data extraction tool:
The data extraction form was reviewed and modified. The researcher decided to include the following study details: author, country, type of care home (with or without health care professionals), ownership of care home (for profit, non-profit), type of participants (managers, administrators, supporting staff, care assistants, nurses, physicians, etc), number of participants, research question/aim, study design, theoretical approach, data analysis method. Table 10 shows a summary of the general characteristics of the included studies.

Table 10. Data extraction tool – characteristics of included studies:

Study details	country	type of care home	ownership of care home	type of participants	number of participants	research question/aim	study design	Theoretical approach	Data analysis

The data extraction form will contain three spreadsheets to extract barriers, enablers/facilitators to influenza vaccination and interventions used in the included studies to improve influenza vaccination rate.

Table 11. Tool to extract the barriers and enablers:

author	How data obtained	
	quote	Author interpretation

A third reviewer with experience using TDF will be consulted to assess the coding of extracted data. In the systematic review, the researcher will extract the

data of the included studies. A second reviewer will check the accuracy of data extraction.

Risk of bias assessment tool:

After running a search for appropriate quality assessment tools, the researcher decided to use the Critical Appraisal Skill Program (CASP) for qualitative studies, whereas the Centre for Evidence-Based Management (CEBMa) critical appraisal for surveys will be used for quantitative studies. These quality assessment tools were chosen because five out of 11 studies that met the inclusion criteria for this scoping search used a qualitative method (one interview, two semi-structured interviews, two focus groups). The remaining six studies used survey design. Table 12 shows the results of the quality assessment of the qualitative studies. Table 13 shows the results of the quality assessment of the quantitative studies. Table 14 shows the quality assessments tools that have been used in the previous systematic reviews. These tools were reviewed to test its appropriateness.

Table 12. Quality assessment of qualitative studies:

First author (year)	1	2	3	4	5	6	7	8	9
Gemma Quinn (2014)	Y	Y	Y	N	Y	Y	Y	Y	Y
Kelly L. Sand (2007)	Y	Y	Y	Y	Y	Y	N	C	Y

1. Was a clear statement on the aims of the research provided? 2. Was the qualitative methodology appropriate? 3. Was the research design appropriate for the aims of the research? 4. Was the recruitment strategy appropriate for the aims of the research? 5. Was the data collected in a manner that addressed the research issue? 6. Has the relationship between researcher and participants been adequately considered? 7. Have ethical issues been considered? 8. Was data analysis sufficiently rigorous? 9. Was a clear statement of the findings provided? Y: Yes, N: No, C: Can't tell.

Table 13. Quality assessment of quantitative studies:

First author (year)	1	2	3	4	5	6	7	8	9	10	11	12
Eanna Kenny (2020)	Y	Y	Y	N	C	N	Y	Y	Y	N	Y	Y
A. Shroufi (2009)	Y	Y	Y	C	Y	N	Y	Y	Y	Y	Y	Y

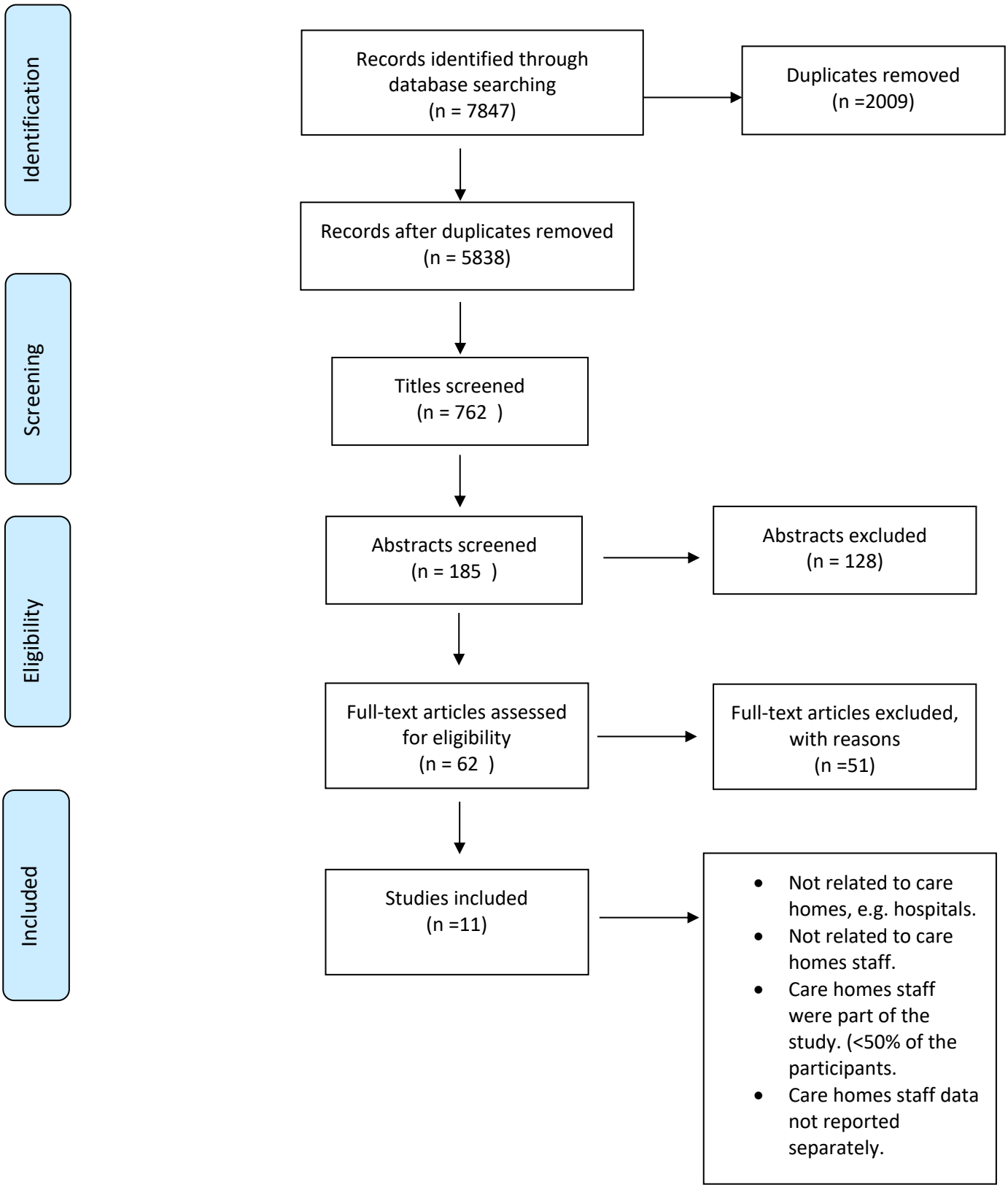
1. Did the study address a clearly focused question/issue? 2. Is the research method (study design) appropriate for answering the research question? 3. Is the method of selection of the subjects (i.e., employees, teams, divisions, and organizations) clearly described? 4. Could the method for obtaining the sample introduce (selection) bias? 5. Was the sample of subjects representative of the population to which the findings will be referred? 6. Was the sample size based on pre-study considerations of statistical power? 7. Was a satisfactory response rate achieved? 8. Are the measurements (questionnaires) valid and reliable? 9. Was the statistical significance assessed? 10. Are confidence intervals given for the main results? 11. Were confounding factors overlooked? Y: Yes, N: No, C: Can't tell.

CASP tool contains 10 questions. Each question comes with a number of decision rules to remind the reviewer why the question is important. CEBMa tool includes 12 questions to assess studies' validity, generalisability and relevance. A narrative summary of the trustworthiness of the included studies will be provided in the systematic review because neither of the tools has a scoring matrix. No studies will be excluded from the systematic review based on the quality of the study. We will discuss the study weakness if it has an impact on the data synthesis.

Table 14: Summary of quality assessment tools and types of systematic review:

	Type of systematic review/included studies	Assessment tool
Seasonal influenza vaccination of healthcare workers: systematic review of qualitative evidence[25]	qualitative	Hawker et al.'s tool
Factors influencing pandemic influenza vaccination of healthcare workers-A systematic review[46]	Mixed method	Not available
Influenza vaccination of health care workers in hospitals-A review of studies on attitudes and predictors[47]	quantitative	Not available
Factors Associated with Healthcare Worker Acceptance of Vaccination: A Systematic Review and Meta-analysis[48]	quantitative	Downs and Black grading approach
Barriers of Influenza Vaccination Intention and Behaviour – A Systematic Review of Influenza Vaccine Hesitancy, 2005 – 2016[176]	Mixed method	Not stated
Factors associated with uptake of vaccination against pandemic influenza: A systematic review[50]	Mixed method	Not stated
Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: A systematic review of published literature, 2007–2012[293]	Mixed method	Peer-reviewed studies
Using behavior change frameworks to improve healthcare worker influenza vaccination rates: A systematic review[232]	Mixed method	Public Health Ontario Meta QAT tool.
Assessing Interventions to Improve Influenza Vaccine Uptake Among Health Care Workers[245]	Randomized controlled studies	Cochrane Risk of Bias tool
Seasonal influenza vaccination campaigns for health care personnel: systematic review[97]	quantitative	Cochrane Risk of Bias tool
Interventions to increase seasonal influenza vaccine coverage in healthcare workers: A systematic review and meta-regression analysis[98]	quantitative	Cochrane Risk of Bias tool
Utility of Healthcare System-Based Interventions in Improving the Uptake of Influenza Vaccination in Healthcare Workers at Long-Term Care Facilities: A Systematic Review[96]	quantitative	EPHPP
Predictors of seasonal influenza vaccination among healthcare workers in hospitals: a descriptive meta-analysis[174]	quantitative	NA
A Systematic Review of Mandatory Influenza Vaccination in Healthcare Personnel[294]	quantitative	GRADE

Figure 1. PRISMA Extension for Scoping Reviews – flow diagram:



Discussion

The scoping search aimed to inform the development of a systematic review protocol. Conducting a scoping search had particular practical benefits for the researcher before running the full systematic review. The scoping search provided an outline of the systematic review methodology and helped the researcher to understand and experienced the systematic review approach.

To identify all studies related to barriers and enablers associated with care homes staff, the researcher determined a combination of optimal databases for the systematic review from the previous systematic reviews related to barriers and enablers to vaccination. These databases were reviewed for suitability for search in the systematic review. A preliminary search in predetermined databases helped the researcher identify the most appropriate databases and determine the databases included in the systematic review. The researcher learned how to identify the databases and gained an experience on how to search in different databases. Some of the databases excluded because they revealed no results, or they provide studies did not meet the inclusion criteria, e.g., systematic reviews. The included databases are combination of specialized databases e.g., CINAHL, PsycINFO and general databases e.g., PubMed, MEDLINE, EMBASEA and that will ensure identify all studies related to the systematic review.

After identifying the optimal databases for the systematic review, building a search strategy is a key step in searching for studies. A search strategy for systematic review should be a combination of key words and controlled vocabulary (MeSH) to avoid missing the studies that did not use the exact terms and avoid missing the studies that have not been indexed in a database. The researcher learned how to build the search strategy and collect the key terms. Similar previous systematic reviews and core studies have been reviewed to identify any alternative terms to "PICO" elements. The researcher also learned how to narrow the search results for the systematic review by identifying the irrelevant terms, e.g., H1N1, children, and using the Boolean operator "NOT" in the search strategy and this step will exclude unrelated studies and safe time effort. The researcher also learned how to apply and adopt the search strategy for the included databases.

The scoping search helped the researcher evaluate and revise the initial inclusion criteria to develop the definitive inclusion and exclusion criteria for the systematic review and ensure that the systematic review focused on the research question.

The scoping search helped the researcher determine the feasibility of conducting a full systematic review and if there are enough relevant studies to conduct a systematic review. 10% of the search results shown 11 studies met the inclusion criteria—this step showed that there are available and relevant evidence to answer the objectives of the systematic review. The new keywords discovered by full-text scanning would also broaden the scope of the search and expand the number of studies that meet the criterion for inclusion.

The data extraction tool has been developed and reviewed with my supervisory team. We developed the data extraction tool to be more precise and specific to obtain the details and main characteristics of the included studies. The data extraction tool developed in Excel software based on the theoretical domain frameworks (TDF). An expert in TDF, Dr Sion Scott, has been consulted in the development of the tool. The researcher also discussed with Essra Youssef, who has experience with TDF, to develop the most suitable data extraction tool.

The studies design of the included studies in the scoping search ranged between qualitative and quantitative method. After reviewing a range of quality assessment tools used in other systematic reviews, the researcher decided to use CASP for qualitative designs and CEBMa tool for quantitative designs. The researcher used these tools to assess the quality of four studies to familiarize himself with the tools and test their appropriateness.

The scoping search was a necessary practice for the researcher to prepare for the full systematic review and develop the systematic review protocol. As a result of the scoping search, the systematic review protocol developed and registered with PROSPE.

Appendix 3: Full Search Strategies for Systematic Review (PRISMA-S Format)

CINAHL Search Strategy

Date: 11/05/2021	Search ID	Search Query	Notes	Results
	S1	(MH "Long Term Care") OR (MH "Residential Care+")	Apply related words; equivalent subjects	34,944
	S2	(MH "Residential Facilities+") OR (MH "Nursing Homes+")	Apply related words; equivalent subjects	34,006
	S3	(MH "Skilled Nursing Facilities")	Apply related words; equivalent subjects	4,468
	S4	S1 OR S2 OR S3	Combined search	60,513
	S5	care OR nursing OR "long term" OR residential OR elderly OR geriatric OR aged OR skilled	Apply related words; equivalent subjects	2,794,274
	S6	home* OR facilit* OR setting* OR institution*	Apply related words; equivalent subjects	831,842
	S7	S5 AND S6	Combined search	509,905
	S8	S4 OR S7	Combined search	525,148
	S9	(MH "Health Personnel+")	Apply related words; equivalent subjects	600,400
	S10	(MH "Nursing Home Personnel")	Apply related words; equivalent subjects	4,082
	S11	S9 OR S10	Combined search	600,400
	S12	staff OR worker* OR employee* OR personnel* OR professional* OR caregiver* OR workforce OR practitioner* OR technician* OR auxiliar* OR assistant* OR aide*	Apply related words; equivalent subjects	1,030,457
	S13	S11 OR S12	Combined search	1,293,003
	S14	S8 AND S13	Combined search	196,065
	S15	(MH "Influenza+") OR (MH "Influenza, Seasonal") OR (MH "Influenza, Human+") OR (MH "Influenza A Virus, H3N2 Subtype")	Apply related words; equivalent subjects	20,990

	S16	influenza OR flu	Apply related words; equivalent subjects	33,441
	S17	S15 OR S16	Combined search	33,441
	S18	(MH "Influenza Vaccine") OR (vaccin* OR immuniz* OR immunis* OR inoculation* OR shot* OR jab)	Apply related words; equivalent subjects	90,571
	S19	S17 AND S18	Combined search	16,006
	S20	barrier* OR obstacle* OR knowledge OR attitude* OR behavi* OR refusal OR rejection OR belief* OR doubt* OR hesitanc* OR distrust OR trust OR mistrust OR rumo* OR misinformation* OR misconception* OR view* OR opinion* OR objector* OR reject* OR controvers* OR oppos* OR dilemma OR criticis* OR perception* OR experience* OR enabler* OR facilitat* OR motivat* OR intervention* OR encourag* OR promot* OR enhanc* OR advocate OR support* OR improv* OR increas* OR utilisation OR utilization	Apply related words; equivalent subjects	3,180,921
	S21	S14 AND S19 AND S20	Combined search	654
	S22	TI h1n1 OR TI pandemic OR TI swine OR TI avian OR TI child* OR TI pediatric* OR TI adolescen* OR TI neonatal* OR TI cancer OR TI diabet* OR TI systematic review OR TI news	Title exclusion filter	992,206
	S23	TI conference OR TI quickstats	Title exclusion filter	41,882
	S24	S22 OR S23	Combined search	1,028,783
	S25	S21 NOT S24	Final search result	532

PsycINFO Search Strategy.

Date: 11/05/2021	Search ID	Search Query	Notes	Results
	S1	DE "Nursing Homes" OR DE "Residential Care Institutions" OR DE "Long Term Care"	Apply related words; equivalent subjects	
	S2	(care OR nursing OR "long term" OR residential OR elderly OR geriatric OR aged OR skilled) AND (home* OR facilit* OR setting* OR institution*)	Apply related words; equivalent subjects	282,282
	S3	S1 OR S2	Combined search	
	S4	DE "Health Personnel" OR DE "Caregivers" OR DE "Social Workers"	Apply related words; equivalent subjects	
	S5	staff OR worker* OR employee* OR personnel* OR professional* OR caregiver* OR workforce OR practitioner* OR technician* OR auxiliar*	Apply related words; equivalent subjects	
	S6	S4 OR S5	Combined search	
	S7	S3 AND S6	Combined search	
	S8	DE "Influenza"	Apply related words; equivalent subjects	
	S9	influenza OR flu	Apply related words; equivalent subjects	
	S10	S8 OR S9	Combined search	
	S11	DE "Immunization"	Apply related words; equivalent subjects	
	S12	vaccine* OR immuniz* OR immunis* OR innoculation* OR shot* OR jab*	Apply related words; equivalent subjects	
	S13	S11 OR S12	Combined search	
	S14	S10 AND S13	Combined search	1,257
	S15	Barrier* OR obstacle* OR knowledge OR attitude* OR behavi* OR refusal OR Rejection OR belief* OR doubt* OR hesitanc* OR distrust OR trust OR mistrust OR rumo* OR misinformation* OR misconception* OR view* OR opinion* OR objector* OR reject*	Apply related words; equivalent subjects	

		OR controvers* OR oppos* OR dilemma OR criticis* OR Perception* OR experience*		
	S16	Enabler* OR facilitat* OR Motivat* OR Intervention* OR encourag* OR promot* OR enhanc* OR advocate OR support* OR improv* OR increas* OR utilisation OR utilization	Apply related words; equivalent subjects	
	S17	S15 OR S16	Combined search	
	S18	S7 AND S14 AND S17	Final search result	97

MEDLINE Search Strategy.

Date: 11/05/2021	Search ID	Search Query	Notes	Results
	1	exp Long-Term Care/		26,536
	2	exp Nursing Homes/ or exp Residential Facilities/		54,156
	3	1 or 2	Combined search	74,729
	4	(care or nursing or "long term" or residential or elderly or geriatric or aged or skilled).mp.	Mapped to multiple fields	8,047,614
	5	(home* or facilit* or setting* or institution*).mp.	Mapped to multiple fields	2,369,763
	6	4 and 5	Combined search	1,095,137
	7	3 or 6	Combined search	1,110,703
	8	exp Health Personnel/		537,711
	9	(staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar*).mp.	Mapped to multiple fields	1,361,621
	10	8 or 9	Combined search	1,539,785
	11	7 and 10	Combined search	250,079
	12	exp Influenza, Human/		51,535
	13	flu.mp.	Mapped to multiple fields	14,071
	14	influenza.mp.	Mapped to multiple fields	116,822
	15	12 or 13 or 14	Combined search	123,747

	16	exp Influenza Vaccines/		23,895
	17	immuni?ation.mp.		164,225
	18	(vaccin* or inoculation* or shot* or jab).mp.	Mapped to multiple fields	492,255
	19	16 or 17 or 18	Combined search	566,544
	20	15 and 19	Combined search	42,956
	21	(Barrier* or obstacle* or knowledge or attitude* or behavi* or refusal or Rejection or belief* or doubt* or hesitan* or distrust or trust or mistrust or rumo* or misinformation* or misconception* or view* or opinion* or objector* or reject* or controvers* or oppos* or dilemma or criticis* or Perception* or experience* or Enabler* or facilitat* or Motivat* or Intervention* or encourag* or promot* or enhanc* or advocate or support* or improv* or increas* or utili?ation).mp.	Mapped to multiple fields	17,369,179
	22	11 and 20 and 21	Combined search	1,145
	23	(H1N1 or swine or avian or child* or pediatric* or adolescen* or neonatal* or cancer or diabet* or molecul* or conference or systematic review or quickstats or news).m_titl.	Title exclusion filter	3,111,959
	24	22 not 23	Final search result	956

EMBASE Search Strategy.

Date: 11/05/2021	Search ID	Search Query	Notes	Results
	1	exp long term care/		1,919,274
	2	exp nursing home/		54,809
	3	exp residential home/		7,340
	4	(care or nursing or "long term" or residential or elderly or geriatric or aged or skilled).mp.	Mapped to multiple fields	8,836,747
	5	(home* or facilit* or setting* or institution*).mp.	Mapped to multiple fields	3,152,487
	6	4 and 5	Combined search	1,437,530

	7	1 or 2 or 3 or 6	Combined search	3,156,617
	8	exp nursing home personnel/		797
	9	(staff or worker* or employee* or personnel* or professional* or caregiver* or workforce or practitioner* or technician* or auxiliar*).mp.	Mapped to multiple fields	1,756,489
	10	8 or 9	Combined search	1,756,489
	11	7 and 10	Combined search	403,751
	12	exp influenza A/ or exp 'Influenza A virus (H3N2)'/ or exp influenza/ or exp Influenza virus/ or exp seasonal influenza/		113,228
	13	flu.mp.	Mapped to multiple fields	36,736
	14	12 or 13	Combined search	135,868
	15	exp influenza vaccine/ or exp influenza vaccination/		44,043
	16	(vaccin* or immuni?ation or inoculation* or shot* or jab).mp.	Mapped to multiple fields	692,062
	17	15 or 16	Combined search	692,062
	18	14 and 17	Combined search	47,970
	19	11 and 18	Combined search	1,867
	20	Barrier* OR obstacle* OR knowledge OR attitude* OR behavi* OR refusal OR Rejection OR belief* OR doubt* OR hesitan* OR distrust OR trust OR mistrust OR rumo* OR misinformation* OR misconception* OR view* OR opinion* OR objector* OR reject* OR controvers* OR oppos* OR dilemma OR criticis* OR Perception* OR experience* OR Enabler* OR facilitat* OR Motivat* OR Intervention* OR encourag* OR promot* OR enhanc* OR advocate OR support* OR improv* OR increas* OR utili?ation	Mapped to multiple fields	17,161,022
	21	19 and 20	Combined search	1,465
	22	(H1N1 or swine or avian or child* or pediatric* or adolescen* or neonatal* or cancer or diabet* or molecul* or conference or systematic review or quickstats or news).m_titl.	Title exclusion filter	3,890,214
	23	21 not 22	Final search result	2,079

IBSS Search Strategy.

Date: 11/05/2021	Search ID	Search Query	Notes	Results
	S1	MAINSUBJECT.EXACT("Assisted living facilities") OR MAINSUBJECT.EXACT("Nursing homes") OR MAINSUBJECT.EXACT("Long term health care")		2,011
	S3	(care OR nursing OR "long term" OR residential OR elderly OR geriatric OR aged OR skilled) AND (home* OR facilit* OR setting* OR institution)		345,456
	S4	S1 OR S3	Combined search	345,803
	S5	MAINSUBJECT.EXACT("Medical personnel")		8,303
	S6	staff OR worker* OR employee* OR personnel* OR professional* OR caregiver* OR workforce OR practitioner* OR technician* OR auxiliar*		714,197
	S7	S5 OR S6	Combined search	714,197
	S8	S4 AND S7	Combined search	244,114
	S9	MAINSUBJECT.EXACT("Influenza") OR flu		5,638
	S10	S9 OR influenza	Combined search	8,594
	S11	MAINSUBJECT.EXACT("Vaccines") OR (vaccine* OR immuniz* OR immunis* OR innoculation* OR jab OR shot*)		54,362
	S12	S10 AND S11	Combined search	2,438
	S13	Barrier* OR obstacle* OR knowledge OR attitude* OR behavi* OR refusal OR Rejection OR belief* OR doubt* OR hesitan* OR distrust OR trust OR mistrust OR rumo* OR misinformation* OR misconception* OR view* OR opinion* OR objector* OR reject* OR controvers* OR oppos* OR dilemma OR criticis* OR Perception* OR experience* OR Enabler* OR facilitat* OR Motivat* OR Intervention* OR encourag* OR promot* OR		2,184,088

		enhanc* OR advocate OR support* OR improv* OR increas* OR utilisation OR utilization		
	S14	S8 AND S12 AND S13	Combined search	1,648
	S17	ti(H1N1 OR swine OR avian OR child* OR pediatric* OR adolescen* OR neonatal* OR cancer OR diabet* OR molecul* OR conference OR "systematic review" OR quickstats OR news)	Title exclusion filter	121,392
	S18	S14 NOT S17	Filtered final result	1,531

IBSS Search Strategy.

Date: 11/05/2021	Search ID	Search Query	Notes	Results
	S1	MAINSUBJECT.EXACT("Assisted living facilities") OR MAINSUBJECT.EXACT("Nursing homes") OR MAINSUBJECT.EXACT("Long term health care")		2011
	S2	(care OR nursing OR "long term" OR residential OR elderly OR geriatric OR aged OR skilled) AND (home* OR facilit* OR setting* OR institution)		345456
	S3	S1 OR S2	Combined search	345803
	S4	MAINSUBJECT.EXACT("Medical personnel")		8303
	S5	staff OR worker* OR employee* OR personnel* OR professional* OR caregiver* OR workforce OR practitioner* OR technician* OR auxiliar*		714197
	S6	S4 OR S5	Combined search	714197
	S7	S3 AND S6	Combined search	244114
	S8	MAINSUBJECT.EXACT("Influenza") OR flu		5638
	S9	S8 OR influenza	Combined search	8594
	S10	MAINSUBJECT.EXACT("Vaccines") OR (vaccine* OR immuniz* OR immunis* OR innoculation* OR jab OR shot*)		54362
	S11	S9 AND S10	Combined search	2438

	S12	Barrier* OR obstacle* OR knowledge OR attitude* OR behavi* OR refusal OR Rejection OR belief* OR doubt* OR hesitan* OR distrust OR trust OR mistrust OR rumo* OR misinformation* OR misconception* OR view* OR opinion* OR objector* OR reject* OR controvers* OR oppos* OR dilemma OR criticis* OR Perception* OR experience* OR Enabler* OR facilitat* OR Motivat* OR Intervention* OR encourag* OR promot* OR enhanc* OR advocate OR support* OR improv* OR increas* OR utilisation OR utilization		2184088
	S13	S7 AND S11 AND S12	Combined search	1648
	S14	ti(H1N1 OR swine OR avian OR child* OR pediatric* OR adolescen* OR neonatal* OR cancer OR diabet* OR molecul* OR conference OR "systematic review" OR quickstats OR news)	Title exclusion filter	121392
	S15	S13 NOT S14	Filtered result	1531
	S16	S15 AND PEER(yes)	Peer-reviewed filter	778
	S17	S15	Final filtered result before peer filter	1531
	S18	S15 AND PEER(yes)	Peer-reviewed final result	778
	S19	S18	Final search result	778

SCOPUS Search Strategy.

Date: 11/05/	Search ID	Search Query	Results
	S1	((((TITLE-ABS-KEY (care OR nursing OR {long term} OR elderly OR aged OR residential OR geriatric OR skilled)) AND (TITLE-ABS-KEY (home OR sitting OR facility OR institution))) AND (TITLE-ABS-KEY (staff OR worker OR employee OR personnel OR professional OR caregiver OR workforce OR	760

2021		practitioner OR technician OR auxiliary))) AND ((TITLE-ABS-KEY (influenza OR flu)) AND (TITLE-ABS- KEY (vaccine OR vaccination OR immunization OR immunisation OR inoculation OR shot OR jab)))) AND (TITLE-ABS- KEY (barrier OR obstacle OR knowledge OR attitude OR behaviour OR refusal OR rejection OR belief OR doubt OR hesitant OR distrust OR trust OR mistrust OR rumour OR misinformation OR misconception OR view OR opinion OR objector OR reject OR controversy OR oppose OR dilemma OR criticise OR perception OR experience OR enabler OR facilitate OR motivate OR intervention OR encourage OR promote OR enhance OR advocate OR support OR improve OR increase OR utilisation OR utilisation))	
	S2	(((((TITLE-ABS-KEY (care OR nursing OR {long term} OR elderly OR aged OR residential OR geriatric OR skilled)) AND (TITLE-ABS- KEY (home OR sitting OR facility OR institution))) AND (TITLE-ABS- KEY (staff OR worker OR employee OR personnel OR professional OR caregiver OR workforce OR practitioner OR technician OR auxiliary))) AND ((TITLE-ABS-KEY (influenza OR flu)) AND (TITLE-ABS- KEY (vaccine OR vaccination OR immunization OR immunisation OR inoculation OR shot OR jab)))) AND (TITLE-ABS- KEY (barrier OR obstacle OR knowledge OR attitude OR behaviour OR refusal OR rejection OR belief OR doubt OR hesitant OR distrust OR trust OR mistrust OR rumour OR misinformation OR misconception OR view OR opinion OR objector OR reject OR controversy OR oppose OR dilemma OR criticise OR perception OR experience OR enabler OR facilitate OR motivate OR intervention OR encourage OR promote OR enhance OR advocate OR support OR improve OR increase OR utilisation OR utilisation))) AND NOT (TITLE (h1n1 OR swine OR avian OR child* OR pediatric OR adolescen* OR neonatal OR cancer AND diabet* OR molecule OR conference OR {systematic review} OR quickstats OR news))	758

Appendix 4: inclusion and exclusion of full texts

INCLUSION **Types of studies** Primary sources with qualitative, quantitative component	
INCLUSION **Outcomes** Studies aimed to identify enablers associated with care home staff flu vac	
INCLUSION **Outcomes** Studies aimed to identify barriers associated with care home staff flu vac	
INCLUSION **Setting** care homes, include long-term accommodations , with nursing or non-nursing	
INCLUSION **Intervention** Studies discussed flu vac among care home staff	
INCLUSION **Type of participants** Health & socila care workers, who have direct contact with care home residents, including admin, full time, part time	
Other non-relevant articles	
EXCLUSION: systematic review	
EXCLUSION: vacs other than influenza vaccine e.g. H1N1	
EXCLUSION:Barriers/enablers not investigated	
EXCLUSION: not related to barriers/enablers of care homes staff flu vaccine or not Not reporting modifiable determinants	
EXCLUSION: Care homes staff data not reported separately (Results mixed with other HCWs)	
EXCLUSION: Care homes staff not part of the study	
EXCLUSION: Not reported in English	
EXCLUSION: Not empirical study	
author	
title	
include:1, exclude:0	
paper ref. number, (article number) e.g. 53, 117	

Appendix 5: Local Authorities' Schemes to Improve the Influenza Vaccination Rate for Care Home Staff

Introduction:

Care homes residents are the most vulnerable to influenza due to their overall frailty, immune function deteriorating, nutritional deficiencies and the possibility of transfer influenza from the staff and visitors[77]. During 2019/20 influenza season, Public Health England (PHE) reported 3,936 acute respiratory infections outbreaks in closed sittings and 69,9% (2,751) of them occurred in care homes[3]. Influenza outbreaks in care homes are a significant concern in terms of mortality and morbidity of residents while also placing added pressure on already overloaded health services. In order to prevent and control influenza in care homes, a multifaceted approach is required. While vaccination of residents and staff and antiviral policies are crucial, good administrative leadership, epidemic planning and ongoing staff training are also essential[14]. WHO recommends that at least 75% of health care workers in close contact with the elderly must be vaccinated[81]. In 2020, Public Health England (PHE) recommended all health and social care employees to get vaccinated against influenza and the ambition was to reach 100% vaccination rate[101].

Reducing deaths and hospital admissions caused by flu-like illnesses in care home residents can be achieved by vaccinating care home staff, and there are many studies showing evidence for this[85-88]. Vaccination of health care staff must therefore be prioritised in these settings. In addition to health benefits, staff influenza vaccination has ensured work stability by reducing staff sickness absence and related job interruption[90].

Local authorities within England have an important role in commissioning and delivering vaccine programmes within their area. They are in a unique position to deliver vaccination services to care homes under their local area[247]. This survey is part of a research project aimed at developing an intervention to increase the influenza vaccination rate for care home staff and estimate the effectiveness and cost-effectiveness of the intervention. We are currently developing the intervention, and as a starting point, we would like to learn from the approaches taken by different local

authorities to tackle the low influenza vaccine uptake in care home staff. This information will be used to finalise the intervention design for the feasibility study.

Aim and objectives:

The aim of this study is to describe local authority initiatives which aim to improve influenza vaccination uptake for care home staff. With respect to enhancing care home staff vaccination rates, the objectives are to:

- Describe the range of education initiatives used to enhance care home staff willingness to be vaccinated
- Describe schemes used to increase accessibility of vaccinations to care home staff
- Describe any incentive schemes for care homes to improve the influenza vaccination rate of care home staff.
- Identify the influenza vaccination target-rates that local authorities set.
- Describe how the local authorities monitor performance in care home staff vaccination uptake.
- Describe initiatives that local authorities plan to use in the future to improve care home staff influenza vaccination rates.
- Identify any additional innovative approaches used.

Methods:

Survey design:

A cross-sectional survey will be used to collect the data because of its ability to reach a wide number of individuals across geographical areas, easy to administer and time-efficiency[248]. In addition, surveys use a standardised technique to ensure that all participants are given the same questions[249]. Questions design will be guided by the aim and objectives of the survey. The questionnaire was designed following the checklist for reporting results of internet e-surveys (CHERRIES). The survey is available in two formats in order to provide the local authorities with flexibility in their method of response. a Word-based version to be return to the research team via email and an online version

accessed via a link Jisc online survey. Given the complexity of reaching the department responsible for annual influenza programme activity in local authorities, and based on feedback from council staff during the survey development, these methods are expected to encourage local authorities to participate. A Word version of the questionnaires was developed as some local authorities may require a Word document to handle our request. The survey items of the Word version were reorganized, simplified, and survey sections were numbered to ensure that the online and paper versions of the survey had the same navigation and style. The questions are short multiple-choice questions and open-ended questions in order to obtain more detailed and explanatory answers and to enable respondents to provide answers which were not originally offered to them. The survey includes an information page describing the purpose of the survey, its significance, relevance, and the types of information will be requested from the local authorities, and the time needed to complete the survey. it also provides the respondents with information regarding whom to contact to return the completed survey or if they have any questions.

Improving response rate:

To increase the response rate for the survey, The survey was created to be short and should take no more than 5 minutes to complete. The UEA logo was added to the top page to emphasise that the survey is supported by the university. My supervisor will send the survey. A follow-up email with the survey link and Word copy will be sent after 20 days to nonrespondents local authorities.

Participants:

The survey will be sent to upper-tier (county councils) and one tier councils (unitary authorities, London boroughs and metropolitan boroughs) which are usually responsible for public health services[256,257]. An inquiry was sent to local authority staff to determine what level of government would be best to direct questions on influenza vaccination activities to. Following this, it was determined that the annual influenza programmes activities are devolved to the upper and one tier local authorities (i.e. County Councils, Unitary Authorities, London Boroughs and Metropolitan Boroughs) and would appropriately be directed to this

level of government. In England, there are 152 upper and one tier councils[256]. We will send the survey to all the 152 local authorities using Freedom of information email addresses.

Questionnaire development

Currently, there are very few publications regarding the activities of local authorities to improve influenza vaccination in care home staff. The questionnaires have been developed following a literature search of the local authorities' activities related to vaccination in general. In addition, a discussion with the research team, which includes experienced researchers in care home services and vaccination, helped inform the questionnaires. Finally, two local authorities staff involved in public health reviewed the draft paper of the survey and asked to give feedback on the content and clarity of the questionnaires. This step helped to achieve the face and content validity of the survey.

The questionnaires comprise 10 sections and 25 questions. The questionnaires will ask about the availability of scheme, educational interventions, interventions used to enhance access to influenza vaccine, and incentives schemes for care homes and staff. In addition, the questionnaires will ask about the influenza vaccination target rate the local authorities set and the methods used to monitor care home vaccination rate.

We will also seek the name of any individual who is willing to receive a follow-up phone call or email to enable us to obtain further information regarding initiatives which we would like to know more about or obtain materials from to inform/support our future research. Any materials would be used such that intellectual property rights were not infringed and ownership was appropriately acknowledged.

Pretesting:

To determine the response rate, quality of survey completion and the administrative process of the survey, a pilot study will be undertaken by sending the questionnaires to (n=10) Local Authorities across England. Method of survey implementation and survey content will be revised in response to pilot results., A word version of the survey was developed as some local authorities require a paper version to respond to our request.

Once piloting and revisions are complete the survey will be sent to all remaining local authorities.

Data collection:

Each local council will be emailed and asked to forward the email to the person responsible for health and social care. A follow-up email with the survey link and a Word copy will be sent after 20 working days to nonrespondents local authorities.

Data analysis:

Descriptive statistical analysis will be used to provide information about the sample of schemes and interventions, such as how many schemes (frequencies) and characteristics of the schemes. Content analysis will be used to group open-ended questions and free-text responses into themes.

Dissemination:

Survey findings will be included as a chapter in Faisal Alsaif's thesis, published in academic peer-reviewed journals, and used for conference presentations.

Ethical consideration:

The survey will not include individual patients, carers, or users' data. The data will be gathered via Freedom of Information (FOI) request[255]. We are adhering to FOI regulations. Ethical approval will be obtained from the Faculty of Medicine and Health Sciences Research Ethics Committee before any data collection take place.

Data storage:

Data will be handled and stored on password-protected computers that will only be accessible to the research team members. The data will be managed in accordance with current data protection rules.

Follow up telephone calls:

Consent will be obtained from the person who will respond to the questionnaires to provide his/her contact details to be called to discuss in more depth the local authority's scheme and interventions. The respondents' names and email addresses, who give consent to be called, will be strictly confidential to the research team and will be used only to contact the respondents to be contacted. These will be used to obtain a richer picture of any initiatives which are of potentially more interest to us i.e. align with the interventions we are already planning within our NIHR grant.

Appendix 6: Ethical approval of local authorities survey

Faculty of Medicine and Health Sciences Research Ethics Committee

University of East Anglia
NORWICH MEDICAL SCHOOL
Bob Champion Research & Educational Building
Rosalind Franklin Road
University of East Anglia
Norwich Research Park
Norwich NR4 7UQ

Email: fmh.ethics@uea.ac.uk
www.med.uea.ac.uk

Faisal Alsaif
School of Pharmacy
University of East Anglia
Norwich Research Park
Norwich
NR4 7TJ

04 November 2021

Dear Faisal

Project Title: Local Authorities' Schemes to Improve the Influenza Vaccination Rate for Care Home Staff

Reference: 2021/22-005

Thank you for your email of 22 October 2021 notifying us of the amendments to your above proposal. These have been considered and I can confirm that your amended proposal has been approved.

Please can you ensure that any further amendments to either the protocol or documents submitted are notified to us in advance, and that any adverse events which occur during your project are reported to the Committee.

Approval by the FMH Research Ethics Committee should not be taken as evidence that your study is compliant with GDPR and the Data Protection Act 2018. If you need guidance on how to make your study GDPR compliant, please contact your institution's Data Protection Officer.

Please can you arrange to send us a report once your project is completed.

Yours sincerely

Dr Jackie Buck
Chair
FMH Research Ethics Committee

Appendix 7: Ethics amendments approval for Local Authorities survey

Tuesday, October 29, 2024 at 12:40:49 Greenwich Mean Time

Subject: Decision - Ethics ETH2122-1541: Mr Faisal Alsaif
Date: Thursday 17 March 2022 at 09:30:42 Greenwich Mean Time
From: Ethics Monitor
To: Faisal Alsaif (PHA - Postgraduate Researcher)

University of East Anglia

Study title: Local Authorities' Schemes to Improve the Influenza Vaccination Rate for Care Home Staff

Application ID: ETH2122-1541 (Amendment prior to EM)

Dear Faisal,

The amendments to your study was considered on 17th March 2022 by the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee).

The decision is: **approved**.

You are therefore able to start your project subject to any other necessary approvals being given.

If your study involves NHS staff and facilities, you will require Health Research Authority (HRA) governance approval before you can start this project (even though you did not require NHS-REC ethics approval). Please consult the HRA webpage about the application required, which is submitted through the IRAS system.

This approval will expire on **30th September 2022**.

Please note that your project is granted ethics approval only for the length of time identified above. Any extension to a project must obtain ethics approval by the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee) before continuing.

It is a requirement of this ethics approval that you should report any adverse events which occur during your project to the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee) as soon as possible. An adverse event is one which was not anticipated in the research design, and which could potentially cause risk or harm to the participants or the researcher, or which reveals potential risks in the treatment under evaluation. For research involving animals, it may be the unintended death of an animal after trapping or carrying out a procedure.

Any amendments to your submitted project in terms of design, sample, data collection, focus etc. should be notified to the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee) in advance to ensure ethical compliance. If the amendments are substantial a new application may be required.

Approval by the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee) should not be taken as evidence that your study is compliant with the UK General Data Protection Regulation (UK GDPR) and the Data Protection Act 2018. If you need guidance on how to make your study UK GDPR compliant, please contact the UEA Data Protection Officer (dataprotection@uea.ac.uk).

Please can you send your report once your project is completed to the FMH S-REC (fmh.ethics@uea.ac.uk).

I would like to wish you every success with your project.

On behalf of the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee)

Yours sincerely,

Paul Linsley

Ethics ETH2122-1541: Mr Faisal Alsaif

Appendix 8: Local authorities survey

University of East Anglia

Local Authorities' Schemes to Improve the Influenza Vaccination Rate for Care Home Staff

My name is Faisal Alsaif and I am a PhD student conducting research in the field of influenza vaccination. I am inviting you to consider taking part in a survey asking about local activities which have been undertaken to promote influenza vaccination uptake by care home staff either by the local authority, NHS, private sector, or through a local partnership. The survey will be conducted by myself, under the supervision of Dr Michael Twigg and Dr Amrish Patel.

The information is requested to inform the design of a government funded trial to improve care home staff influenza vaccination rates. We would like to learn from what you have done and are doing so we can optimise the design of our intervention.

Information for survey completion

The meanings for the following terms which are used throughout the survey are:
Scheme: Local strategy for promoting the influenza vaccination uptake in care home staff.
Intervention: Any stand-alone activity or effort to promote behaviour to increase the influenza vaccination rate.
Care home staff: All workers (including agency staff, catering and administrative staff) employed by a residential care home for older adults.

The survey will take 5-10 minutes to complete. Please remember that the questionnaire is applicable to all local authorities irrespective if the local authority is or is not directly responsible for the influenza vaccine programmes.
If you decided to participate in the follow up contact, your email address will only be used to make contact with you, will not be disclosed to anyone outside the research team, and will only be held for 6 months following the completion of the study.
The researcher will hold contact information for you, and will be kept on a password-protected computer.

Thank you for taking the time to consider participating in this study. Should you wish to obtain further information, or follow up on any information in the study, you can contact the researcher at: f.alsaif@uea.ac.uk.

Please complete the survey and return to:
Faisal Alsaif
Email: f.alsaif@uea.ac.uk

Section 1:

First, we would like to ask for general information about the role of the local authority in care home staff influenza vaccination irrespective if the local authority does or does not have a scheme.

Please note that all fields marked with asterisks (*) are required.

Local Authority detail:

What local authority do you represent? *

Performance Monitoring:

Which types of staff do you expect to be vaccinated in the care home as part of the national flu vaccination programme? (Please choose all that apply) (If Other, please specify)

☐ Care staff
☐ Administration staff
☐ Domestics/housekeeping, catering staff
☐ Agency/temp staff
☐ Other

Was the influenza vaccination uptake for care home staff monitored during the 2021/22 influenza season? *

☐ Yes
☐ No (if no, please go to question 7 on page 4)

If Yes, what percentage of the care home staff received the influenza vaccine during the 2021/22 influenza season in your local area? *

Which of the following methods used to collect data about the vaccination rate for care home staff? (If Other, please specify) *

☐ Immform
☐ National Immunisation Vaccination System (NIVS)
☐ NHS Capacity Tracker
☐ Other

Please use the space below to describe any other methods used to monitor the influenza vaccination rate.

Vaccination target-rate:

Did you have an influenza vaccination target for care home staff for the 2021/22 influenza season? *

☐ Yes
☐ No

If Yes, please state in percentage (%) the influenza vaccine uptake ambition you set for the 2021/22 influenza season for care home staff?

Section 2: Availability of the scheme

This section asks about the schemes and interventions that developed to improve the influenza vaccination rate for care home staff.

Has the local council instigated any scheme or intervention to increase care home staff influenza vaccination rates?

☐ Yes
☐ No

Do you have local partners responsible for developing interventions to improve the influenza vaccination rate for care home staff?

☐ Yes
☐ No

If you answered "Yes" to any of questions 9 or 10, please go to question 11.
If you answered "No" to questions 9 and 10, please go to question 24 on page 9.

Educational interventions:

Do/did you provide any training or information materials to care home staff to increase their willingness to be vaccinated? *

☐ Yes
☐ No (if no, please go to question 14 on page 6)

Which of the following has your scheme included to encourage care home staff to receive the influenza vaccine? (Please choose all that apply) (If Other, please specify) *

☐ Educational leaflets and/or posters
☐ Face to face training (virtual or physical)
☐ Educational videos
☐ Educational toolkit
☐ Informing care home staff of influenza vaccination goal and/or policies
☐ Inform staff where they could obtain free vaccination
☐ Providing additional education to staff who declined vaccine
☐ Email/text messages reminders to care home staff to get influenza vaccine
☐ Publicising vaccination uptake rate to care homes
☐ Other

Please use the space below to describe any other education intervention used to enhance care home staff willingness to be vaccinated.

Interventions used to enhance access to influenza vaccine:

Do/did you provide any additional influenza vaccination clinics to support care home staff? *

☐ Yes
☐ No (if no, please go to question 17 on page 7)

To increase access to vaccinations for care home staff have you done any of the following: (Please choose all that apply)(If Other, please specify) *

☐ Located vaccination clinics within care homes
☐ Offer influenza vaccine during day and night shifts (Out of hours provision)
☐ Facilitate free vaccination via GP or pharmacist with vouchers/letters
☐ Ensure pharmacies and GP have sufficient stocks for the whole influenza season
☐ Ensure care home staff not eligible under the current NHS influenza vaccination scheme get free influenza vaccine from GP, community pharmacy or NHS trust.
☐ Provided transport or travel reimbursement
☐ Other

Please use the space below to describe the initiatives used to enhance access to influenza vaccine for care home staff.

Incentive schemes:

Do/did you offer any incentives to encourage care home managers or owners to improve their staff influenza vaccination rate? *

☐ Yes
☐ No (if no, please go to question 19 on page 7)

Please use the space below to describe the incentives offered to care homes.

Do/did you offer incentives to care home staff to promote access to influenza vaccination services? (e.g., monetary, vouchers, prize draw)

☐ Yes
☐ No

Please use the space below to describe any incentives offered to care home staff

Schemes and interventions evaluation:

Since the scheme or intervention was started, has it been evaluated within your local authority? *

☐ Yes
☐ No
☐ Not sure

Which one of the above interventions was the most effective or had the most significant impact on care home staff influenza vaccination? *

☐ Educational interventions
☐ Enhance access to influenza vaccine
☐ Financial incentives
☐ Unable to state
☐ Other

Additional information:

Please use the space below to provide additional information e.g., innovative approaches used to increase care home staff influenza vaccination rate or local authority's partnerships to deliver influenza vaccine programme for care home staff.

Future plans:

Do you have a future plan to improve the influenza vaccination rate for care home staff? *

☐ Yes
☐ No
☐ Not sure

If Yes, please use the space below to outline any future plans that the council may have to improve influenza vaccination uptake in care home staff

Participant details

In the next few months, we would like to conduct follow-up interviews to clarify and explore the schemes and interventions in more depth. Please enter your email below if you are willing to be interviewed. Your contact name and email address will remain strictly confidential and will be used only to contact you about taking part in an interview.

Would you willing to take part in a brief follow up confidential contact to help us understand some of your responses to the questions? Please indicate below if you would be interested in follow up interview *

☐ Yes, I am interested in taking part in a follow up interview.
☐ No, I am not interested in taking part in a follow up interview.

Contact name:

Preferred email address:

Thank you for your response

Appendix 9. Exploratory Multiple Regression Model Including All Intervention Variables

An exploratory multiple regression model including all 18 intervention variables and the number of care homes (19 predictors total) was conducted to assess feasibility of including all predictors simultaneously. With n = 117, the residual degrees of freedom were only 99, which falls below the recommended sample size for reliable estimation based on Tabachnick & Fidell (2013). The ANOVA table below shows the model degrees of freedom (18) and residual degrees of freedom (99), along with the model's non-significant p-value.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1169.229	18	64.957	1.608	.072
Residual	3998.499	99	40.389		
Total	5167.728	117			

Note: df = degrees of freedom; residual df (99) is substantially lower than the recommended threshold (50 + 8m = 202 cases for m = 19 predictors) for testing the overall model.

Appendix 10: Formal training

Training or Professional Development Activity	Date completed
Evaluating your training needs and developing your skills	05/10/2020
Basic introduction to research ethics	06/10/2020
Getting started as a researcher	06/10/2020
The Student-Supervisor Relationship	06/10/2020
HOW TO make the most of UEA Library Resources	15/10/2020
Advanced Searching Skills	20/10/2020
Surveying the Literature for Your Thesis	05/11/2020
Introduction to Reference Management	11/11/2020
Systematic Reviewing	19/11/2020
Introduction to Academic Writing (Part 2)	02/12/2020
Managing Your PhD	03/12/2020
Making Citations Count: Understanding and Using Bibliometrics	17/12/2020
Preparing for the Probationary Review Meeting	18/01/2021
Using Threshold Concepts in Research Practice	03/02/2021
Managing Your PhD: the Supervisor Relationship	08/02/2021
How to Write a Thesis	15/02/2021
How to Write an Effective Research Proposal	25/02/2021
Critical Thinking	01/03/2021
Preparing for Your Probationary Review	16/03/2021
Where to start with the thesis?	19/04/2021
Developing and testing complex healthcare interventions	07-10/07/2021
UCL Summer school for behavior *(*Introduction to Behaviour Change: Principles & Practice)	12-16/07/2021
Introduction to Academic Writing (Part 1)	24/11/2021
Writing the Thesis	08/12/2021
Essential Statistics for Researchers	10-11/01/2022
Practical Statistics Using SPSS - Day 1	11/02/2022
How to Write a Thesis	17/02/2022

Training or Professional Development Activity	Date completed
Practical Statistics Using SPSS - Day 2 - Statistical significance	23/02/2022
Writing the Thesis	02/03/2022
Mixed Research Methods	15/03/2022
Scientific Publishing - a Journal Editor's View	18/05/2022
SURVIVING YOUR PHD - FIVE WAYS TO WELLBEING	20/05/2022
Qualitative methods planning: which approach for my research?	10/03/2023
SURVIVING YOUR PHD - FIVE WAYS TO WELLBEING	9/05/2023
Data analysis in qualitative research	25/05/2023
Keeping up to Date with Research - Tips from UEA Library for Sifting Through the Information Avalanche	16/11/2023
Strategies for success in scientific publishing and conferences	08/03/2024

Appendix 11: Participants information sheet (PIS) for Vaccine providers

NORWICH CTU

University of East Anglia

FluCare
Working towards flu-free care homes

FluCare Trial: Estimating the effectiveness and cost-effectiveness of a complex intervention to increase care home staff influenza vaccination rates

Participant Information Sheet
(Care Home Staff, Pharmacists, GP Practice Staff)

You have been given this information sheet because your Care Home, Pharmacy or GP practice is taking part in the FluCare research project. As part of the research, we would like to interview some Care Home Managers, Care Home Staff, Pharmacists and GP practice staff to ask them what they think about the FluCare Project. This information sheet is designed to help you decide whether or not you want to take part. Please read this carefully and feel free to ask questions if anything is not clear or you want further information.

1. Why is the research being done?

Every year flu, caught from staff and visitors, causes serious illness and death in care home residents. In the UK, less than half of care home staff are vaccinated which means that residents are put at higher risk. Our initial studies suggest three main reasons why staff do or do not get vaccinated:

- how easily they can access vaccines
- how important their manager sees staff vaccination
- and attitudes and beliefs around vaccination

We now want to find out whether an intervention called 'FluCare' can improve flu vaccination uptake by care home staff.

Contents:

1. Why is the research being done?
2. Why have I been invited to take part?
3. Do I have to take part?
4. What will I be asked to do if I decide to take part?
5. Are there any disadvantages of taking part?
6. What are the possible benefits of taking part?
7. Who has approved the research?
8. What will we do with the results?
9. What if I am not happy about the project?
10. Data protection: how will we use your information?

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2. Why have I been invited to take part?

We are inviting you to take part because you are a manager or you work in a care home that is taking part in the FluCare project, or a pharmacist or GP practice staff involved in delivering flu vaccinations as part of the FluCare project. We are therefore inviting you to ask if you would be happy to be interviewed. Speaking to you will help us to better understand what has worked or hasn't worked well in the FluCare project.

3. Do I have to take part?

No, it is up to you to decide whether or not you want to take part. If you decide to take part but later change your mind, you can withdraw at any time without having to give a reason. A decision not to take part will not affect the standard of support or services that you receive in the future.

If you withdraw from this part of the study, we will use the research information we have collected from you up until the point that you withdraw. You can withdraw at any time.

4. What will I be asked to do if I decide to take part?

We are asking you to take part in an interview. The interview will be held either by phone or virtually and should last between 45 and 60 minutes. During the interview, a member of the research team will ask your views and experiences with participating in the FluCare project. For care homes that received the FluCare intervention and for pharmacist and GP practice staff involved in the delivery of flu vaccinations, we would like to know your thoughts on the implementation and acceptability of the intervention.

The interview will be recorded on a voice recorder to allow us to accurately capture the discussion. What is said will then be 'transcribed' (written down) to make it easier to analyse. You are welcome to have a copy of this transcript – just ask a member of the research team.

For care home staff, at the end of the interview, we will turn the recorder off and ask you about your gender, age bracket, ethnicity, and job role. You do not need to answer these questions, but the information will help us describe the group of people we have interviewed.

5. Are there any disadvantages of taking part?

We do not think there are any disadvantages of taking part beyond the time taken to participate. In consideration of this, you will be reimbursed for your time.

During the interview, you will not be asked to talk about anything that you do not wish to talk about. However, if for any reason you do not feel comfortable at any point during the interview, you are free to stop without giving a reason. It is unlikely you will become distressed during the interview, but if you do the researcher will support you until you feel better and make sure that you are aware of where you can go for further support later if needed.

6. What are the possible benefits of taking part?

Your participation in this national research project will help us to minimise the likelihood of care home residents suffering from the serious effects of catching flu from staff. It will also help protect staff from catching and suffering the effects of flu, thus increasing continuity of care for residents.

7. Who has approved the research?

This research project, sponsored by the University of East Anglia, has been checked and approved by an independent group of people, called a Research Ethics Committee. This committee checks that risks of the research have been kept to a minimum and that we give you all the information you need to make an informed choice about whether to take part or not. This study has been checked and given a favourable opinion by the the University of East Anglia FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee (ETH2122-2419).

8. What will we do with the results?

The results of the research will be shared with care home organisations, NHS organisations, health professionals, education professionals, and academic audiences. We will do this by publishing the results in academic journals and circulating them via care home networks. We may wish to quote you when we present our findings about the FluCare project, we will not use your name in the quotes, or identify your organisation, but may use your job role. We will make sure you cannot be identified.

9. What if I am not happy about the project?

If you are not happy about any part of the research, you will be able to speak with a member of the research team who will do their best to help.

Complaints should be directed to:
Dr Emiliya Lazarova, Associate Professor in Economics and Head of School
School of Economics, University of East Anglia, Norwich Research Park, Norwich NR4 7TJ
Email: E.Lazarova@uea.ac.uk Tel: 01603 592867

10. How will we use information about you?

We will need to use information from you, for this research project. This information will include your name and work contact details. People will use this information to do the research, or to check to make sure that the research is being done properly. We will keep all information about you safe and secure. People who do not need to know who you are will not be able to see your name or contact details. Your data will have a code number instead.

Once we have finished the study, we will keep some of the data so we can check the results. We will write our reports in a way that no-one can work out that you took part in the study. Information collected may be used to support other research in the future and will be shared anonymously with other researchers. We do need to let you know, however, that if you do disclose anything which might identify a risk to yourself or to others, or a personal or professional offence, this would be shared with the relevant responsible authority.

What are your choices about how your information is used?

- You can stop being part of the study at any time, without giving a reason, but we will keep information about you that we already have.
- We need to manage your records in specific ways for the research to be reliable. This means that we won't be able to let you see or change the data we hold about you.

Where can you find out more about how your information is used?

You can find out more about how we use your information

- At www.hra.nhs.uk/information-about-patients/
- HRA leaflet available from www.hra.nhs.uk/patientdataandresearch
- by asking one of the research team
- by sending an email to dataprotection@uea.ac.uk
- by ringing us on 01603 597644

Thank you for taking time to read this information sheet!

If you decide to take part in the project you will be given a copy of this information sheet and your signed consent form to keep. If you would like more information about this project, please contact Carys Seeley, email: c.seeley@uea.ac.uk who will be contacting you about the research. Alternatively, you may contact Dr Amrish Patel or Professor David Wright who are leading the research.

Dr Amrish Patel, Tel: 01603 597644,
email: amrish.patel@uea.ac.uk

Professor David Wright, email:
d.j.wright@leicester.ac.uk

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Appendix 12: FluCare (Phase 3) Process Evaluation Topic Guide for Pharmacists or GP practice staff

As the purpose of the interview is to encourage a conversation in which the participant can feel confident in expressing their own views, the following topic guides are indicative. This means that the interviewer may adapt it to suit the conversation style and preferences of the participant.

	Introduction Introduce yourself Explain the purpose of the research	You have been delivering a new service in which care home staff can opt to receive Flu vaccinations within their care home, workplace. We now want to explore your experiences of delivering this service.
	The digital recorder **1. Stress confidentiality** **2. Set ground rules**	I would like to highlight the confidentiality of everything you tell me, and specifically that: • *you won't be identified individually in any report* • *all information will be anonymised* • *we will not tell anyone else including your employer organisation, what you tell us as an individual.* • *likewise, no other individual e.g., pharmacist, care home staff, resident will be identifiable in any report.* *We do need to remind you, however, that* if you do disclose anything which might identify a risk to yourself or to others, or a personal or professional offence, this would be shared with the relevant responsible authority. However, we would tell you if we thought this were the case. • All your views are of value to us. There are no right or wrong answers, • Please ask me to clarify if the question isn't clear. • We remind you not to share any personal or patient identifying information during this interview
	Ask if there are any questions	

	Confirm consent

	Stem question for Pharmacists	**Probes / follow ups**
	Intervention	
1.	Overall, what are your thoughts on the FluCare study?	• Views on delivering vaccinations in CH setting for staff
2.	How has the FluCare intervention impacted on your workload?	• (Negatively / positively) • Time including time out of pharmacy/GP practice • Visit frequency • Access to vaccinations/pharmacy supplies for clinic • Record keeping
3.	In what ways does FluCare fit with your contracted pharmacist or practice work?	• Local vaccine initiatives • Reimbursement and payment processes • Workplace targets
	Implementation	
4.	What has been your experience with setting up and running the flu vaccination visits?	• Communication with CH • Location of clinics • Time taken to set up and close down • Communication with staff during clinics • Support from manager/team • Ease of vaccinating on site
5.	What barriers if any to implementing the vaccinations visits?	
	Do you have any suggestions for how to overcome these barriers?	
6.	What did you see as facilitating the vaccination visits?	
7.	How has the new service affected your relationship with the care home managers and staff?	• New contributions • New problems
8.	Have there been any communication issues during your time delivering the FluCare clinics?	• Care home manager • Care Home staff • Pharmacist or practice colleagues

	Stem question for Pharmacists	**Probes / follow ups**
	If so, what were they?	• Residents • Relatives • FluCare team

Part 4	Acceptability	
9.	What aspects of the FluCare intervention went well from your perspective?	• Time commitment • Paperwork • Issues raised/resolved
10.	What aspects of the FluCare intervention went less well from your perspective?	• Time commitment • Paperwork • Issues raised/resolved
	How could we improve these?	
11.	What elements of the FluCare intervention did you like best?	• Professionalism • Contracted targets • Being in care homes
12.	Overall, how satisfied are you with the vaccination service provision?	
13.	Would you like the vaccination service to continue in the care home you currently support? Why/why not?	• In its current from • In a revised form • Not at all
14.	Any final comments?	
15.	Thank you for taking part in this interview	

Appendix 13: FluCare (Phase 3) Process Evaluation Topic Guide for Pharmacists who could not deliver the clinics

As the purpose of the interview is to encourage a conversation in which the participant can feel confident in expressing their own views, the following topic guides are indicative. This means that the interviewer may adapt it to suit the conversation style and preferences of the participant.

	Introduction Introduce yourself Explain the purpose of the research	You agreed to offer Flu vaccines clinics within a care home as part of the FluCare study but were unable to provide these clinics. With this in mind, we would like to explore your experience within the FluCare study.
	The digital recorder **Stress confidentiality** **Set ground rules**	I would like to highlight the confidentiality of everything you tell me, and specifically that: • *you won't be identified individually in any report* • *all information will be anonymised* • *we will not tell anyone else including your employer organisation, what you tell us as an individual.* • *likewise, no other individual e.g., pharmacist, care home staff, resident will be identifiable in any report.* *We do need to remind you, however, that* if you do disclose anything which might identify a risk to yourself or to others, or a personal or professional offence, this would be shared with the relevant responsible authority. However, we would tell you if we thought this were the case. • All your views are of value to us. There are no right or wrong answers, • Please ask me to clarify if the question isn't clear. • We remind you not to share any personal or patient identifying information during this interview
	Ask if there are any questions	

	Confirm consent

	Intervention	Follow up
1.	What motivated you to participate in the Flucare study?	How did you feel about the opportunity to deliver on-site staff flu clinics?
2.	What are your views about the FluCare project?	
3.	As part of the Flucare project, you had planned to deliver on-site clinics for care home x, was there a pre-existing relationship between your pharmacy/practice with the care home(s)? • If yes, what services did you previously provide for the care home(s)? • Did any of the services above include delivering vaccination clinics (including flu and covid) either for staff or residents? • What are the key barriers or facilitators to establishing a good relationship? o How do you find communicating with care homes regarding provision of services?	
4.	Can you describe how you initially planned to deliver the on-site staff flu clinics? • What are the key actions that need to be taken prior to the influenza season in order to deliver the on-site staff flu clinics?	
5.	What kinds of organizational changes were needed to accommodate delivering the on-site staff flu clinics?	
	Barriers/challenges	Follow up
6.	Why were you unable to deliver the on-site staff flu clinics?	How did you attempt to overcome these challenges?

	• Can you describe any challenges/barriers that you encountered?	
7.	Did you encounter any barriers or difficulties in communication? • How did you communicate with the care homes manager/owner about the vaccination clinic? ○ should the vaccine providers take the lead in organising the clinics and communication with care homes or should care home managers take the lead?	How you attempted to address these difficulties?
8.	One of the key challenges faced with running clinics is vaccine supply – could you tell us your experience with vaccine supply and why this is a challenge?	• When and how vaccines are ordered? • How they prioritize population groups to vaccinate i.e., care home vs walk in patients?
	Enablers/facilitators	Follow up
9.	How was your relationship with the care home (manager/staff) before participating in the FluCare study?"	
10.	What kind of support or resources would you have needed to successfully deliver the on-site staff flu clinics in the care homes?	
11.	Were there any incentives/rewards/reimbursements that would have encouraged you to participate or deliver the on-site staff flu clinics? • What types of incentives/rewards/reimbursements do you think would have been effective in encouraging pharmacists to participate in the vaccine delivery?	• £300 per clinic, and whether this incentive is enough. • What is your opinion on the reimbursement for administering the vaccine, including the time it takes to administer the vaccine and any associated work?
	Future planning	Follow up
12.	How do you think the flu vaccine clinics for care home staff could be improved in the future, taking into account the challenges you experienced?	• Do you have any suggestions for how pharmacists could better prepare for delivering the on-site staff flu vaccine clinics in care homes? • What do you think would work most easily in your pharmacy to deliver of on-site Flu clinics? What wouldn't?

13.	Who do you believe would need to be involved in the process of delivering the on-site staff flu clinics through a collaboration with care homes for successful delivery of on-site Flu clinics?	
14.	Would you like the vaccination clinic for care home staff to continue in the care home you currently support? Why/why not?	
15.	Any final comments?	
16.	Thank you for taking part in this interview	

Appendix 14: Clinic guide for care home managers

Care Home Managers Clinic Guide

What we need from you during the study

1. Organize and Support Flu Clinics:
   - Coordinate with the Community Pharmacy to arrange flu clinics within your care home. You should plan between 2 and 5 clinics on different days and times to accommodate the staff's varying schedules.
   - Set up reminders to keep track of upcoming clinic dates and ensure they align with staff availability.
   - Once the clinic dates and times are confirmed, communicate this information to all staff members in advance, ensuring maximum participation.
2. Communicate with Staff:
   - Use multiple communication channels, such as emails, posters, and verbal announcements, to remind staff about the flu clinic dates and the importance of getting vaccinated to protect both themselves and the residents.
   - Encourage staff to attend the clinics by emphasizing the benefits of vaccination for their health and the well-being of the vulnerable individuals in their care.
   - Provide ongoing updates if there are any changes to the clinic schedule.
3. Engagement with the Research Team:
   - Notify the research team about the final clinic schedule and any challenges you encounter during planning.
   - If invited, attend a focus group or interview with researchers after the flu vaccination clinics to provide feedback and share your experience in organizing the clinics.

During the clinics

The research team need to know when the clinics are held and how many people were vaccinated. Therefore, you will need to:

- Ensure Attendance:
- Encourage staff to attend the vaccination clinic on the scheduled dates. Make sure they are aware of the clinic location and time.
- Provide ongoing encouragement to staff, emphasizing the importance of getting vaccinated to protect both themselves and the care home residents. Remind staff that their participation is essential for maintaining a healthy environment.
- Track Vaccinations:
- Work closely with the Community Pharmacy to ensure all staff vaccinations are recorded.
- Keep a list of staff who receive vaccinations and provide this information to the vaccination lead at the end of each clinic.

After the clinics

1. Provide Feedback to the Research Team:
   - After each clinic, submit a vaccination log to the research team, indicating how many staff members participated.

- BCT Integration (Feedback on Behavior): Reflect on the staff engagement and clinic outcomes, providing feedback on what worked well and what could be improved for future clinics.

Communication Tools for Staff

- Place posters in staff rooms and common areas to remind staff of the upcoming vaccination clinics.
- Send out regular reminders (emails or texts) with clinic information, including the benefits of vaccination. Use text messaging if necessary to ensure all staff members receive the updates.

Support Staff Engagement

- Share success stories from other care homes or previous vaccination clinics to encourage staff participation. Highlight how high vaccination rates contribute to the overall health and safety of the care home.
- Recognize and celebrate staff members who participate in the vaccination clinic. This could include verbal praise, acknowledgment in staff meetings.
- Check in with staff to address any concerns or barriers they might face regarding the flu clinics.

Appendix 15: Clinic guide for community pharmacists

Community Pharmacists Clinic Guide

What we need from you during the study

- Contact the care home to organise and book the flu clinics.
- Set automated reminders to follow up with care homes before the start of the flu season, ensuring the early organization of clinics.
- We recommend organising between 2 and 5 clinics on different days of the week and times; expect an average of 10 vaccinations per clinic.
- At the end of each clinic, provide feedback to the care home manager and research team about staff engagement and clinic outcomes. Highlight the number of staff vaccinated and any potential barriers encountered.
- discuss care home managers' experience, challenges, and suggestions for improvement.
- Let the research team know the dates and times of the clinics once they have been arranged
- If invited, attend a focus group or interview with researchers after completion of flu vaccination clinics (online or telephone)

During the clinics

The research team and care home need to know when the clinics are held and how many people were vaccinated. Therefore, you will need to:

- Keep a list of the names of staff who receive a vaccination during each clinic
- At the end of each clinic, give the list of staff names to the vaccination lead at the care home
- Maintain and update a paper or electronic (Excel) vaccination log during each clinic
- At the end of each clinic, return the completed vaccination log to researchers
- Use posters in care homes to remind staff of upcoming clinics.
- Encourage care home managers to inform staff about the date and time of the flu clinics.

Equipment Checklist

As well as flu vaccines, you will need to bring all other equipment required for delivery of the clinics. Here is an equipment checklist we have prepared; you can add anything else to it and check it off before each clinic.

Please bear in mind that the best time to run the clinics may be out of your usual working hours, meaning that you will need to arrange access to the pharmacy to obtain and return necessary equipment.

Equipment Checklist			
	(✓)		(✓)
Flu vaccines		Cooling boxes (check temperature)	
Clinical waste disposal bins		Sharps disposal bin	
Wipes		Hand sanitisers	
Anaphylactic kits (check the expiry date of the adrenaline injection)		Face masks (check if requirement in care home)	
Plasters and cotton wool balls		Laptop and printed clinic provider log/attendance record	