

1 **Evaluation of Inter-professional Education (IPE) with medical, nursing and pharmacy**
2 **students through a simulated IPL Educational Intervention**

3 **5 keywords required**

4 Interprofessional education, simulation, pharmacy education, nursing education, medical
5 education

6 **Abstract**

7 Introduction

8 Inter-professional education (IPE) is becoming an integral part of many professional
9 programmes throughout the UK, ensuring health professionals are competent to
10 work as part of an inter-professional team upon entry into their profession. IPE has
11 become a fundamental component of curriculum content in health and social care
12 degrees.

13 **Aims**

14 Research aim - to evaluate a simulated IPE intervention.

15 **Methods**

16 A one day IPE intervention, 'Evening On-Call' was run involving nursing and medical
17 students and pre-registration pharmacists (student pharmacists in year 5 of training)
18 in an on-call setting.

19 This IPE incorporated manikin and actor patients in a simulated ward. During the
20 intervention, the 3 groups of students are assessed under observation on their
21 clinical, prioritisation and communication skills. Participants perceptions of this
22 intervention were evaluated by completion of a questionnaire to capture their

perceptions regarding the experience, the pre-IPL briefing and post-IPL feedback and perceived relevance of this training. Free text sections collected additional comments and a follow-up questionnaire was sent six months later.

Results

Initial questionnaire feedback was predominantly positive for each professional group. The majority perceived the simulated IPL had given them a greater understanding of other professionals' roles, had enhanced their professional confidence and would help them prioritise workload once qualified.

The 6 months follow up questionnaire supported the initial questionnaire findings. Some responses highlighted participants believed the simulated IPL had helped them work more effectively with other healthcare professionals, communicate more effectively and better prioritise their workload. There may be some evidence of sustained self-reported effectiveness in teaching certain professional and clinical skills to participants using this type of simulated intervention.

INTRODUCTION

The development of good teamwork skills is a core requirement of the modern healthcare professional. Collaborative practice strengthens health systems and improves health outcomes and there is evidence that interprofessional education enables collaborative practice.¹ Inter-professional Education (IPE) is defined by the World Health Organization (WHO) as “when students from two or more professions learn about, from and with each other to enable effective collaboration and improve

45 health outcomes.”² It focuses on the way practitioners learn together to work together
46 for the benefit of the patient.

47 IPE initiatives exist in law, engineering and science.³ Within healthcare, WHO
48 recognised that if health professionals were taught together in a multi-professional
49 educational setting and learn to collaborate as a team during their student years,
50 they were far more likely to work effectively together in their professional lives in a
51 clinical setting.² As a result IPE has become a fundamental component of curriculum
52 content in University health and social care degrees, to help health care students
53 understand the importance of good communication and teamwork. There are
54 multiple studies involving nursing and pharmacy students;^{4,5} nursing, medical and
55 pharmacy students;^{6,7} and sometimes up to six disciplines including dietetics,
56 physiotherapy, radiography and occupational health.⁶ Although the duration of IPE
57 was in most instances single encounters, there are instances of IPE being used over
58 longer periods such as several weeks.^{9,10} IPE has been highlighted as having a
59 positive impact on learners developing their knowledge, skills, behaviours and
60 attitudes which will subsequently have a positive impact on learners practice and
61 patient safety.^{11,12}

62 From a Scottish pharmacy perspective ‘Achieving Excellence in Pharmaceutical
63 Care’¹³, alludes to programmes such as the Scottish Patient Safety Programme¹⁴ and
64 Adverse Events Programme¹⁵ are designed to tackle the safety issues to which poor
65 communication amongst healthcare professionals can contribute. ‘Realistic
66 Medicine’¹⁶ describes in detail the importance of communication to manage risks in
67 healthcare.

68 IPE should help students to:

- Work collaboratively in an interprofessional team towards the provision of patient centred care.
- Gain insight into their relationship with other health professionals, their differing roles and responsibilities and the significance on the overall care of individuals, families and communities.
- Set specialist care and treatment in a holistic context, including human factors.
- Improve patient safety by improving communication and collaboration between professions variously responsible for the same patient.¹⁷

As a result of the positive impact of this type of educational intervention, IPE has been repeatedly called for in health professionals' education.^{18,19} As FIP (International Pharmaceutical Federation) stated in its 2015 Global Report, Interprofessional Education in a Pharmacy Context: "A collaborative practice-ready workforce cannot exist without first establishing effective interprofessional education [IPE]. IPE efforts... should begin before registration or licensing."¹⁷

This educational intervention also involved simulation which has been suggested to increase the quality of preparation for workplace-based training.²⁰ The use of simulation within health professionals has shown developmental gains in medical knowledge, decision-making, critical-thinking, procedural skill development, communication skills, self-confidence and self-efficacy.²¹ Technology enhanced simulation has consistently been shown to be associated with improved educational outcomes compared with no intervention for health care professionals.²²

Aim

92 The aim of this study was to explore the perceptions of all participants of the IPL
93 educational intervention to provide useful information for educational planners to
94 amend and improve future programmes.

95 **METHODS**

96 **The IPL Educational Intervention**

97 NHS Lanarkshire has been incorporating ward-based IPE in the 'Preparation for
98 Practice' teaching block with nursing, medical students and pre-registration
99 pharmacists since 2015. This educational intervention called 'Evening on-call'
100 incorporates manikin and actor patients in a multi-ward simulation. Medical, nursing
101 students and pharmacy pre-registration trainees test their clinical, prioritisation and
102 communication skills under observation of a trained assessor/facilitator from their
103 discipline. The three disciplines work through various on-call scenarios over three
104 mock wards. All scenarios are run at the same time for one hour, with one student
105 nurse allocated to cover each ward and one pre-registration pharmacist and one
106 medical student covering all three wards. After each 60-minute session, participants
107 reflect on their experience and discuss the session with a trained facilitator from their
108 own profession. Once this individual debrief is completed all participants within that
109 session participate in a multidisciplinary debriefing with all the other healthcare
110 participants.

111 Prior to the session the participants are asked to work towards the following
112 objectives:

- 113 • Choose patients on whom to focus who will help achieve specific learning
114 objectives/ gaps in knowledge.

- Collaborate with the other staff/students on the wards to ensure safe and effective care is provided to patients on the wards.
- Reflect upon the experience to identify what went well, what could be improved upon and what would be done differently.

Participants and Setting

Participants were from three defined professional groups; final year medical and nursing students and pre-registration pharmacy trainees who had taken part in the IPL educational intervention in the 2018. The opportunity to participate in the session was provided to Medical Students within NHS Lanarkshire, Nursing students (in the West of Scotland) and Pre-registration pharmacy trainees (across Scotland) as they are all at similar stages of their healthcare profession's initial education and training and thus was thought the optimum time to introduce this experience. All places were filled on a first come first serve basis.

Medical students

Medical students from the one Scottish medical school took part in this IPL educational simulation event. These individuals had completed their medical degree and were currently undergoing their Preparation for Practice (PfP) block before their Foundation Training Programme began. PfP is essentially a one-month apprenticeship consisting of work shadowing and lectures. Graduates cannot be fully registered with the General Medical Council until the end of their first Foundation year.²³

Nursing students

138 Nursing students taking part in this IPL educational intervention were in their final
139 year at one of the Scottish nursing schools, with the exit award after year 3 being a
140 BSc in Nursing Studies. Students had undertaken modules on Interprofessional
141 practice in all years of their degree. Up to 50% of their course was in clinical practice
142 including a significant amount of time learning alongside other health care
143 professionals. On successful completion of the BSc, graduates are eligible for
144 registration as a Registered Nurse with the Nursing and Midwifery Council (NMC).²⁴

145 **Pharmacy pre-registration trainees**

146 Pre-registration Pharmacists involved in this IPL educational intervention were
147 undertaking their supervised learning year in practice following a four-year MPharm
148 degree at a school of Pharmacy. Within the current standards for initial education
149 and training of pharmacists, the General Pharmaceutical Council (GPhC) highlight
150 that there should be inclusion of interprofessional education.²⁵

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152 **Questionnaire development and completion by participants**

153 Participants were asked to complete a questionnaire immediately after completing
154 their IPL educational intervention (immediate questionnaire) and then a second
155 follow-up questionnaire. This second questionnaire was e-mailed to the participants
156 to complete approximately six months after the IPL educational intervention (6-month
157 questionnaire).

158 The immediate questionnaire comprised of demographic questions and Likert-type
159 responses ranging from strongly agree to strongly disagree to assess participants'

views of changes in their skills and abilities as a result of the IPL educational intervention. Free-text questions allowed students to provide greater detail.

Demographics and Likert-type responses were analysed using descriptive statistics. Mann Whitney U test was used to explore significance in response immediately after and at follow up (paired comparisons were not possible due to anonymity of the data). Free-text was thematically analysed to determine common perceptions and opinions of the trainees²⁶. The free text comments in the questionnaire were coded and then grouped together in themes using Microsoft Excel.

The 6-month questionnaire format was similar to the immediate questionnaire, but some questions were altered in an attempt to ascertain participants' views on how the IPL educational intervention had impacted on their ability to perform now working as healthcare professionals. The follow up survey was open for 4 weeks for participants to take part. Weekly reminders were sent using the online survey tool to encourage participation with the questionnaire.

Ethical approval details were not required for this study, as the work was not considered to be research, as determined by the NHS Health Research Authority.²⁷

RESULTS

All students/trainees (100% n=118) completed the immediate questionnaire and 24(20.3%) completed the 6-month follow-up questionnaire.

Demographics were considered to be representative for the professional groupings (Table 1).

182 Table 2 shows the participants' response to questions in the immediate
183 questionnaire and 6-month questionnaire.

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185 **Analysis of results**

186 **Professional skills**

187 The questionnaires elicit participant perceptions of how the IPL educational
188 intervention would help them with key skills once in practice. With the professional
189 skills, the majority in all three professional groups either strongly agreed or agreed
190 that evening on-call would help them **work more effectively with other health**
191 **professionals; communicate more effectively; prioritise workload; effectively**
192 **manage my time; effectively identify my personal limitations; be confident**
193 **professionally**. No participant disagreed with these statements.

194 For the participants who responded to the 6-month questionnaire the agreement
195 rating of professional skills remained high for the statements **communicate more**
196 **effectively** and **identify my personal limitations**. The agreement decreased at 6
197 months for all other statements in this category ($P < 0.05$).

198 **Clinical Skills**

199 With the clinical skills, the majority in all three professional groups either strongly
200 agreed or agreed that the IPL educational intervention would help them **effectively**
201 **assess deteriorating patients; make clinical decisions more effectively;**
202 **escalate care to a higher level.**

203 At 6 months the agreement rating for clinical skills statements significantly fell
204 ($p < 0.05$) for all but **effectively assess deteriorating patients**.

205 **Technical Skills**

206 With technical skills all professional groups reported that the IPL intervention was
207 useful initially. After 6 months there was a significant reduction in agreement for all
208 technical skills ($p < 0.05$).

209 **Sub-analysis**

210 A sub-analysis revealed that there was no significant difference ($p > 0.05$) for any
211 professional, clinical and technical skills for nursing students or pharmacy trainees
212 when comparing the immediate and 6-month questionnaires. For medical students,
213 this was only true for **effectively assess the deteriorating patients, effectively**
214 **prioritise my workload, and effectively identify my personal limitation**. This sub
215 analysis suggests that the overall findings are influenced by the perceptions of
216 medical students, but the lack of paired data means that interpretation requires
217 caution.

218 Thematic analysis of the free text answers highlights suggestions for improvements
219 for future training. The themes identified were similar across the disciplines, with
220 nursing students highlighting the benefits this would bring in earlier years of training
221 (Table 3).

222

223 **DISCUSSION**

224 **Key findings**

225 This study reports a very positive response to using the IPL educational intervention
226 as a tool to enhance interprofessional learning with pharmacy trainees and nursing

227 and medical students. The majority agreed that this learning would help them work
228 more effectively with other health professionals, communicate better and prioritise
229 workload. It is positive to see that six months later all participants thought 'Evening
230 On-Call' had had a positive impact on their interprofessional working in practice.

231 The level of agreement that the IPL educational intervention had contributed to the
232 development of professional, clinical and technical skills was generally lower at 6
233 months than immediately after the intervention. This was determined for the
234 respondents to the follow up questionnaire, using an independent non-parametric
235 statistical analysis because data were not paired due to anonymity. In addition, the
236 response rate at follow up was poor and limits the extent to which we can interpret
237 these findings. The authors conclude that participants agreed that the IPL
238 intervention helped them develop professional, clinical and technical skills
239 immediately after the intervention. Further research, which would need to take into
240 account the effect of real practice and should include pairwise comparisons with sub-
241 analysis within professional groups, is required to determine if there is a sustained
242 benefit at 6 months. From this study it would appear that the simulated intervention
243 was less useful in developing long term technical skills, and more useful in long-term
244 professional and clinical skills. Further research in this area is needed.

245 This study has contributed to an area of research that draws attention to the
246 importance of this type of educational intervention to support the development of
247 multidisciplinary working. Pharmacists, as the experts in medicines, are an important
248 part of the multidisciplinary team; it is therefore essential that trainees in pharmacy
249 are given the opportunity to partake in IPE with medicine and nursing students,
250 amongst others.

251 This IPL educational intervention study is similar to a study carried out at the
252 University of Manitoba, Winnipeg, Manitoba, Canada by Joyal et al⁶ where nursing,
253 pharmacy and medical students came together for a hospital simulated 12-hour
254 overnight ward shift. This study was of similar scale and utilised two questionnaires
255 prior to and immediately after intervention, as opposed to immediately after and 6
256 months after. Both studies had marked reduced completion rate for the second
257 questionnaire. The Canadian study demonstrated that there was a desire to take part
258 in interprofessional activities, and that communication between disciplines and an
259 understanding of different roles was improved. It also drew conclusions that the
260 frequency of such events must be greater and that better explanation prior to the
261 event was needed. The findings of the Canadian study are similar to those reported
262 in this study.

263 **Strengths and Limitations**

264 The immediate questionnaire response rate was excellent (100%) across all three
265 professions but lower (20%) in the 6-month questionnaire, with proportionally more
266 nursing students than other professions. One contributing factor to this may be that
267 university student/trainee email addresses were given as a point of contact at the IPL
268 event. Some trainees may not have utilised these, or only checked them
269 infrequently, once working in practice. On reflection personal email addresses should
270 have been collected. This would be an important point to consider for future cohorts
271 to improve data collection. These poor response rates may make generalisation of
272 results somewhat unreliable.

273 In the 6-month questionnaire (n=24) the majority (>85%) still strongly agreed or
274 agreed Evening On-Call had helped them, even after working in practice for 6

275 months. Although there was a shift in trend from strongly agreed to agreed, this
276 should be interpreted cautiously because of the low response rate. Additionally,
277 anonymity (which was intended to improve the response rate) had resulted in data
278 that were not paired. As such, it is impossible to determine if individual perceptions
279 had changed over 6 months and this limited professional sub-analysis.

280

281 **Further Research/ Proposed changes to practice**

282 The participants' comments highlighted suggestions for improvements. Some of
283 these could be easy to achieve, such as clearer information pre-intervention. Others
284 would be more difficult and would necessitate changing the current format and
285 increasing capacity, such as more real-life patients, longer sessions and follow-up
286 sessions. These suggestions are worth consideration given that they were echoed
287 throughout all three professions and may be something all three educational bodies
288 involved (University of Glasgow, West of Scotland College and NES) may need or
289 want to consider. Further research should be completed to evaluate any adaptations.

290 The provision of additional events should be considered because participant
291 responses were overwhelmingly positive. Better explanation of how the sessions
292 would work (as pre-information) should be a priority for improvement and increasing
293 the accessibility and the scale of this intervention should be encouraged, based on
294 these results of this study.

295 The barriers around further work in this area will be mainly resource related – this
296 would include senior clinical staff to monitor and provide feedback, live actors and
297 simulation wards. As such this type of IPL simulation should be considered to be

298 incorporated with adequate funding into the initial education of healthcare
299 professionals.

300

301 **CONCLUSION**

302 In this study, the questionnaires have provided valuable feedback on inter-
303 professional education based on participants' views from the three professional
304 groups. Feedback on the IPL educational intervention was overwhelmingly positive
305 from all three professions both immediately after the IPL intervention and six months
306 later when in practice (although these were generally less positive than immediate
307 responses - but still reinforced that the IPE had been useful despite all participants
308 now working in practice). There is some evidence of sustained self-reported
309 effectiveness in teaching certain professional and clinical skills to participants using
310 this type of simulated intervention. More research is needed to confirm this
311 hypothesis.

312 Comments received have provided ideas for development and expansion of Evening
313 On-Call to extend the students' exposure to inter-professional education by
314 increasing capacity, by introducing more real-life patients and having longer
315 repeated programmes of IPE events with robust follow-up sessions.

316 This simulated IPL intervention was well received, and while further evaluation is
317 required to determine its full value, the COVID-19 pandemic has meant that there
318 has never been a greater time to invest in simulated education to improve access to
319 experiential learning in a safe environment.

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434 **Table 1: Demographic breakdown of participants and response rate to both the immediate**
435 **and 6-month questionnaires**

Professional Group	Immediate Questionnaire n = 118		6-month Questionnaire n = 24	
	No. of participants	% of Participants	No. of participants	% of Participants
Medicine	38	32.2	6	25.0
Nursing	44	37.3	11	45.8
Total pharmacy	36	30.5	7	29.2
Community pharmacy	18	15.3	4	16.7
Hospital/modular* pharmacy	18	15.3	3	12.5
Age				
20 – 29	106	89.8	22	91.7
30 – 39	8	6.8	2	8.3
40 – 49	2	1.7	0	0
Gender				
Male	29	24.6	6	25

Female

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436 * Modular pharmacy consists of at least 4 weeks placement in hospital pharmacy, combined
 437 with pre-registration experience in another sector of pharmacy, usually community

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446 **Table 2:** Response to questions – immediate questionnaire and 6-month questionnaire (shaded)

Discipline	Immediate Strongly agree n (%)	6-month Strongly agree n (%)	Immediate Agree n (%)	6-month Agree n (%)	Immediate Neither agree nor disagree n (%)	6-month Neither agree nor disagree	Immediate Disagree n (%)	6-month Disagree n (%)
How will/did the IPL educational intervention help you when you register to practice:								
To work more effectively with other healthcare professionals ^p								
Medicine*	22 (56.4)	0	13 (33.3)	5 (83.3)	0	1 (16.7)	0	0
Nursing**	24 (53.3)	5 (45.5)	14 (31.1)	4 (36.4)	1 (2.2)	2 (18.2)	0	0
Pharmacy***	23 (65.7)	4 (57.1)	10 (28.6)	3 (42.9)	2 (5.7)	0	0	0
To communicate more effectively ^p								
Medicine*	23 (59.0)	1 (16.7)	12 (30.8)	4 (66.7)	0	1 (16.7)	0	0
Nursing**	25 (55.6)	8 (72.7)	13 (28.9)	2 (18.2)	1 (2.2)	1 (9.1)	0	0
Pharmacy***	21 (60.0)	3 (42.9)	12 (34.3)	4 (57.1)	2 (5.7)	0	0	0
To effectively assess deteriorating patients ^c								
Medicine*	24 (61.5)	1 (16.7)	8 (20.5)	5 (83.3)	0	0	0	0
Nursing**	25 (55.6)	5 (45.5)	13 (28.9)	4 (36.4)	1 (2.2)	2 (18.2)	0	0
Pharmacy***	12 (34.3)	2 (28.6)	17 (48.6)	4 (57.1)	5 (14.3)	1 (14.3)	1 (2.9)	0
To effectively prioritise my workload ^p								
Medicine*	28 (71.8)	2 (33.3)	7 (17.9)	4 (66.7)	3 (7.7)	0	0	0
Nursing**	25 (55.6)	4 (36.4)	13 (28.9)	5 (45.5)	1 (2.2)	2 (18.2)	0	0
Pharmacy***	25 (71.4)	4 (57.1)	10 (28.6)	3 (42.9)	0	0	0	0
To effectively manage my time ^p								
Medicine*	23 (59.0)	0	11 (28.2)	5 (83.3)	1 (2.6)	1 (16.7)	0	0

Nursing**	24 (53.3)	5 (45.5)	14 (31.2)	3 (27.3)	1 (2.2)	4 (36.4)	0	0
Pharmacy***	24 (68.6)	5 (71.4)	10 (28.6)	2 (28.6)	1 (2.9)	0	0	0
To make clinical decisions more effectively^c								
Medicine*	21 (53.8)	1 (16.7)	13 (33.3)	3 (50.0)	1 (2.6)	2 (33.3)	0	0
Nursing**	23 (51.1)	5 (45.5)	14 (31.1)	5 (45.5)	2 (4.4)	1 (9.1)	0	0
Pharmacy***	22 (62.9)	2 (28.6)	12 (34.3)	4 (57.1)	1 (2.8)	1 (14.3)	0	0
To effectively identify my personal limitations^p								
Medicine*	26 (66.7)	2 (33.3)	9 (23.1)	3 (50.0)	0	1 (16.7)	0	0
Nursing**	22 (48.9)	7 (63.6)	15 (33.3)	2 (18.2)	2 (4.4)	1 (9.1)	0	1 (9.1)
Pharmacy***	22 (62.9)	5 (71.4)	10 (18.6)	2 (28.6)	3 (8.6)	0	0	0
To effectively escalate care to a higher level^c								
Medicine*	25 (64.1)	1 (16.7)	10 (25.6)	4 (66.7)	0	1 (16.7)	0	0
Nursing**	23 (51.1)	6 (54.5)	16 (35.6)	3 (27.3)	0	2 (18.2)	0	0
Pharmacy***	14 (41.2)	2 (28.6)	13 (38.2)	3 (42.9)	7 (20.6)	2 (28.6)	0	0
To be more confident professionally^p								
Medicine*	19 (48.7)	0	15 (38.5)	5 (83.3)	0	1 (16.7)	0	0
Nursing**	23 (51.1)	4 (36.4)	14 (31.1)	4 (36.4)	2 (4.4)	3 (27.3)	0	0
Pharmacy***	21 (60.0)	4 (57.1)	12 (34.3)	3 (42.9)	2 (5.7)	0	0	0
To be more effective in prescription writing / prescription checking and dispensing / drug administration^t								
Medicine*	20 (51.3)	0	12 (30.8)	3 (50.0)	3 (7.7)	3 (50.0)	0	0
Nursing**	20 (44.4)	4 (36.4)	18 (40.0)	3 (27.3)	1 (2.2)	4 (36.4)	0	0
Pharmacy***	19 (54.3)	4 (57.1)	14 (40.0)	3 (42.9)	2 (5.7)	0	0	0
To effectively complete any documentation associated with patient care^t								
Medicine*	15 (38.5)	0	15 (38.5)	4 (66.7)	4 (10.3)	2 (33.3)	0	0
Nursing**	22 (48.9)	4 (36.4)	14 (31.1)	3 (27.1)	3 (6.7)	4 (36.4)	0	0
Pharmacy***	13 (37.1)	2 (28.6)	19 (54.3)	4 (57.1)	3 (8.6)	1 (14.3)	0	0

447 Missing data *n=4, ** n=6, *** n=1

448 ^p professional skills, ^c clinical skills, ^t technical skills

449 No participant chose strongly disagree as an option

450 **Table 3** Thematic analysis of open questions in immediate questionnaire to amend
451 and improve the programme for future cohorts

Nursing	Medical	Pharmacy
<ul style="list-style-type: none"> <i>Better briefing before simulation would be beneficial – goals of the session were unclear</i> <i>More time during the experience would be useful</i> <i>More opportunities in earlier years of training</i> 	<ul style="list-style-type: none"> <i>More sessions/multiple sessions would be useful to allow demonstration of improvement</i> <i>More preliminary information on what to expect would be helpful</i> 	<ul style="list-style-type: none"> <i>A longer simulation time would be useful</i> <i>An extended briefing may be useful especially for community pharmacists</i>

<i>would be beneficial</i>		
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