Medical Students' Views about Interprofessional Clinical Skills Sessions for Delivering Interprofessional Education

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Short Title: Developing Interprofessional Clinical Skills

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Abstract

Objective

The need to improve interprofessional collaborative working to increase patient safety is now well recognized. This has led to interprofessional education (IPE) becoming a familiar component of medical education in the United Kingdom. Advocates of IPE are encouraged to evaluate their initiatives and share findings to contribute to the evolving evidence base for delivering effective and innovative IPE. Norwich Medical School (NMS) has developed a form of IPE focused on clinical skills, which involves students from different healthcare professions working in partnership. This paper describes the sessions and presents evaluation findings from the medical students.

Methods

Medical students' views about engaging in interprofessional clinical skills sessions (ICS) with students from pharmacy, nursing or paramedic science were analysed using data from 1030 end-of-year course evaluations completed between 2013-2017. Year 4 and 5 medical students from a five-year undergraduate Bachelor of Medicine and Bachelor of Surgery (MBBS) degree course in the UK participated in the study.

Results

Medical students commented on the ICS format being engaging and useful; with clinically authentic OSCE-style simulations being relevant for both upcoming clinical exams and future clinical practice. It was also preferred to classroom-based IPE activities the students had undertaken in earlier years of the course. ICS was regarded as an effective way of learning about their role and responsibilities, those of other healthcare professions, and how different professions complement each other. Medical students felt that ICS helped develop their interprofessional teamworking skills and it was regarded as a highly satisfactory activity.

Conclusions

The findings suggested that ICS was effectively contributing to the development of interprofessional collaborative working skills in medical students. Furthermore, the ICS was enabling the medical students to practice safe delivery of care in their roles as a doctor in collaboration with other members of a multi-disciplinary team.

Keywords: Interprofessional Education, Interprofessional Learning, Interprofessional clinical skills, Evaluation, Medical Students, Simulation.

Introduction

The safe delivery of healthcare requires the unified efforts of a wide range of allied health and social professionals. Despite being dependent on one another to deliver high-quality care, these professions historically trained in isolation [1,2]. In recent years, the importance of improving interprofessional collaborative working to increase patient safety has rapidly gained recognition [1,3-5], and interprofessional education (IPE) has become a familiar component of medical education in the United Kingdom (UK) [1,6].

At the outset of the millennium little evidence was available to guide the development and delivery of IPE [1]. Subsequently, over the course of the first decade, many approaches appeared within undergraduate medical curricula with varying outcomes [1,7-9]. Since then, guidelines for successful IPE [10-13] have become more frequent. However, institutions championing new approaches to IPE are still encouraged to evaluate their initiatives and publish their findings to promote continued development and learning.

This paper describes medical students' views about an IPE initiative using clinical skills to encourage collaborative working between medical and other healthcare students at a UK university.

Introducing IPE at Norwich Medical School

Norwich Medical School (NMS) at the University of East Anglia (UEA), UK, established its five-year undergraduate Bachelor of Medicine and Bachelor of Surgery (MBBS) degree in 2002. As a new school, NMS was able to design and launch a modern curriculum incorporating IPE throughout the course. Between 2002 and 2009, IPE opportunities at UEA were mainly classroom-based [14-16] and underpinned by adult education theories [17], and the modified contact hypothesis presented by Brown and Hewstone [18], which emphasizes the need for face-to-face purposeful and supported learning environments.

However, feedback from medical students regarding these classroom-based IPE activities indicated that whilst students had appreciated the opportunity to meet students from other healthcare professions and to learn about their syllabus and profession's role in the multidisciplinary team, they desired IPE activities with a more clinical focus in a situational learning environment. In response to this feedback, in 2010 the NMS clinical skills team devised a practical IPE opportunity that was centered round clinical skills.

The principal objective of these interprofessional clinical skills sessions (ICS) is to offer an interprofessional learning (IPL) opportunity with a focus on clinical skills relevant to the professions involved (e.g. prescribing or manual handling) with a view to enhancing interprofessional competency between participants as they perform these skills together in a simulated 'real' setting. The ICS require students to problem solve together during six timed, formative, objective structured clinical examination (OSCE) style, practical scenarios (see Box 1 in the Supplementary Material for the themes of the 6 stations for each ICS). The scenarios provide a range of challenges/tasks derived from those likely to be experienced in their future practice. Half of the scenarios are designed to be led by medics, the other half will be led by their colleague from a different profession. All scenarios require collaboration and input from both professions. There were no formal marks or grades awarded, but tutors gave immediate feedback to the student pair (for some scenarios feedback was provided to a small group comprising of three pairs).

The ICS are delivered to full cohorts as a mandatory requirement. At the time of writing, Year 4 medical students are participating in an ICS with final-year pharmacy or second-year paramedic students, and Year 5 medical students participate in an ICS with final-year nursing students. Learning is facilitated by tutors from the professions involved, who provide clinical guidance when required and facilitate team reflection at the end of each scenario. A more detailed description of the

evolution of ICS at NMS can be found in Webb et al. [19] and an outline of the paramedic ICS in Nagraj et al. [20].

Methods

Study Design

This is an evaluation of medical students' views of the ICS using a course evaluation survey collecting quantitative and qualitative data. Medical student feedback is the focus of this evaluation, as the intervention was designed and implemented to address suggestions and short comings identified in previous years' medical student evaluation surveys regarding their experiences with the existing classroom-based IPL activities on the MBBS. Additionally, medical students participated in ICS in both Year 4 and 5, working with a different health profession each time. All medical students then completed the same compulsory annual evaluation survey; this allowed efficient, comparable data collection from a large number of students. Unfortunately, there is not an equivalent survey currently completed by students from the other healthcare professions involved to include in this paper.

Sample

All NMS students are required to complete annual evaluations during their five-year course of study to actively contribute to the quality assurance and ongoing development of the MBBS course through providing feedback on their experiences. The ICS were evaluated by all Year 4 and 5 NMS students two-thirds of the way through their fourth year and at the end of their fifth year for four consecutive academic years; 2013-14 to 2016-17. Approval was obtained from the NMS' Faculty's Research Ethics Committee to ask students for their consent to use the data they provide in the course evaluations anonymously for additional purposes, i.e. research, presentations, publications, and NMS promotional activities. Students were provided with full details of how their feedback might be used via a question and answer format information sheet and they were able to contact the medical school's course evaluation lead (author SM) with any questions before choosing whether or not to provide their consent on the accompanying consent form. The sample comprised of those students who gave consent for their evaluation data to be used for publication purposes.

Data collection

Students were sent an individual link to their own copy of the online evaluation form, hosted by SurveyMonkey, with up to three reminders to their university email address. In all four academic years, students were asked to rate their overall satisfaction with the ICS in a single closed question (rated on 5 points, from 1 = Not at all satisfied to 5 = Completely satisfied) and to provide comments on the most useful aspects of the session and what improvements they would suggest for the future via two open-ended questions. Students are asked to complete this set of three questions about *every* area of the MBBS course in their annual evaluation form each year. Using a core set of questions enables NMS to monitor the quality of each aspect of the course over time, and to compare student satisfaction across different aspects of the course. Where ratings of satisfaction are low, responses provided by students to the two open-ended questions are used to understand where the strengths and weakness of that aspect lie, with a view to making improvements for the future. For the first academic year questions related to the ICS were included in the annual evaluation (2013-14), the students were provided with four additional closed questions where they were asked to rate their agreement with statements about the value of the ICS for their learning. The four questions related to stated learning objectives of the ICS; the purpose in asking these questions was to ascertain whether the student experience of the sessions was in line with these objectives. See Supplementary Material, Box 2 for all questions asked and response options.

Data analysis

Data from SurveyMonkey were imported into Microsoft Excel 2013. Analyses on the quantitative data were performed in Excel and IBM SPSS Statistics 22. There were five dependent variables (the five closed questions) and three independent variables (gender, age group and year of study). Non-

parametric analyses were performed (Chi-square test) as the data were ordinal. A corrected significance level of p = 0.01 (Bonferroni correction: 0.05/5 = 0.01) was used, as multiple tests were being performed for each independent variable. The qualitative responses provided to the two open-ended questions were subjected to basic content analysis by two of the authors (SM, HKB) to categorize and summarize the data.

Results

Consenting sample

For the four consecutive cohorts of students between 2013-14 and 2016-17, 1158 medical students completed the annual evaluation in Years 4 and 5 (100% of the Year 4 and 5 cohorts in these four academic years). Of these, 1030 (89%) consented for their evaluation data to be used in a publication (see Table 1). Demographic data gathered in Year 1 indicated that there were more female than male students and a slight majority had come straight from secondary education and were 18 years of age or younger on admission (Table 1).

Table 1. Demographic details of the sample consenting for their data to be used for publication purposes *(data collected in Year 1: 23 students did not provide their age or gender at that time)*

		Year 4	**Year 5**	**Both Year Groups**
Academic Year	2013-14	123 (23%)	131 (27%)	254 (25%)
	2014-15	138 (26%)	123 (25%)	261 (25%)
	2015-16	145 (27%)	116 (24%)	261 (25%)
	2016-17	131 (24%)	123 (25%)	254 (25%)
	TOTAL	*537*	*493*	*1030*
Age	≤ 18 years	225 (42%)	171 (35%)	396 (38%)
	19-21 years	195 (36%)	172 (35%)	367 (36%)
	≥ 22 years	100 (19%)	144 (29%)	244 (24%)
	Unknown	17 (3%)	6 (1%)	23 (2%)
Gender	Male	197 (37%)	191 (39%)	388 (38%)
	Female	323 (60%)	296 (60%)	619 (60%)
	Unknown	17 (3%)	6 (1%)	23 (2%)

Findings from the quantitative data

Data showed that the students had found the ICS to be an effective learning exercise (Table 2). In the first year of evaluation (2013-14) across both Years 4 and 5 it was found that over three-quarters of the students agreed or strongly agreed that this type of exercise enabled them to “learn about my own and others’ respective professional roles and responsibilities”, helped them “develop my own interprofessional teamworking skills”, was an effective way of learning about the clinical skills being taught, and was an “effective way of learning about how these two professions complement each other's skills” regarding prescribing (Year 4) and clinical skills (Year 5). Across both Year 4 and 5 students over the four academic years overall satisfaction with the ICS was high, with 71% of the students being very, or completely satisfied.

There were no differences between male or female students, or between students of different ages in their level of agreement with the statements or how satisfied they were with the ICS (data not reported here). However, there was a tendency for the ratings from Year 5 medical students to be higher than those from Year 4 students across all five questions, but this only reached significance for two questions (Table 2). Paramedic students were first introduced to the Year 4 ICS in 2015-16 (prior to that the ICS included medical and pharmacy students only); further analysis of the Year 4 data for 2015-16 and 2016-17, indicated that there was no difference in overall satisfaction with the ICS for the medical students who had been paired with a pharmacy student partner versus those with a paramedic student partner (data not reported here).

Table 2: Number (and percentage of respondents answering that question) of students who Agreed or Strongly Agreed with each statement.

Statement	**Year 4**	**Year 5**	**Overall**	**Chi square (df)**
Learn about own and other's roles and responsibilities *(question asked in 2013-14 only)*	74 (68%)	100 (83%)	174 (76%)	7.506 (2), not significant
Develop own interprofessional teamworking skills *(question asked in 2013-14 only)*	84 (78%)	102 (86%)	186 (82%)	3.055 (2), not significant
Learn how the two professions complement each other *(question asked in 2013-14 only)*	75 (69%)	104 (87%)	179 (78%)	10.876 (2), $p < 0.004$
Effective way of learning about prescribing (Year 4) / clinical (Year 5) skills *(question asked in 2013-14 only)*	95 (87%)	101 (86%)	196 (86%)	0.118 (2), not significant
Overall satisfaction with ICS session *(question asked in all academic years)*	330 (67%)	349 (76%)	679 (71%)	10.854 (2), $p < 0.004$

Findings from the open comments

Students were asked to comment on the aspects of the ICS that had been most useful for their learning needs and to provide any suggestions they had for improvement (see Supplementary Material, Boxes 3 and 4 respectively for example comments). Whilst there were some minor differences in comments about specific practical issues which were noted for attention over the four academic years, the feedback was otherwise similar over time and across both Year 4 and 5 students. Students' responses indicated that IPE delivered through formative OSCE-style clinical scenarios was found to be enjoyable, fun, interesting and useful. It was also felt to be a reflection of true multidisciplinary team (MDT) work, thus making it a relevant learning experience. Students had found it useful to identify their own role and skills within the partnership while working through each clinical case, and then coming to understand how their counterpart as a pharmacy, nursing, or paramedic student could contribute additional skills and knowledge. Students mentioned that the activity led to new insights into their counterpart's course, their skill-set and role within the MDT. Furthermore, medical students expressed specific skills sets being enhanced in this joint alliance, such as communication skills, delegation, knowing when to lead and when to step back, and ultimately how to integrate different skill-sets to ensure synergistic clinical decision making for optimal patient care.

Students expressed a desire for more similar learning opportunities earlier on and throughout the course; often linked to comments indicating that students preferred this style of IPL to the classroom-based learning activities that they had completed in earlier years. Students' particularly enjoyed the OSCE-style stations as they felt it provided a good opportunity for OSCE practice and working on simulation models, thus allowing them to prepare for their clinical assessments on simulated patients. Related to this, students valued the real-time feedback provided by tutors during the activity, since it gave them valuable insight into their current knowledge and skill-base.

Effectiveness of the IPL process was felt to fall short whenever there was poor engagement, or participation from their counterpart; such as when their partner showed an unwillingness to take the lead or appeared to lack knowledge about their role or the skill required. In some cases, medical students felt this might be due to their partner being too early in their own training to optimally participate in the activity. Some students mentioned a lack of information prior to the ICS, which prevented them from preparing for the activity beforehand and was felt to be particularly problematic for their counterparts from other professions. Some felt their partner lacked experience with simulation models and OSCE-style activities which, when combined with a lack of preparation, left the other students unclear as to what to expect during the session. Some medical students described a lack of clarity in the scenarios, regarding what was expected in a particular activity, or in relation to who was supposed to lead for different components. Some felt that there was an imbalance in some scenarios, such that one member of the pair had less to do. Additionally, practical issues were highlighted, including the timing of the activity alongside other medical course activities and assessments. Furthermore, as the number of students from each profession can be uneven a few students had to work as part of a triad, and occasionally a pair of medical students completed the scenarios without a colleague from a different healthcare profession; the students recognised this as being less useful from an IPE perspective.

Discussion

Data collected from medical students in Years 4 and 5 of a five-year MBBS course, over four successive academic years from over a thousand annual evaluation surveys, repeatedly demonstrated the perceived value of ICS to medical students of all gender and age. Whilst medical students had found the classroom-based IPE activities of the early years of the MBBS to be an enjoyable opportunity to interact with students from other health professions and they had been interested to hear about the other students' training, they consistently fed-back a preference to have their IPL in a more practical, clinical context. The objective when developing the ICS was to

provide a practical IPL experience, which centered around clinical skills pertinent to the health professions involved, performed in a simulated 'real' setting; with the aim of enhancing skills needed for interprofessional collaborative working that promoted safe care to patients. The findings reported here suggest that this objective was successfully met, and that the ICS was a valuable addition to the Norwich Medical School medical students' IPL experiences (see also [19,20]).

As outlined in the results, ICS was consistently reported by medical students as an effective and satisfying form of IPE and it was preferred to the classroom-based learning. A key reason given by students for scoring these IPE sessions so highly was the simulated clinical environment which helped the students to make connections with 'real' practice; as has been reported previously in the literature (e.g. [21,22]).

The desire to practice skills for their assessments was also given as a reason why the medical students rated ICS as a more worthwhile exercise than previous IPE experiences at NMS, as discussed by Lindqvist et al. [15]. Although exam preparation was not the primary aim of ICS, the feedback indicated that students valued the opportunity to practice working through problems in a multiple, timed, station format they could relate to their future OSCEs and that they perceived a benefit from real time feedback.

Many students commented on the authenticity of the scenarios, describing them as a true reflection of MDT work. Each healthcare professional can observe something different in the same clinical setting. This diversity in observation and information synthesis can be a key ingredient to enable holistic and seamless care. As the scenarios identified gaps in their own knowledge, ICS enabled the medical students to step back in a safe environment and observe their colleagues' expertise in motion, this allowed students to learn about their counterpart's role and value their professional input, which is important in producing positive outcomes of IPE and patient care [10].

Although 71% of the 1030 students described themselves as being 'very, or completely, satisfied' with the experience, it was interesting that the feedback was significantly more positive from the Year 5 than the Year 4 students. This may be the result of Year 5 students being just a few months away from entering clinical practice and thus spending much of their final year on placement in the hospital. Increased clinical exposure provides insight into the practicalities of working in the ward environment and with other professionals. It is possible that they consequently valued these sessions more highly as opportunities to practice interprofessional skills and learn about their colleagues' roles. This theory is supported by McFayden et al. [23] who found that students in their longitudinal study scored 'perceived need for cooperation' and 'positivity of attitude towards IPE' more highly as they progressed through their studies and gained clinical exposure.

Tunstall-Pedoe and colleagues [24] warned that IPE can also foster negative attitudes. This highlights the need to address the findings presented here that some medical students felt that their counterpart during the ICS lacked engagement. Potentially, this could translate to a long-term negative view of the wider profession if left unattended. This emphasises the importance of debriefs during the ICS to encourage reflection on the interaction, and also the value of involving tutors from both professions so that students can have exposure to role models from each. The significance of debriefs and preparation of tutors is also reported by Nagraj and colleagues [20] who looked specifically at the interaction between the medical and paramedic students at NMS.

According to Brown and Hewstone [18] and the contact hypothesis, students need to be on equal footing in order to have an optimal IPE experience. Our findings demonstrate that despite best intentions, this is not always the case. The OSCE-style format of this simulated learning environment, although beneficial to the medical students, may have contributed to hindering other professions from contributing their knowledge and skills. Other healthcare professions at UEA are less familiar

with the OSCE-style approach and thus may have felt uncomfortable taking the lead and thus effectively engaging with the task.

To address the issue of unequal contribution to the ICS activity, each scenario now clearly indicates which profession is expected to lead the scenario. Additionally, to encourage communication around decision-making and the leadership role, students are now given a chance to plan their approach before each scenario begins. Having increased clarity at the beginning addresses some of the points raised in student feedback reported in this study, and has resulted in improved sessions. The ICS tutors also play a key role here in supporting students who may feel less confident with the format.

Another issue identified in the open feedback, that of failure to pair students evenly from each profession is more difficult to address due to variation in cohort size and illness or non-attendance on the day. But it has been acknowledged that this has a negative effect on effectiveness of the session and so every attempt is now made to find an optimal solution with the numbers that attend. It has also been recognised that pairing students with students from their own profession in response to a shortage is not an acceptable solution. While students may gain benefit from practicing the clinical skills and being encouraged to think from the perspective of another profession, this is not allowing professions to learn with, from and about one another, and so by definition is not IPL [25,26]. Students are now placed in triads, as opposed to same-profession pairs, should a cohort malalignment arise.

Specific examples of changes made in response to student feedback can be seen for the Year 5 medical and nursing student ICS in Boxes 5 and 6 of the Supplementary Material (details of the ICS with paramedic and pharmacy students can be found elsewhere [19,20]). From initial piloting in 2012-13 through the four years of evaluation reported in this paper a number of changes were made to improve the students' IPE experience. Subsequently, the content of the stations and instructions have been largely unchanged from 2017-18 to the present, and student feedback is now consistently positive (aside from occasional 'on the day' issues). The value of regular student feedback in supporting the development of this new IPE experience has been readily apparent throughout the period of time reported in this paper. Even for a learning opportunity such as this which has been highly regarded by the students since its introduction, consistent feedback has identified areas which can be, and have been, addressed to optimise the value of the IPE experience for the students.

The main limitation of this evaluation of student experience of ICS as a learning experience and vehicle for IPE is that the results are based on feedback from only medical students, as part of an MBBS annual evaluation form which is not specific to the ICS. McFadyen et al. [23] report in their longitudinal study of the effectiveness of a four year IPL intervention, that there was a significant difference between professions in their response to the intervention. Although we have different forms of feedback gathered from other professions about the sessions (an internal satisfaction questionnaire was completed by all students during the paramedic ICS immediately after the intervention [20]), the annual evaluation is carried out by NMS and we do not have equivalent data for the nursing, pharmacy or paramedic students. We are therefore unable to equivocally determine if this activity was found to be equally beneficial by all professions, or if the same issues reported by the medical students were perceived by students from other professions.

As with almost all other IPE evaluations, although our results show high satisfaction with the ICS and high agreement to the statements given, we appreciate that this is only an indicator that successful IPL has actually occurred. We thus recognise that our evaluation remains a surrogate marker of the achievement of the goal of IPE, which is to improve interprofessional collaborative working with the aim of increasing the quality and safety of care [11,12,27]. Although we have no empirical data to demonstrate the effectiveness of the ICS in achieving this goal, the comments provided by the medical students regarding what they found most useful indicates that they recognise the value of

the ICS for their learning and their future practice working alongside colleagues from other health professions. As such, the data collected over four years presented here suggest that this type of IPE intervention is likely to have a tangible positive impact on future interprofessional collaboration and quality of care.

Conclusions

In conclusion, data collected from medical students' annual evaluations over four consecutive years show an overall and consistently high satisfaction with the ICS as a vehicle for IPE. Medical students believed that these sessions would help them prepare for their future practice, as well as their clinical assessments. The clinically authentic, OSCE-style simulations format was preferred to earlier classroom-based IPE activities. The ICS helped them clarify their role, the boundaries of their profession and what other professions can contribute in terms of skills needed to provide holistic and safe care. The main challenge reported by students was a perceived lack of contribution by the other profession at times. But, as was intended during its development, the feedback indicates that the ICS is supporting the medical students in developing a variety of collaborative working skills alongside other student health professionals at UEA and is providing a valuable opportunity to practice delivery of care in their roles as both doctor and as member of a multi-disciplinary team.

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Ethical approval: As outlined in the Sample sub-section of the Methods section, use of the students' course evaluation data for publication purposes was approved by the Faculty's research ethics committee. This study has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. As further outlined, all students gave their explicit opt-in informed consent prior to inclusion of their data in this study.

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Supplemental Material

Medical Students' Views about Interprofessional Clinical Skills Sessions for Delivering Interprofessional Education
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Box 1: Themes for each of the 6 stations for the ICS sessions

Station	Pharmacy & Medical students	Paramedic & Medical students *	Nursing & Medical students
1	Drug history and medication review: Patient admitted (i) following a fall, (ii) with confusion	Communication skills: Admission of confused elderly lady	Information gathering: social history
2	Acutely unwell patient: Opiate overdose. GI bleed on warfarin	Patient with atrial fibrillation and chest infection	Telephone communication skills - escalation
3	Drug chart errors	Telephone consultation, confidentiality and consent	Respiratory assessment and management of IECOPD
4	Data interpretation	Patient with GI bleed	Insulin and fluid prescribing and administration (cannulation station)
5	Acutely unwell patient: Pneumonia and fast atrial fibrillation. Fast atrial fibrillation and congestive cardiac failure	Medical emergencies in the community	Data interpretation: waterlow, BMI, ABPI, MUST, EWS, urinalysis
6	Bag of drugs - medication review and optimisation	Major incident: train crash	Manual handling

** Further details available in Nagraj et al 2018*

Key:
ABPI = Ankle-brachial pressure index
BMI = Body mass index
EWS = Early warning score
GI = Gastrointestinal
IECOPD = Infective exacerbation of chronic obstructive pulmonary disease
MUST = Malnutrition universal screening tool

Box 2: Interprofessional Clinical Skills (ICS) session questions included in the 2013-14 to 2016-17 Year 4 and 5 Annual Evaluations.

The following questions are about the Year 4 IPL joint teaching exercise where you were partnered with pharmacy students to solve prescribing and therapeutics scenarios. *(2013-14 evaluation only: instructions for Year 4)*

The following questions are about the Year 5 IPL joint teaching exercise where you were partnered with nursing students to solve clinical skills scenarios. *(2013-14 evaluation only: instructions for Year 5)*

Please rate your level of agreement with the following statements: *(1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree)*

1) This exercise enabled me to learn about my own and others' respective professional roles and responsibilities: *(2013-14 evaluation only: asked in both Years 4 & 5)*

2) This exercise helped me develop my own interprofessional teamworking skills: *(2013-14 evaluation only: asked in both Years 4 & 5)*

3a) The exercise was an effective way of learning about how these two professions complement each other's skills in prescribing and therapeutics specifically: *(2013-14 evaluation only: asked in Year 4)*

3b) The exercise was an effective way of learning about how these two professions complement each other's skills with respect to clinical skills specifically: *(2013-14 evaluation only: asked in Year 5)*

4a) This exercise was an effective way of learning about prescribing and therapeutics: *(2013-14 evaluation only: asked in Year 4)*

4b) This exercise was an effective way of learning about clinical skills: *(2013-14 evaluation only: asked in Year 5)*

5a) Please rate your overall satisfaction with the joint learning exercise (Interprofessional Clinical Skills) where you were partnered with pharmacy students to solve prescribing and therapeutics scenarios. * *(All evaluation years: asked in Year 4)*

5b) Please rate your overall satisfaction with the joint learning exercise (Interprofessional Clinical Skills), where you were partnered with nursing students to solve clinical skills scenarios. *(All evaluation years: asked in Year 5)*

Question 5 rated on the following scale: 1 = Not at all satisfied, 2 = Slightly satisfied, 3 = Moderately satisfied, 4 = Very satisfied, 5 = Completely satisfied.

6) What aspect/s of this joint learning exercise (Interprofessional Clinical Skills) were most useful for your learning needs, and why? *(All evaluation years: asked in Years 4 and 5)*

7) What, if any, improvements would you suggest for this joint learning exercise (Interprofessional Clinical Skills) for the future? *(All evaluation years: asked in Years 4 and 5)*

** Following the introduction of paramedic students this satisfaction question was revised as follows "Please rate your overall satisfaction with the joint learning exercise (Interprofessional Clinical Skills) where you were partnered with other health professional students (e.g. pharmacy, paramedic students).".*

NB The Interprofessional Clinical Skills (ICS) sessions were initially referred to as an 'IPL joint teaching exercise' on the students' timetables, so they were described as such in the evaluation questions for the first academic year of this study. In later years the activity was referred to as an "Interprofessional Clinical Skills joint learning exercise" and so the evaluation questions were revised accordingly to match how the students would be familiar with this IPL opportunity.

Box 3: Illustrative quotes from the open-ended question "What aspect/s of this joint learning exercise were most useful for your learning needs, and why?"

"I was very sceptical beforehand, thinking the exercise would be a waste of an afternoon. However I was very surprised to find myself actually enjoying the experience. Having pressure put upon us to use the BNFs to quickly prescribe is really good practice for our upcoming electives, shadowing and subsequent working lives as junior doctors." *[2013-14, 20, Male, Year 4]*

"It was a good indicator to see what our strengths and weaknesses were by being thrown in to different scenarios. Was a relaxed but useful session to learn, great working with another member of the team with guidance from experienced tutors." *[2016-17, 22, Female, Year 5]*

"Useful to learn what important skills are needed to work with others and also see what other colleagues can bring to the overall management of a patient." *[2016-17, 18, Female, Year 5]*

"Good to see what it would be like working in a team in real life scenarios in the future." *[2014-15, 22, Female, Year 4]*

"Each station required you to either take a leadership role or a supporting role - this was useful to remind you or your role but also the role of others." *[2013-14, 19, Female, Year 4]*

"Fantastic team working, able to compliment each others skills and knowledge. It made it very clear that we all have areas that we are good at and need help for others. Good for the nursing students to see how much they know and that they have a skill base that we don't have - this was the perception my nursing colleague gave me." *[2016-17, Not provided, Not provided, Year 5]*

"I did not realise how much we knew until I was paired with a nurse for the session, and likewise I was not aware of a nurses knowledge and expertise in many crucial areas of patient care. It was a great eye opener on how both professions complement each other and should work together to achieve the best patient care." *[2015-16, 18, Female, Year 4]*

"Was a fun and interactive exercise that helped me to appreciate the vast knowledge of the pharmacists. I was very impressed by my partner and would definitely seek a pharmacists help in the future." *[2014-15, 19, Female, Year 4]*

"Really interesting to work with other professions closely - it helped to identify the boundaries of my knowledge, and what I need help with from other professionals - I felt it was an invaluable experience." *[2015-16, 19, Male, Year 4]*

"Practice at fulfilling my soon to be professional role in the team (I.e. rather than just being the student) and gaining confidence of asking things of people in their areas of expertise. Also gaining more knowledge of who is trained up to do what in the MDT." *[2016-17, 22, Male, Year 5]*

"Working in a team, problem solving together, seeing how brilliant the pharmacists are." *[2015-16, 18, Male, Year 4]*

"Working as a multidisciplinary team, integrating our different skillsets and optimizing communication between different members of the team." *[2016-17, 22, Female, Year 5]*

"Really good experience learning when to take the lead and when to step back was useful." *[2015-16, 18, Female, Year 5]*

"Very useful to have a chance to practice simman under non OSCE conditions and receive feedback." *[2014-15, 18, Female, Year 4]*

"Good practice of acute situations and SBAR + simman skills." *[2016-17, 19, Male, Year 5]*

"It was really good doing a simman situation and everybody showing what they would do in the scenario. Also the SBARD situation was really useful too." *[2016-17, 19, Female, Year 5]*

"It was a great opportunity to run through scenarios as an OSCE but in a more relaxed manner and the verbal feedback afterwards has been very useful with regards to highlighting areas in which I need to work on in the future and well as learning what my strengths were. I found the experience quite a confidence boost as, with the help of the paramedic student, we were able to problem solve and work through scenarios as will be required in the hospital in a few years. I also found it a good way to interact with a student from a different course, and as each of us led different scenarios, it didn't feel like one of us was superior to the other." *[2015-16, 18, Female, Year 4]*

Key: [Year of study, Participant identification number, Gender, Year group]
NB Unedited/uncorrected comments provided by the students in response to the open ended question.

Box 4: Illustrative quotes from the open-ended question "What, if any, improvements would you suggest for this joint learning exercise for the future?"

"In the IPL OSCE I didn't feel like the students of the other health care professions were always that engaged/interested … Obviously this is to some degree a personal factor, but also I feel it was due to the fact that many of the stations were geared much more towards medical students than other health care professions … I was really looking forward to this as a learning opportunity to be part of a inter-professional team, and I think it has the potential to be a fantastic teaching session, as long as it is applicable and useful to all healthcare professions." *[2016-17, 18, Male, Year 4]*

"It felt like the pharmacy students were quite shy and would let the medical students do everything until the medical student got stuck. Perhaps the pharmacy students could be better briefed so they get more involved." *[2013-14, 19, Female, Year 4]*

"It would be useful to have a 10 minute primer for some of these scenarios. It was evident from my own experience and from that of my colleagues that some nurses were unclear as to their role and responsibility" *[2015-16, 21, Male, Year 5]*

"Encourage the nurses more to take charge of the scenarios where they are meant to run it. Because they were often just leaving it to us when it was their role." *[2015-16, 19, Female, Year 5]*

"To have mainly final year nursing students. Some first years couldn't complete the tasks required." *[2016-17, 22, Female, Year 5]*

"The pharmacists' knowledge was not developed enough for us to learn how our skills complement each other." *[2013-14, 42, Female, Year 4]*

"I struggled with my partner as he was in the younger years and didn't complete his parts of the tasks which meant that I ended up doing most of each scenario. I didn't get the most of out the session due to this. I was looking forward to the session as I knew I could get useful information from the pharmacy student but unfortunately I didn't get this." *[2014-15, 19, Female, Year 4]*

"More briefing for students before. Pharmacist student didn't know what to do so didn't participate even with a lot of encouragement." *[2013-14, 22, Female, Year 4]*

"Give us more information about what the session involved beforehand - I had no idea what to expect and a little preparation would have gone a long way in making the most of it." *[2013-14, 25, Male, Year 4]*

"Not an improvement as such, but was surprised the nursing students don't get more simman experience (I believe this was their first time). Maybe consider inviting them along earlier in their course and ours (year 1 nursing, year 2 medic for example)." *[2013-14, 19, Male, Year 5]*

"Would be useful to introduce the nursing students to Sim Man prior to jumping straight into the scenario as my partner remarked that it was quite daunting to use it for the first time." *[2016-17, 18, Male, Year 5]*

" … the pharmacy students didn't seem to know many topics or were used to the OSCE style stations, which meant that the medical students had to take much of the lead, which didn't seem to be the purpose of the session." *[2016-17, 18, Female, Year 4]*

"It wasn't always clear what we were expected to do in each station, or who was supposed to do what." *[2015-16, 22, Female, Year 4]*

"Ensure stations are split half and half for pharmacy students and medical students, as the OSCE seemed more geared towards what we had learnt on our course than the pharmacy students." *[2013-14, 19, Female, Year 4]*

"The psych timetable meant I was unable to attend, not sure how much can be done about that but it is a bit annoying." *[2014-15, 18, Male, Year 4]*

"It was the day before our SSS presentation." *[2014-15, 18, Female, Year 4] NB this is a formal Year 4 assessment*

"Don't hold it in the middle of the week for students on placement in LOCATION - we were mostly staying away in LOCATION and had to drive back just for this exercise in the middle of a week." *[2013-14, 35, Female, Year 5]*

"We had 2 medical students and 1 nurse which meant that sometimes there was a person not really doing anything in the scenarios." *[2016-17, 19, Female, Year 5]*

"Make sure equal numbers of each and proper delegation of partnering up. I was placed with a fellow medic; whilst useful, it wasn't the point of the exercise." *[2014-15, 24, Male, Year 5]*

"I think this should be used throughout the years - it is a much more practical approach to IPL. I also think we should complete these sessions with other specialities (particularly Physician Associates)." *[2015-16, 21, Female, Year 4]*

"Would be helpful to have a couple sessions working with the nurses through various scenarios as this was enjoyable and a new experience." *[2013-14, 20, Female, Year 5]*

"… could there be IPL OSCEs earlier in the course? Seems to make sense to learn IPL in clinical scenarios rather than exercises in class room." *[2016-17, 18, Male, Year 5]*

Key: [Year of study, Age, Gender, Year group]
NB Unedited/uncorrected comments provided by the students in response to the open ended question.

Box 5: Full details of the 6 stations for the nursing and medical student ICS sessions: Evolution from 2012-13 to 2019-20.

Scenario title	Scenario content	Original content of 2012-13 pilots	Changes made over the years to 2019-20
Social History	Patient is independent and refusing help. Daughter has additional information / different view and is anxious father gets more care.	Patient (actor) interviewed by medic and relative (tutor in role play) by nurse.	- Increased from 15 to 20 minutes. - Second actor added (for relative), allowing tutor to supervise 3 different pairs of students and give feedback (alongside actors) in last 5 minutes.
Telephone Communication	Fever due to neutropaenic sepsis in patient post chemotherapy.	Nurse to ring doctor and handover using SBARD (situation, background, assessment, recommendation, decision) structure.	- Increased from 15 to 20 minutes. - Expanded tutor and student instructions *(see example in Box 6)*.
Emergency assessment and management	Infective exacerbation COPD (chronic obstructive pulmonary disease) with fast AF (atrial fibrillation).	Apply oxygen, nebulisers, complete observation chart (including EWS - early warning score) and drug charts.	- Increased from 15 to 20 minutes. - Interpretation ABGs (arterial blood gases) introduced. - Expanded tutor instructions to include teamwork debriefing. - Student instructions revised to clarify roles.
Cannulation and insulin and fluid administration	Hyperkalaemia scenario - interpret blood tests, suggest treatment and institute management.	Cannulate arm and administer appropriate SC (subcutaneous) insulin and IV (intravenous) fluids	- Increased from 15 to 20 minutes - Data interpretation and prescription element removed to allow more time and balance contribution from nursing and medical students. - Students use pre-prescribed regimen but still have to cannulate, give SC insulin dose and set up a fluid infusion *(see example in Box 6)*.
Data Interpretation	Patient A - venous ulcer image and charts. Patient B - frail, thin older patient with long	Patient A - calculate ABPI (ankle-brachial pressure index) and EWS.	- Increased from 15 to 20 minutes. - Introduced written answer sheet to allow

	term catheter and skin at risk.	Patient B - interpret urinalysis. Calculate BMI (body mass index) and Waterlow score and discuss CPR (cardiopulmonary resuscitation) status.	verbal debrief with tutor to three pairs of students together in the last 5 minutes.
Manual Handling	Confused patient slipped down bed and tangled with drip and catheter.	Risk assess. Move patient together using slidesheet while maintaining dignity and communication.	- Increased from 15 to 20 minutes. - Clarification of task to students through revised instructions. - More detailed actor instructions.

Box 6: Examples of station development. Taken from the Telephone Communication station (notes for tutors) and Cannulation station (background for students) between 2012-13 and 2019-20.

Instructions used for the station for 2012-13	Instructions used in the station for 2019-20
Telephone Communication station: Tutor notes There are 15mins for this station in total. Oversee the role play of the telephone call without interruption. They should both be familiar with and use the SBARD framework. When they have finished get them to discuss their telephone c/s and in particular the advantages and disadvantages of the SBARD framework. The call should only take a few minutes so there may be sufficient time to re-run the call if they wanted to practice again after feedback. The observation chart should trigger them to realise that the patient is unwell. (his B/P120/80, P84, RR12, T36.4 and urine output 100mls/hr. Changing over the five hour period to B/P80/60, P112. RR18, T39.0 and urine output 20mls/hr).	**Telephone Communication station: Tutor notes** There are 20mins for this station in total and you need to look after 3 pairs of students. A bell will sound half way through. You can run the session however you like however the following notes are some suggested guidance. 1. Ensure they understand their instructions and then start the 3 student pairs off on their conversation. Try not to interrupt the conversation but observe all 3 pairs during the task. The initial call is unlikely to take more than 5mins. 2. When all 3 pairs have finished you can call the group together and discuss what went well and what went less well for each pair. They will probably want to have 'the correct answer' for management but encourage them to think more about the process than the content. The observation chart should trigger them to realise that the patient is unwell (his B/P120/80, P84, RR12, T36.4 and urine output 100mls/hr, changing over the five hour period to, B/P80/60, P112. RR18, T39.0 and urine output 20mls/hr). The plan should include increased observation frequency/checking obs, EWS calculation, fluid resuscitation, considering sepsis, possibly neutropenic sepsis (? FBC/Cultures) and early medical review. 3. One debrief strategy might be to; a. Ask the medics if they had sufficient information to make a clinical judgement(s), did they feel a sense of urgency etc b. Then ask the nurses to comment on the Drs responses. Did they feel there was a clear plan? Did they feel adequately supported and involved in the plan of action? c. Consider what communication strategies got the best combined outcome? If they didn't use an SBARD or similar frame work discuss this option and how this supports systematic assessment and decision-making. Hand out the SBARD cards. 4. If you have time ask them to discuss handovers/telephone interacts they have seen or heard on the ward. What have they taken away from observing these interactions?

	5. Collect the SBARD cards up again ready for the next group
Cannulation station: Background for students This arm belongs to Mrs. Judith Wallace, a 53 year old lady admitted with sepsis and dehydration. Your task is to; • Insert a venous cannula • Interpret her blood results • Deliver some treatment for her hyperkalaemia using the equipment and drugs provided. You have 15 minutes for this station.	**Cannulation station: Background for students** You are working on the medical assessment unit. This arm belongs to Mrs. Judith Wallace, a 55 year old lady with insulin dependent diabetes mellitus who has just been admitted with diarrhoea and dehydration. She has been seen by the medical registrar who has prescribed her some treatment. You will be given her drug chart. Your task is to; • Cannulate the arm • Deliver the appropriate insulin • Set up the intravenous fluid including calculation of the appropriate drip rate per minute / setting up the infusion pump • Please sign and time the charts for insulin and fluids but please note how the drug chart (a Master version with green cover) is completed for both these procedures. Please note that it is 12 noon and she is about to have lunch. Her pre-lunch BM is 6. You have 20 minutes for this station.