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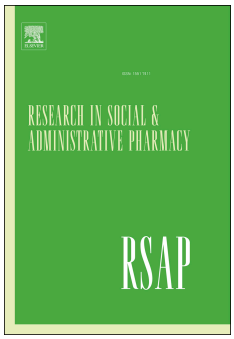

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Barriers and facilitators to pharmacists integrating into the ward-based multi-disciplinary team: a systematic review and meta-synthesis

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Declaration of interest: None

Abstract

Background

Pharmacists who are integrated into the ward team are involved in initial decision making, therefore pre-empting pharmaceutical problems and optimising therapy from the outset. Identifying the barriers and facilitators (determinants) to successful pharmacist integration within a multidisciplinary ward team will facilitate design of strategies to support integration.

Objective

The study aimed to identify the modifiable barriers and facilitators to pharmacist integration into the ward-based multidisciplinary team.

Method

Searches were conducted in May 2018 across 5 databases: MEDLINE, Embase, CINAHL, PsychINFO and ASSIA, combined with grey literature and manual searches. Qualitative and mixed-methods studies using a qualitative method of data collection and analysis were eligible if reporting at least 1 *modifiable* determinant. Framework synthesis using the Theoretical Domains Framework (TDF) as the *a priori* coding framework was undertaken. Behaviour change techniques for addressing the identified determinants were selected.

Results

Twenty studies were included indicating 9 facilitators and 5 barriers to pharmacist integration. These were grouped into 3 themes. **Professional knowledge and skills** of the pharmacist were a facilitator to integration; **interpersonal skills and relationships** when representing positive interactions with team members were a facilitator whilst hierarchy was a barrier; **working patterns** were a facilitator when pharmacists were co-located with team members whilst profession-specific goals and excessive workload were barriers. These mapped to the TDF domains ‘knowledge’, ‘social/professional role and identity’, ‘skills’, ‘reinforcement’, ‘social influence’, ‘goals’, and ‘environmental context and resources’ respectively.

Conclusion

The identified determinants within TDF domains and their associated behaviour change techniques now enable researchers to design theory- and evidence-based interventions to facilitate pharmacist integration into the ward-based multidisciplinary team. Pharmacist integration is facilitated by their knowledge and skills being valued and through demonstrating effective interpersonal skills. Re-structuring pharmacist responsibilities and working patterns to align with those of multidisciplinary team members also promotes integration.

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Keywords

Pharmacist; Theoretical Domains Framework; Integration; Collaboration; Systematic Review; Qualitative

Introduction

The pharmacist's role in hospital has evolved from a focus on accurate, efficient medicine supply to roles such as medicines review, prescribing advice, reconciliation of medicines and patient education (1). These roles are inherently associated with greater interaction with other members of the healthcare team. In the UK, most hospital wards have a designated pharmacist who makes scheduled visits to their ward. The remainder of the pharmacist's day is spent in the pharmacy department undertaking non-patient facing duties such as writing guidelines or dispensing. Pharmacists are often therefore not part of medicine-related decision making on the wards and are required to react retrospectively to discuss queries and concerns or make interventions to prescriptions. Nonetheless, multidisciplinary team members have described how they value pharmacists, frequently seeking their advice and accepting their role in the team (2, 3).

UK and European hospital pharmacy guidelines advocate the importance of integrating pharmacists into the multidisciplinary team (4), a concept considered necessary in order to optimise patient outcomes through collaborative working (5-7). A healthcare team that works effectively can enhance patient safety, improve patient care and reduce workload imbalance within the team (8). As pharmacists spend an increasing proportion of their time on patient-facing activities, integration into the ward-based multidisciplinary team will become ever more essential (9).

Evidence quantifying the clinical and economic impact of integrating pharmacists into ward-based multidisciplinary teams is weak, mostly due to small studies with a range of interventions, comparators and outcomes (10, 11). A recent systematic review suggests a ward-based pharmacist providing input throughout the patient stay is cost-effective and improves patient satisfaction but with inconsistencies in some clinical outcomes (11). Reported disparities in clinical effectiveness could be as a consequence of the level of integration of the pharmacist within the team (11) and it is therefore imperative to understand the factors which affect the level of integration.

Integration as a concept

The degree of integration into a team can be described as a continuum between a loose-knit association (e.g. network), and a closely integrated team where decision making is collective and governed by organisational policy (12). It is therefore important for authors to clearly operationalise their own terms within their research and this approach has been taken for this particular study (13). We define an effective ward-based multidisciplinary team as professionals working in an organisation closely together as a team and including the patient to varying degrees. They may share records and have formalised meetings, to which other key professionals from other employers are attached. A shared plan is prepared within the organisation but may not be agreed by other organisations, particularly if there are resource implications or tasks to complete. Teamwork can be very high and communication good between team members (14).

Few studies have explicitly investigated the integration of pharmacists into the team through exploring interdisciplinary collaboration between hospital pharmacists and other healthcare professionals. A qualitative study investigating the impact of clinical pharmacists working directly with the medical team on patient and process care outcomes indicated that team processes such as role clarity and relationships built on trust were influential in successful integration whereas organisational factors such as high workload and work schedules impeded it (15). Another qualitative study has explored perceptions of hospital pharmacists from a physician's perspective, describing how the presence and visibility of hospital pharmacists needs to be improved, and physicians feel they should be more aware of what pharmacists can offer (16).

Effective inter-professional communication has also been highlighted as a facilitator to integration into the multidisciplinary team with pharmacists themselves expressing the importance of this with respect to building collaborative working relationships (17).

Individual studies exploring collaborative relationships between pharmacists and the multidisciplinary team members provide valuable insight but tend to be very context specific with an absence of supporting behavioural theory. There is therefore a need

to explore the barriers and facilitators affecting integration of pharmacists into these teams by synthesising available evidence and underpinning the findings with behavioural theory. This will broaden our understanding of barriers and facilitators reported in individual studies and will allow greater generalisability of the study findings due to an increased level of abstraction (18).

Behavioural theory and the Theoretical Domains Framework

Changing current practice will require changes in behaviour by individuals which is inherently difficult. The first step is to identify the behaviour(s) that needs to be changed within the context they are performed and then specify the target behaviour (19). The third step is then to identify strategies to change behaviour. Using theory to understand this behaviour change process, underpin recommendations and inform design of interventions increases the likelihood of successful implementation (20, 21). An array of theories have been developed in an attempt to explain behaviour change. There is significant commonality in the constructs represented by these theories, however, each proposes its own merits. Selecting the most appropriate explanatory theory for the behaviour of interest is therefore challenging. Researchers have sought to overcome this challenge by synthesising existing theories into frameworks such as the Fishbein Framework (22) and Theoretical Domains Framework (TDF) (20). The former has largely been applied to the public health context whilst the latter (TDF) was developed for practitioner behaviour change (20).

This study provides a systematic review and meta-synthesis of the modifiable barriers and facilitators to pharmacist integration into the ward-based multidisciplinary team using the TDF as an *a priori* coding framework.

147 **Table 1**. The refined theoretical domains framework (23)

Domain	Constructs
1. Knowledge	Knowledge, procedural knowledge, knowledge of task environment
2. Skills	Skills, skill development, competence, ability, interpersonal skills, practice, skill assessment
3. Social/professional role and identity	Professional identity, professional role, social identity, identity, professional boundaries, professional confidence, group identity, leadership, organisational commitment
4. Beliefs about capabilities	Self-confidence, perceived competence, self-efficacy, perceived behavioural control, beliefs, self-esteem, empowerment, professional confidence
5. Optimism	Optimism, pessimism, unrealistic optimism, identity
6. Beliefs about consequences	Beliefs, outcome expectancies, characteristics of outcome expectancies, anticipated regret, consequents
7. Reinforcement	Rewards (proximal/distal, valued/not valued, probable/improbable), incentives, punishment, consequents, reinforcement, contingencies, sanctions
8. Intentions	Stability of intentions, stages of change model, transtheoretical model and stages of change
9. Goals	Goals (distal/proximal), goal priority, goal/target setting, goals (autonomous, controlled), action planning, implementation intention

10. Memory, attention and decision processes	Memory, attention, attention control, decision making, cognitive overload/tiredness
11. Environmental context and resources	Environmental stressors, resources/material resources, organisational culture/climate, salient events/critical incidents, person x environmental interaction, barriers and facilitators
12. Social influences	Social pressure, social norms, group conformity, social comparisons, group norms, social support, power, intergroup conflict, alienation, group identity, modelling
13. Emotion	Fear, anxiety, affect, stress, depression, positive/negative affect, burn-out
14. Behavioural regulation	Self-monitoring, breaking habit, action planning

Method

A systematic review with meta-synthesis was performed using the 'best'-fit' framework synthesis method (24). We used the TDF as a coding matrix to provide a theoretical lens through which to interpret the behavioural determinants of pharmacist integration into the ward-based team (23). Three factors guided selection of the TDF; its comprehensive coverage of behavioural determinants, previous successful application in a range of clinical environments to systematically understand and explain barriers to implementation at an individual, team and organisational level (25) and that each of its 14 domains are linked to a taxonomy of potentially effective behaviour change techniques (BCTs) (26). BCTs are 'building blocks' which can be utilised to inform development of future behaviour change interventions. The study protocol was registered prior to initiating searches

(PROSPERO register reference CRD42017068440) and adheres to the 'ENhancing Transparency in REporting the synthesis of Qualitative research' (ENTREQ) statement (27) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (28).

Qualitative research studies or mixed-methods studies using a qualitative method of data collection and analysis were included where findings identified at least 1 *modifiable* barrier or facilitator to pharmacist integration into the ward-based multidisciplinary team.

Search strategy

The search strategy combined terms for Population (hospital pharmacists), Outcome (integration into the ward-based multidisciplinary team) and Study design (qualitative). A scoping review was first undertaken to identify appropriate synonyms and Medical Subject Headings (MeSH) for each. MeSH terms such as 'Pharmacists', 'Hospitals' and 'Interprofessional relations' were expanded where appropriate and combined with free-text search terms such as 'wards', 'multidisciplinary' and 'focus groups' (Supplementary item 1). Truncations ($) and Boolean operators were applied to develop an effective search strategy.

The search strategy was applied to Medline, Embase, CINAHL, PsychInfo and ASSIA, together with the grey literature sources Open Grey, Proquest A&I and EthOS in May 2018. Publications were restricted to English language and no date restrictions were applied. A manual online search of the journal *Research in Social and Administrative Pharmacy* was carried out up to (and including) volume July-Aug 2017. The reference lists of the papers selected for data extraction were reviewed and authors of the papers contacted via e-mail to identify any additional relevant publications.

Study selection and data extraction

Results for each search were exported into reference manager software EndnoteX8.1 (29) and articles from non-English language journals and duplicates were removed. Two researchers (KH and DW) sequentially and independently screened titles, abstracts and papers for relevance to the research question; at each

stage discrepancies between reviewers were resolved by face-to-face discussion. Cohen's Kappa (30) was calculated to provide a measure of agreement between the 2 reviewers. Reasons for rejection of each paper were documented.

Data extraction was undertaken by KH using a piloted electronic data extraction form designed for a previous similar study (31), and adapted. Data were extracted to inform quality assessment, provide study context and to collate content regarding barriers and enablers. Verbatim supporting quotes, where available, were extracted to illustrate and support the primary authors' analysis but authors' interpretations and findings from secondary analysis of primary data were not included.

Accuracy of data extraction was assessed by a second researcher (DW) who checked data extraction for 3 papers without identification of any inaccuracies.

Quality assessment

Mays and Pope criteria (32) were used to assess methodological rigour (33) with each element categorised as high, medium or low. DW independently appraised the first 3 studies alongside KH with no concerns identified.

Data synthesis

Data synthesis followed the 'best-fit' framework synthesis method (24), based on the framework method for analysing qualitative data (34) with the TDF as the *a priori* coding framework. This approach offers a structured and transparent approach to synthesis of large volumes of data and eases production of the coding frameworks or 'matrices' (35, 36). Figure 1 outlines the main stages of the evidence synthesis.

Researcher KH initially coded each data extract into the relevant 14 domains of the TDF. Categorisation was independently verified by 2 researchers with extensive experience of the TDF (DB and SS). All cases of disagreement were discussed by all 3 researchers until consensus was reached. At this stage extracts were also coded as either a barrier or facilitator to integration.

Data extracts were reviewed by KH to explore relationships, and where concepts within each domain shared commonalities they were clustered together. These clusters were reduced into higher concepts relating to pharmacist behaviours, to ultimately synthesise a set of barriers and facilitators.

DW, DB and SS reviewed the TDF coded matrix together with the final set of barriers and facilitators to integration to achieve agreement. No changes were deemed necessary at this stage.

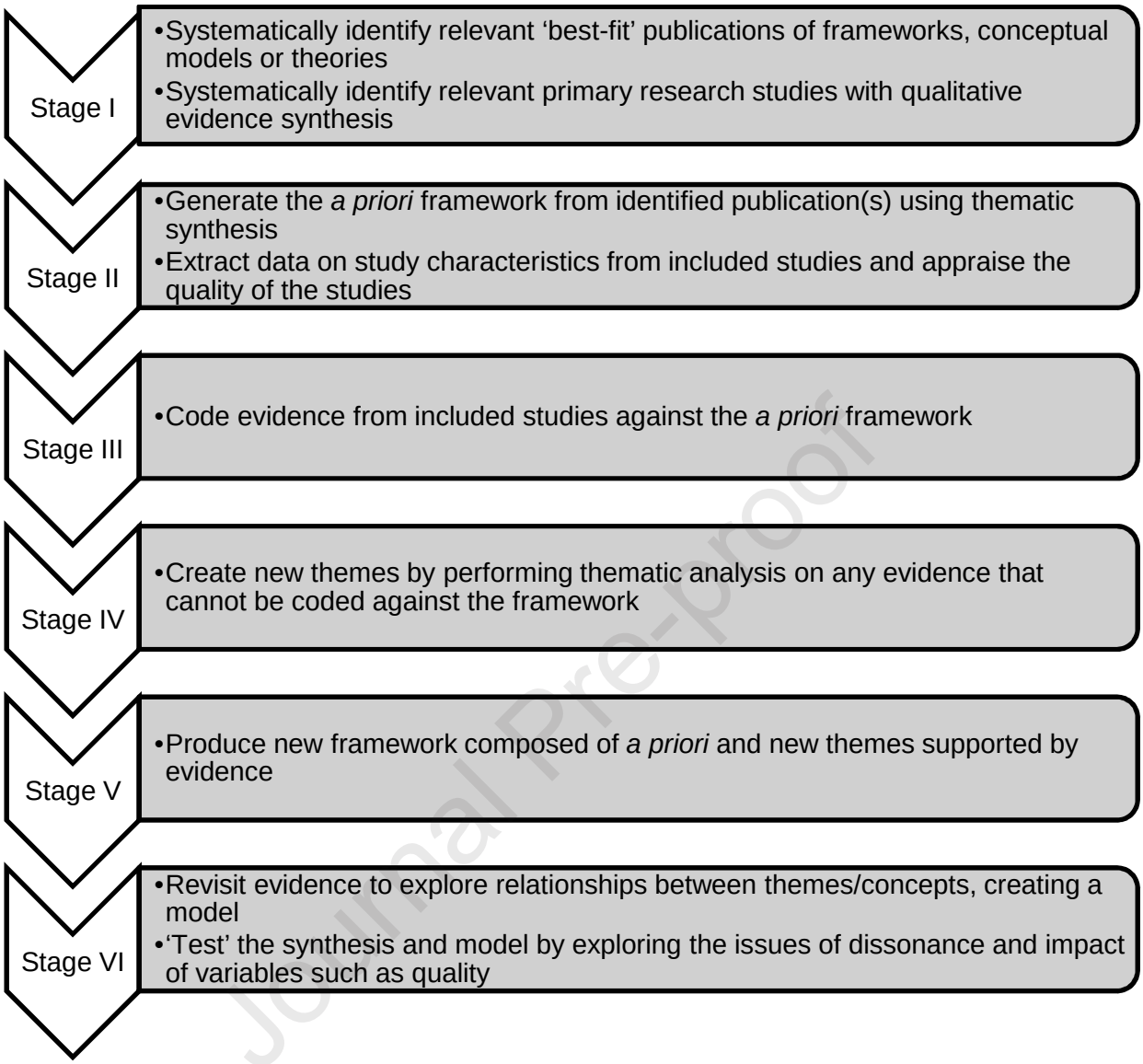
Testing the synthesis

Where the critical appraisal process had identified a study as 'low' quality, the contribution to the evidence synthesis was assessed following outlined principles (24). Firstly, the coding in each domain of the framework was reviewed to determine if excluding low quality studies removed any of the domains from the final coded framework. Secondly, the coding framework was reviewed following exclusion of the 'low quality' studies to evaluate whether a barrier/facilitator still remained but at the expense of its 'richness'.

Re-mapping determinants to the TDF domains from the perspective of the pharmacist and identifying relevant BCTs

The identified barriers and facilitators were then reviewed from the perspective of the pharmacist and mapped to the relevant domain of the TDF by a group of 3 researchers (KH, DB and SS). Once the domains were determined, all potentially effective BCTs for those domains were identified using the mapping table by Cane *et al*. (26) which links BCTs to TDF domains.

Figure 1. Qualitative evidence synthesis using 'best-fit' framework synthesis (24)



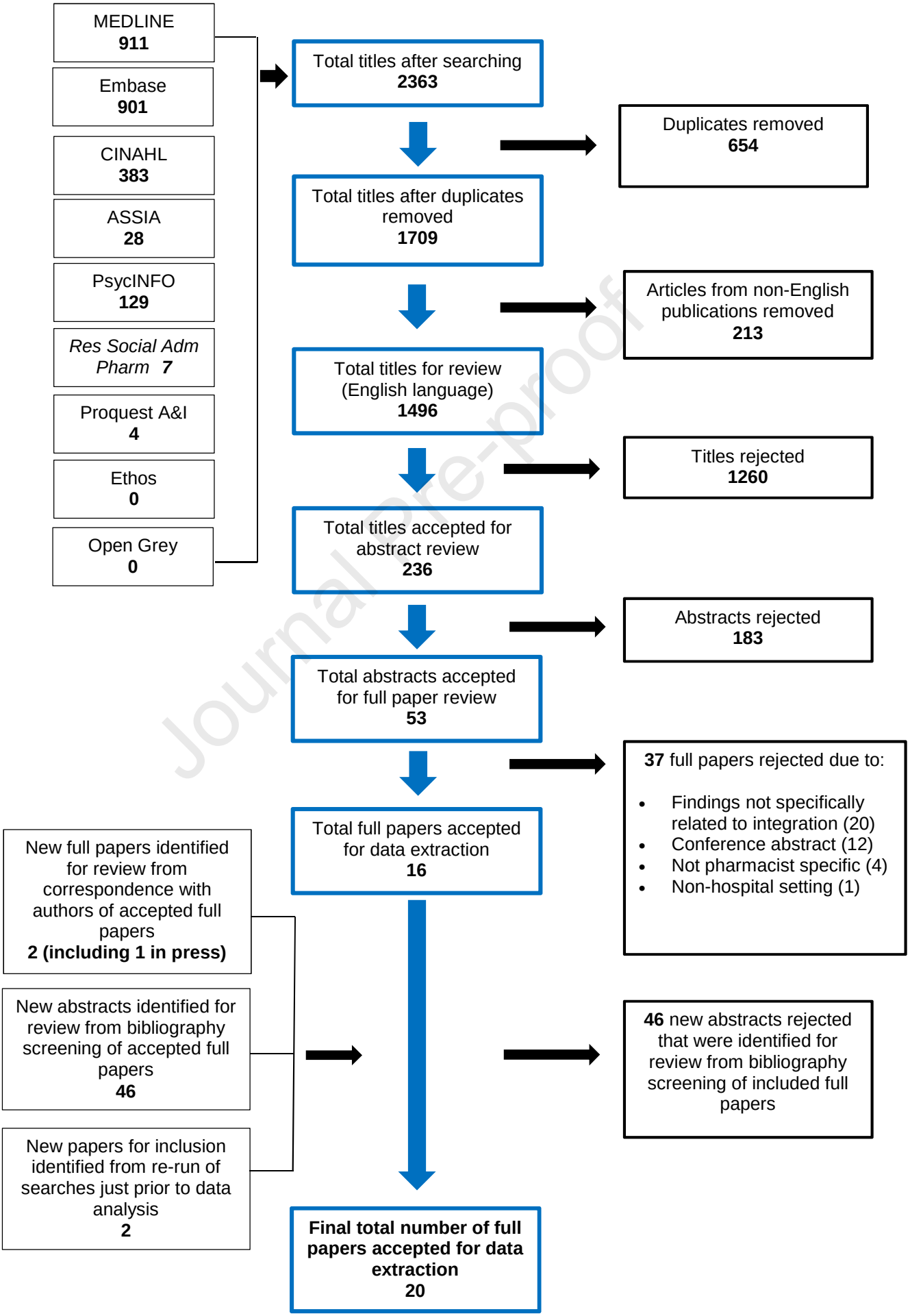
Results

Literature searches

A total of 2363 results were obtained after combining results from all initial searches. This was reduced to 1496 following de-duplication and removal of non-English publications. Figure 2 summarises the results from each stage of the study screening and selection process. Kappa coefficients at title, abstract and paper screening stages were 0.518, 0.548 and 0.687 respectively. Main reason for exclusion at full text screening was that papers did not specifically address integration.

A re-run of all searches of the electronic databases between 25th April and 3rd May 2018, immediately prior to data analysis, identified 2 new references for inclusion. Two further references were identified from e-mail correspondence with authors, (37, 38) resulting in a final total of 20 papers in the evidence synthesis.

Figure 2. Summary of results from searches



Study characteristics

Table 2 shows the characteristics of the 20 studies included in the meta-synthesis. Studies were based in a range of geographical locations although Australia accounted for 8 of the included studies (17, 37, 39-44). Only 2 of the included studies did not include pharmacists as participants (16, 45), exploring experiences of nurses (45) and physicians (16, 45) collaborating *with* pharmacists.

280 **Table 2**. Summary of study characteristics

First author	Year of study*	Country of study	Methodology/ theoretical approach$^{\Delta}$	Aim (s) of study	Data generation method(s)∞	Data analysis approach
Al Shemeili (46)	2016*	United Arab Emirates	Interpretive phenomenology	To describe and understand health professionals' views and experiences of medicines management healthcare structures, processes and outcomes for elderly hospitalised patients	Semi-structured interviews	Thematic analysis (Framework Method)
Bechet (16)	2015	Switzerland	Qualitative enquiry$^{\Delta}$	To study the collaboration between hospital pharmacists and physicians in the hospital setting, from the physicians' point of view including needs, expectations and satisfaction towards pharmacists	Semi-structured interviews	Thematic analysis
Bharwani (47)	2010	USA	Qualitative enquiry$^{\Delta}$	To observe interprofessional medical teams and compare their behaviours with the best practices of high-performing business teams to identify opportunities for improvement	Observations Interviews (no further detail)	Not specified
Broom (44)	2014	Australia	Qualitative enquiry$^{\Delta}$	To investigate the experiences of pharmacists involved in the delivery of antibiotics and explore how they engage in antibiotic decisions in the hospital environment	Semi-structured interviews	Thematic analysis
Coomber (39)	2018*	Australia	Qualitative enquiry$^{\Delta}$	To identify communication methods between hospital pharmacists and doctors, their perceptions and usage patterns	Semi-structured interviews	Thematic analysis
Costa (48)	2007 to 2008	USA	Qualitative enquiry$^{\Delta}$	To examine how a variety of intensive care unit clinicians view interprofessional collaboration and identify the elements that facilitate collaboration	Semi-structured interviews	Thematic analysis

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Ebert (40)	2010 to 2012	Australia	Qualitative enquiry[Δ] ('interpretive research design')	To explore experiences of newly graduated healthcare professionals and their understandings of 'knowing about' and 'working with' other healthcare professionals as well as their preparedness for working as part of an interprofessional team	Focus groups	Thematic analysis
Ekole (49)	2016 (Unpublished)	USA	Hermeneutical phenomenology	To explore how pharmacists and physicians I the hospital perceive 'relational intelligence' as a leadership skill in working collaboratively with each other	Semi-structured interviews	Thematic analysis
Halvorsen (45)	2011*	Norway	Qualitative enquiry[Δ]	To explore how nurses and physicians and nurses working in nursing homes experienced collaboration with pharmacists Experiences were contrasted with those of physicians and nurses participating in case conferences that include pharmacists in hospitals	Focus groups (nursing home) Semi-structured interviews (nursing home & hospital)	'systematic text condensation'
Hung (50)	2015 to 2016	UK	Qualitative enquiry[Δ]	To describe how novel 'integrated care pharmacist' post was implemented, activities undertaken and identify any perceived or actual changes in ward performance (mixed-methods)	Focus groups Semi-structured interviews	Thematic analysis
Lloyd (51)	2016*	UK	Qualitative enquiry[Δ]	To explore pharmacists' attitudes to delivering feedback and determine what processes currently exist for the provision of feedback on prescribing errors	Focus groups	Thematic analysis using the Framework Method
Luetsch (17)	2015*	Australia	Qualitative enquiry[Δ]	To explore pharmacists' experiences and reflections after completing a learning and practice module which introduced a framework to structure interprofessional communication	Written reflective summary written by pharmacists as part of coursework assessment	Thematic analysis

Luetsch (37)	2016*	Australia	Qualitative enquiry[Δ]	To investigate pharmacists' written reflections on applying newly acquired interprofessional communication skills in a structured encounter with a healthcare professional To evaluate written feedback provided by healthcare professional to pharmacist after the encounter	Written reflective summary written by pharmacists as part of coursework assessment Anonymous feedback from healthcare professional	Thematic analysis
Makowsky (15)	2006 to 2007	Canada	Phenomenology	To explore integration process of clinical pharmacist within a healthcare team To explore pharmacist, physician and nurse practitioner experiences around working as a team and continuous professional learning needs	Reflective journal (pharmacists only) Semi-structured interviews (all)	Thematic analysis
Mesler (52)	1981 to 1985	USA	Qualitative enquiry[Δ]	To relate the social construction of an occupation role more directly to a sociological understanding of pharmacy and medical role boundaries	Observations Semi-structured interviews	Not stated
Noble (41)	2014	Australia	Constructionist approach	To investigate the development of junior doctors' prescribing capacity and how pharmacists contribute to this To understand the meanings pharmacists and doctors generated through their interactions in prescribing practices	Semi-structured interviews	Thematic analysis
Prystajecky (53)	2017*	Canada	Qualitative enquiry[Δ]	To explore the goals of healthcare providers attending interprofessional rounds on an internal medicine ward and to explore the challenges encountered	Focus groups	Thematic analysis
Thomson (42)	2015*	Australia	Qualitative enquiry[Δ]	To explore the attitudes and experiences of recent pharmacy, nursing and medicine graduates in relation to interprofessional teamwork and communication	Focus groups	Thematic analysis
Wilson (43)	2016*	Australia	Qualitative	To explore the perspectives and experiences of recently graduated,	Focus groups	Thematic analysis

			enquiry[Δ] (interpretive research design)	currently practicing Australian nurses, pharmacists and doctors in relation to interprofessional collaborative practices when prescribing, dispensing and administering medicines		
Wright (38)	2016 to 2017 In press	UK	Grounded theory	To identify and describe the most effective model for managing, educating and training pharmacist advanced clinical practitioners in the urgent care setting To describe how the role evolves during the training period and how best to manage its effectiveness	Focus groups Semi-structured interviews]	Thematic analysis

* Year of publication given where year of study is not specified in paper [Δ] Described as 'qualitative enquiry' if qualitative approach is not explicitly stated by authors
∞ Interviews are face-to-face unless specified

Framework synthesis

Following consensus discussions, extracts were coded into 9 of the 14 domains of the TDF with between 1 and 44 data extracts per domain. Further clustering of similar concepts within domains produced 9 facilitators and 5 barriers influencing pharmacist integration into the ward-based multidisciplinary team. These were then preliminarily grouped into 3 overarching themes.

Testing the synthesis

Comparison with the *a priori* model

The TDF comprises 14 domains of behaviour change, of which 5 were not coded for during analysis ('beliefs about capabilities', 'beliefs about consequences', 'intentions', 'memory, attention and decision processes' and 'behavioural regulation').

Quality assessment

Table 3 provides the quality assessment for included studies. The majority of studies were of 'medium quality'; the main criteria poorly addressed were the clarity of the research question and the study context. For example, details about hospital bed numbers, whether they were specialist or generalist institutions, size of pharmacy departments and roles of pharmacists were rarely adequate meaning it was difficult to assess whether findings were context specific.

305 **Table 3.** Quality assessment of included studies based on Mays and Pope criteria (32)

First author	Worth or relevance	Clarity of research question	Appropriateness of design to question	Context	Sampling	Data collection and analysis	Reflexivity of the account	Overall quality assessment
Al Shemeili (46)	◎	◎	✓	×	×	✓	◎	Medium
Bechet (16)	✓	✓	✓	✓	✓	◎	✓	Medium
Bharwani (47)	×	×	✓	×	×	×	×	Low
Broom (44)	✓	◎	✓	×	✓	✓	×	Medium
Coomber (39)	✓	◎	✓	✓	×	◎	×	Low
Costa (48)	✓	◎	✓	◎	◎	✓	◎	Medium
Ebert (40)	✓	✓	✓	◎	◎	✓	◎	Medium
Ekole (49)	✓	✓	✓	◎	◎	✓	✓	Medium
Halvorsen (45)	◎	✓	✓	×	×	◎	◎	Medium
Hung (50)	✓	◎	✓	×	×	◎	×	Low
Lloyd (51)	✓	◎	✓	◎	◎	◎	✓	Medium
Luetsch (17)	✓	◎	◎	◎	×	◎	◎	Low
Luetsch (37)	✓	◎	◎	◎	◎	◎	◎	Medium
Makowsky (15)	✓	◎	✓	◎	◎	✓	◎	Medium
Mesler (52)	◎	×	✓	✓	×	×	×	Low
Noble (41)	✓	◎	✓	✓	◎	✓	◎	Medium
Prystajecky (53)	◎	◎	✓	◎	✓	◎	✓	Medium
Thomson (42)	✓	◎	✓	◎	◎	✓	×	Medium
Wilson (43)	✓	◎	✓	◎	◎	✓	◎	Medium
Wright (38)	✓	✓	✓	◎	×	◎	✓	Medium

306 ✓ Adequately addressed ◎ Partly addressed × Inadequately addressed

Sensitivity analysis

For the 5 studies considered 'low' quality, extracts were mapped to 8 domains. Individually excluding each of the low-quality studies from the coding framework removed the domain of 'emotion' from the final mapped framework. Removing the 'low' quality studies from the other domains did not affect the 'thickness' of data in these domains. Therefore, the final barriers and facilitators remained the same.

The domain 'optimism' only had 1 data extract coded to it, this was from a 'medium' quality study. It was felt that analysis from a single data extract may not be meaningful; other domains had over twenty pieces of data coded, which were able to be reduced into a few barriers or facilitators showing richness and thickness of data. For these reasons it was decided to exclude the single data extract in the 'optimism' domain from the final analysis. Other data from the same study remained coded in alternative domains.

Behavioural determinants and intervention components

The final 5 barriers and 9 facilitators to pharmacist integration within relevant domains of the TDF are described below and summarised in table 4. These are grouped into 3 themes comprising 'knowledge and skills', 'interpersonal skills and relationships' and 'working patterns'. Table 5 provides the 5 TDF domains to which the determinants mapped, from the perspective of the pharmacist. We have also illustrated the process of selecting and characterising BCTs by providing hypothetical examples prepared by the research team.

Key theme	Facilitators (F) and barriers (B)	Domain in the TDF	Number of studies coded within domain (and references)
Professional knowledge and skills	Pharmacists' knowledge of medicines (F)	*Knowledge*	n = 7 (16, 38, 40, 43, 45, 50, 52)
	Lack of knowledge of the pharmacist role (B)	*Knowledge*	
	Role recognition (F)	*Social/professional role and identity*	n = 14 (15, 16, 37, 38, 40-42, 44, 45, 49-53)
	Professional confidence (F)	*Social/professional role and identity*	
	Competence (F)	*Skills*	n = 8 (16, 17, 37, 40, 46, 48, 49, 52)
Interpersonal skills and relationships	Interpersonal skills (B)	*Skills*	
	Interdisciplinary positive feedback (F)	*Reinforcement*	n = 4 (17, 49-51)
	Positive interactions with team members (F)	*Social influences*	n = 16 (15-17, 37, 38, 40-43, 45-50, 52)
	Hierarchy (B)	*Social influences*	
	Strengthening interdisciplinary relationships (F)	*Social influences*	
Working patterns	Healthcare profession-specific goals (B)	*Goals*	n = 5 (15, 42, 48-50)
	Proximity of healthcare professionals (F)	*Environmental*	n = 14 (15, 16, 38, 39, 41, 43-46, 48-50, 52, 53)
	Continuity of team membership (F)	*Environmental*	
	Excessive workload (B)	*Environmental*	

Table 4: Determinants of pharmacist integration into the ward-based multidisciplinary team

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Key theme 1: Professional knowledge and skills

Pharmacists' knowledge of medicines (facilitator)

Pharmacists' expertise in both the proactive and reactive use of medicines facilitates their integration into the ward-based team. Having the necessary knowledge facilitates professional confidence, aiding inter-professional working.

> *'Pharmacist drug knowledge was reported to have assisted integration with nurses who were also training as prescribers…' (38)*

Lack of knowledge of the pharmacist role (barrier)

Lack of awareness of and misconceptions regarding the role of the ward-based pharmacist created tensions within the team and hindered integration. This included situations when pharmacists were undertaking extended roles. When the role of the pharmacist was promoted to team members, respect within the team developed together with an emerging enthusiasm to work together.

> '*…perception by physicians was that the role of the pharmacist was to 'check-up' on the team…' (38)*

Role recognition (facilitator)

The role of the pharmacist includes duties, which could undermine relationships with other team members and question professional boundaries. For example, formal reporting of prescribing errors and the 'challenging' of prescribing decisions may be perceived as 'meddling', 'interfering' or 'policing'.

Where the role of the pharmacist is recognised by other team members there is an improved team dynamic which facilitates inter-professional working within the team. This is augmented if pharmacists take on extended roles such as assisting new doctors as they rotate into the team.

> *'When roles and expectations were clearly defined and other healthcare professionals understood area of pharmacist 'competency' then teamwork was facilitated.' (15)*

Professional confidence (facilitator)

When pharmacists had confidence in their role and in their ability to communicate effectively, then inter-professional working was facilitated.

> '*Pharmacists described how they built or extended their credibility as a health professional through their interaction, which they perceived will facilitate stronger collaboration in the future.' (37)*

Competence (facilitator)

Where pharmacists demonstrate their competence then team-working is enhanced. Pharmacists may choose to 'go out of their way' to discuss their patient reviews with the team, or deliberately use their skills to reduce the workload of other team members. These pharmacists are intentionally proving their competence and that they possess the required skills to integrate into the multidisciplinary team.

> *'These pharmacists were aligning themselves with nurses not just structurally, as ancillary members of the medical team, but deliberately using the expanded boundaries of their role to address the immense responsibilities…..' (52)*

Key theme 2: Interpersonal skills and relationships

Interpersonal skills (barrier)

Poor interdisciplinary communication and underdeveloped team working skills of pharmacists were barriers to effective integration. When a framework was introduced for pharmacists to structure a clinical conversation with a healthcare professional then communication skills improved, resulting in pharmacists becoming more visible and valued by other healthcare professionals.

> *'Generally, all highlighted the need for more effective and efficient multidisciplinary team working, describing issues relating to poor intra- and interdisciplinary communication and documentation.' (46)*

Interdisciplinary positive feedback (facilitator)

Interdisciplinary positive feedback (a social reward) from other team members facilitates integration of pharmacists into the team. This applies to pharmacists acknowledging the work of other team members but also receiving an acknowledgement of their own work.

'Positive feedback and support from colleagues/patients/relatives was identified as facilitating role delivery.' (50)

Positive interactions with team members (facilitator)

When pharmacists consciously initiate positive encounters with team members and work hard to develop positive relationships then this is valued and collaborative relationships develop. Integration is facilitated when pharmacists knowingly adapted their communication styles to complement the style of the team member they are interacting with.

'When team members initiated positive interactions and make an effort to communicate effectively, this was welcomed and reciprocated. Through these cooperative interactions, knowledge was transferred, people felt valued and respected, and patient safety was enhanced.' (43)

Hierarchy (barrier)

A power differential within the team hinders integration. Hierarchy, with the Physician as head of the team, creates feelings such as intimidation leading to team members' inability to speak freely and openly. When Consultant Physicians and pharmacists together model inter-professional behaviours and provide strong leadership, this can motivate team members to adopt non-hierarchical collaborative behaviour.

'Another benefit of integrating pharmacists into the medical team is through its provision of opportunities for consultants and pharmacists to model interprofessional working to junior doctors. This modelling was held to be important by the consultants and pharmacists as it communicated to junior doctors the value of productive interprofessional interactions that were non-hierarchical.' (41)

Strengthening interdisciplinary relationships (facilitator)

Lack of social support for pharmacists from other healthcare professionals, feeling undervalued, not appreciated and disrespected leads to poor inter-professional relationships which creates a barrier for integration. Alienation of the pharmacists by excluding them from team discussions further damages inter-professional teamwork.

However, when team members were familiar, they adapted to each other, building up respect and trust with willingness to initiate further interaction, which improved relationships.

> *'Participants stated that trust was reinforced by familiarity – staff members familiar with each other, usually through long working relationships and sometimes personal relationships had greater trust in one another and therefore were more likely to provide effective inter-professional care.' (48)*

Key theme 3: Working patterns

Healthcare profession-specific goals (barrier)

When goals are specific to each healthcare professional rather than goals for the team, the individuals are unable to work cohesively in their team.

> *'Lack of inter-professional cohesiveness evident in the task focus of each inter-professional team member where nature of workplace goals noted to be often independent and profession specific; overshadowing subordinate goals of inter-professional team as a whole.' (42)*

Proximity (facilitator)

When pharmacists physically work alongside other team members and were easily accessible then their role was recognised, team integration was enhanced and conflict reduced. Pharmacist attendance on multidisciplinary ward rounds was considered to improve the team dynamic.

> *'teamwork and patient-centred care were enhanced when team members worked alongside one another and were available when questions or other needs arose.' (48)*

Inflexible pharmacist working patterns and the logistics of communicating remotely with pharmacists via telephone or medical notes negatively affects teamwork and prevents collaborative relationships developing.

> *'… the Pharmacy department… could provide extra support for team-based care by allowing greater flexibility in schedules '. . . if you could just make your work day so it fits with what the team does.' (15)*

Continuity of team membership (facilitator)

A 'team based' or 'ward based' pharmacist facilitates integration into the team by allowing team members to get to know each other. Building of relationships by repeatedly working with the same healthcare professionals enhances inter-professional working whereas frequent turnover of team members impacts negatively.

> 'T*eamwork facilitated when pharmacists able to work with same physicians again and again so that a relationship could be developed '. . . There is a direct correlation between my overall comfort level with each physician and the time I spent with each physician...' (15)*

Excessive workload (barrier)

When workload is excessively high then pharmacists work reactively rather than proactively which can hinder the development of team relationships. When pharmacists spend less time on the ward working in the multidisciplinary team due to pharmacy understaffing then team relationships suffer.

> *'Participants found organisational and practice structure to be barriers to team-based care…..workload was a significant challenge... 'when the case load is too high I feel like I revert to ''putting out fires'' and becoming reactive, rather than methodically providing good care.' (15)*

489 **Table 5:** Determinants of pharmacist integration, associated BCTs and examples of hypothetically selected and characterised
490 BCTs.

#TDF domain *and determinant*	TDF domain label: *pharmacist perspective*	Associated BCTs (26)[$]	Hypothetically selected and characterised BCT*
Domain 1: Knowledge			
• Pharmacists' knowledge of medicines (F) • Lack of knowledge of the pharmacist role (B)	Social influence Social influence	Social comparison Social support or encouragement (general) Information about others' approval Social support (emotional)* Social support (practical) Vicarious reinforcement Restructuring the social environment* **Modelling or demonstrating the behaviour** Identification of self as role model Social reward	Draw attention to other pharmacists who are successfully integrating into the MDT by providing 1 opportunity to shadow these pharmacists on an accompanied ward visit.
Domain 2: Skills			
• Pharmacists' interpersonal skills (B) • Competence as a pharmacist (F)	Social influence Social influence	See domain 1	See domain 1
Domain 3: Social/professional role and identity			
• Role recognition (F) • Professional confidence (F)	Social influence Social/prof. role and identity	See domain 1 None assigned	See domain 1 N/A

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Domain 7: Reinforcement			
• Inter-disciplinary positive feedback (F)	Reinforcement	Threat Self-reward Differential reinforcement Incentive Thinning Negative reinforcement Shaping Counter conditioning Discrimination training Material reward **Social reward** Non-specific reward Response cost Anticipation of future rewards or removal of punishment Punishment Extinction Classical conditioning	Multidisciplinary assessment of pharmacist's performance by completing a 360 degree peer review every 3 months.
Domain 9: Goals			
• Healthcare profession-specific goals (B)			
- Misalignment of pharmacist and multidisciplinary team goals	Social influence	See domain 1	See domain 1
- Pharmacist goal conflicts	Goals	Goal setting (outcome) Goal setting (behaviour) Review of outcome goal(s) Review behaviour goal(s) **Action planning (including implementation intention)**	Create an action plan to incorporate existing activities and new activities associated with multidisciplinary team integration.

Domain 11: Environmental context and resources			
• Proximity of healthcare professionals (F) • Continuity of team membership (F) • Excessive workload (B)	Environmental context and resources	**Restructuring the physical environment** Discriminative (learned) cue Prompts/cues Restructuring the social environment Avoidance/changing exposure to cues for the behaviour	Re-organise pharmacists from being assigned to ward(s) to being assigned to a multidisciplinary team.
Domain 12: Social influences			
• Hierarchy within the team (B) • Strengthening interprofessional relationships (F)	Social influence Social influence	See domain 1	See domain 1

 # (B) indicates barrier; (F) indicates facilitator

$ emboldened BCT is the hypothetically selected BCT

** Example of hypothetically selected BCT that has been characterised in terms of content, mode of delivery and dose (intensity)*

Discussion

The review has identified several determinants of pharmacist integration into the multidisciplinary team that are modifiable by the pharmacy team. The 3 key themes were the pharmacists' 'professional knowledge and skills', their 'interpersonal skills and relationships' and finally their 'working patterns'.

Professional knowledge and skills

(Knowledge of medicines, lack of knowledge of pharmacist role, role recognition professional confidence, competence)

Pharmacists possess a unique and unrivalled blend of 'clinical, pharmaceutical and social scientific knowledge' (54) and it is this tacit knowledge, together with their '*professional confidence'* and '*competence*' that were found to facilitate integration. There is therefore a need to identify approaches which ensure that pharmacists are confident and competent in the ward environment. Where this knowledge is lacking, various training opportunities such as e-learning modules (55, 56), learning via simulation (57, 58) and the use of face-to-face problem based learning (59) have demonstrated improvement in the knowledge of pharmacists. Each have their own advantages and disadvantages which require appraising at individual and organisational levels prior to inclusion in an intervention.

A preceptor model may address insufficient '*professional confidence*' and '*competence*'. Preceptors are teachers who facilitate practice-based learning for students (60) or newly qualified healthcare professionals and have been demonstrated to enhance competence and confidence of nursing preceptees to practice as autonomous professionals (61).

Despite pharmacists being experts in medicines and their use, the profession of pharmacy is not well-understood or recognised which is hindering integration of pharmacists into the ward-based team. Pharmacists are constantly being challenged to demonstrate their benefit in patient-care (62) and ward-based healthcare professionals are unable to distinguish between pharmacists and other members of the pharmacy team (63). For effective collaboration within a team, each member must have a clear understanding of the roles of the others and respect their

position in the team. Pharmacists should be located within their ward teams for extended periods of time during their formative development years to support this.

Implementing inter-professional education at the earliest possible opportunity has also been suggested as a way of enhancing doctor-pharmacist collaboration to enhance understanding of the crucial role each profession plays (64). Pharmacy and medical student teaching of therapeutics by interdisciplinary pairing up of students has been shown to be successful (65). Whether inter-professional education translates directly into improved collaborative working on wards is more difficult to determine. Certainly positive benefits have been reported in working culture, patient safety, collaborative team behaviour and clinical error rates in the emergency department and collaborative team behaviour in operating rooms; other studies have demonstrated mixed results (66).

Interpersonal skills and relationships

(Interpersonal skills, interdisciplinary positive feedback, positive interactions with team members, hierarchy, strengthening interprofessional relationships)

The importance of developing deeper professional relationships to enable collaboration has previously been identified (67), thus supporting the findings from this study. Evidence suggests that interactions between team members and relationships could be enhanced by interactive, well-planned inter-professional education (38).

The presence of a hierarchy in the team does not appear to hinder nurse-physician collaboration in certain teams (68). However, this study identified '*hierarchy'* as a barrier to integration of pharmacists. When non-hierarchical, collaborative care was modelled by pharmacists and physicians then integration was facilitated (41) suggesting the importance of role models within the team. Another suggested approach is to consider the physician as the 'primary leader' of the team with all other team members willing to take-up a leadership role in patient care when appropriate (67).

Open and effective communication between multidisciplinary team members is a clear pre-requisite for collaborative practice, and not unique to pharmacists (14).

Whilst pharmacists are required to demonstrate their competence in inter-professional communication in order to register with their professional body (69-71), this study identified that poor '*interpersonal skills*' of pharmacists were a barrier to integration into the team. Engaging clinical pharmacists in a post-graduate training programme to develop interdisciplinary communication skills has been shown to improve collaboration (37) which could be further explored.

Working patterns

(Excessive workload, profession-specific goals, proximity, continuity of team membership)

Individual profession-specific goals were identified as a barrier to pharmacist integration into the team. When pharmacist-specific goals such as reconciling medicines at admission and discharge, providing patient education and providing pharmacokinetic monitoring advice are identified as shared team goals which the pharmacist is responsible for delivering, this can facilitate integration (67).

The geographical '*proximity'* of pharmacists to their team members was also found to be a facilitator. This can be facilitated by pharmacy departments supporting pharmacists to spend more time working within their ward team. A study of nurse and physician perceptions of collaboration in ward-based teams has similarly found that being physically located in proximity, having sufficient time to get to know each other and a realistic workload facilitates collaborative behaviours (68).

Usually, ward-based pharmacists will do not accompany nurses and doctors on ward rounds. This means interventions made by pharmacists are generally retrospective. A review of pharmacist working patterns and rota reconfiguration by the pharmacy department could allow a 'team-based' pharmacist approach whereby pharmacists are 'attached' to a Consultant medical team. As well as facilitating integration into the team, this has been shown to have a beneficial impact on prescribing (72).

Behaviour change from the perspective of the pharmacist

Whilst the identified determinants to pharmacist integration were primarily from the perspective of pharmacists, some were reported from the perspective of other members of the multidisciplinary team. When designing behaviour change

interventions, it is essential that it is determined *a priori*, the target group whose behaviour requires changing. This study adopted the perspective of the pharmacist given that the aim is to facilitate pharmacist integration. Any determinant relating to the behaviour of others is a 'social influence' and thus were mapped accordingly. This highlights the importance of the inter-personal interactions that pharmacists have with multidisciplinary team members. Having the skills to generate positive interpersonal interactions has been identified as a characteristic that pharmacists perceive contributes to career success (73). It has also been identified as an area that is lacking in the early career training of pharmacists (74); for the existing workforce, this gap may be addressed by the proposed characterised behaviour change technique of drawing attention to role models who have developed the required interpersonal skills to foster positive relationships with colleagues of the multidisciplinary team.

Strengths and limitations

Strengths

Independent review at the screening, extraction, appraisal, coding and synthesis stages provides transparency and confidence in the reproducibility and validity of the findings. Requiring consensus from all 3 members of the review team with experience in behavioural theory and the TDF provides further confidence in the robustness of the syntheses.

Using the TDF as the coding framework during data synthesis means the findings are underpinned by behavioural theory (23); behavioural domains from the TDF are linked to BCTs meaning any resultant interventions are more likely to successfully change behaviour (26, 75). All data extracts could be mapped into 1 or more of the TDF domains suggesting this is a relevant theoretical framework for this clinical context.

None of the included studies focussed primarily on integration of pharmacists within a ward-based multidisciplinary team. Of those which were most closely aligned, Bechet *et al*. (16) studied collaboration between hospital pharmacists and physicians from the view point of physicians, Costa *et al.* (48) examined collaboration within a multidisciplinary team on an intensive care unit, and Makowsky *et al.* (15) explored

integration of pharmacists within a healthcare team by assigning a pharmacist to a specific medical team. The remaining 17 studies were included based on 'incidental findings' being modifiable barriers or facilitators to integration. This is taken to be an advantage because the findings of the included studies cover a wide variety of pharmacist duties such as the responsibilities of pharmacists in medicines management (46), antibiotic stewardship (44), critical care (48), supporting junior doctor prescribing (41), attending ward rounds (15), providing prescribing feedback (51) and advanced clinical roles (38, 50). The outcome is that findings from this study are therefore potentially more relevant to pharmacists with varying clinical roles in the ward-based teams.

Limitations

The search strategy was limited to English publications for pragmatic reasons. Whilst there is thought to be little impact of language bias when limiting searches to English-language publications, in reality it is difficult to predict the circumstances when this might bias a systematic review (76).

Inclusion criteria did not specify the country where the study was carried out and ultimately studies were included from 7 different countries. Ward-based teams and roles vary between countries but this is also true within countries where different levels of clinical pharmacy service are delivered (77). Ultimately, each of the identified behavioural determinants will have higher or lower relevance depending on the local context and can be subsequently prioritised by the target audience during design of an intervention for implementation.

Whilst the TDF provides a theoretical lens through which to interpret determinants of individual level behaviours, it does not comprehensively consider wider structural, policy and social factors. Accordingly, any pharmacist behaviour change intervention derived from the recommendations in Table 5 requires appraisal to determine suitability for implementation with respect to factors beyond individual level behaviour (78).

Implications for practice

National and international guidelines identify the importance of integrating pharmacists into ward-based teams in order to deliver optimised care (4-6). As hospital pharmacist roles expand, pharmacists will spend more time on clinical duties (9). If these are to be fully effective then the pharmacist needs to operate from a position where they can be proactively optimising therapy rather than reactively change it. Consequently, they need to be fully integrated team members as per our definition of working closely within the team and as part of formalised meetings e.g. ward rounds.

It is however, imperative that pharmacists have appropriate knowledge and competence, combined with confidence to undertake such a role and therefore the education model underpinning the development of pharmacists requires review to ensure that this happens. Pharmacists also need to have goals which are aligned with the ward team and therefore, potentially, management structures and processes for target setting may require realignment.

This synthesis provides the evidence base for developing behaviour change interventions to enhance integration of pharmacists and has the potential to transform the current approach to ward-based pharmacy.

Future considerations

There is a sparsity of literature studying pharmacist integration into ward-based multidisciplinary teams. Therefore for this study a generic definition of an effective multidisciplinary team within the UK was utilised (14). Future work should aim to utilise the BCTs identified in this study to develop a definition or rating scale for 'integration into a ward-based multidisciplinary team'. This could include factors relating to closeness of working and knowledge of each member's roles, presence of shared team goals, joint record keeping, proximity of working, extent and effectiveness of inter-professional communication and positivity of encounters. An agreed definition for integration would allow implementation of interventions to overcome barriers or enable facilitators to integration to be assessed.

Integration as an active intervention component is complex in nature. This study has identified 14 modifiable barriers/facilitators to pharmacist integration into the ward-

based multidisciplinary team aligned to 32 different evidence-based intervention components (BCTs). This is an unrealistically large number of determinants of behaviour to attempt to change. One way to manage this could be to use the target audience to prioritise key behaviours to address a more feasible number (19). Using a consensus approach, the target audience would then select the most appropriate BCT from those mapped to domains of the TDF by Cane *et al.* (26). The APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side effects/safety and equity) could be utilised to provide structure and transparency to the choice of BCT (78).

The chosen BCT(s) would then be characterised in terms of content, mode of delivery, mechanism of action and context to develop an intervention targeting integration of pharmacists into the ward-based multidisciplinary teams (79).

Conclusion

The identified determinants within TDF domains and their associated behaviour change techniques now enable researchers to design theory- and evidence-based interventions to facilitate pharmacist integration into the ward-based multidisciplinary team. Pharmacist integration is facilitated by their knowledge and skills being valued and through demonstrating effective interpersonal skills. Re-structuring pharmacist responsibilities and working patterns to align with those of multidisciplinary team members also promotes integration.

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