Taking a closer look at Undergraduate acute care interprofessional simulations: Lessons learnt

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Abstract

Interprofessional undergraduate/pre-registration simulations (UIPSims) are growing in popularity but remain under researched and without pedagogic instruction. We report on an evaluation of final year healthcare student UIPSims, focussed on safe practice using a mixed methods study. The evaluation combines traditional methods with direct observations of students. Students completed a pre and post-course questionnaire with scored and free text questions and in addition an ethnographer observed the UIPSims supported with video recordings. Final year students participated (medical, nursing, operating department practitioner, pharmacy; n=230). The scored questions were significant ($P<0.01$) with student comments confirming the value of the learning. The observations identified strengths and weaknesses. The students were professional and patient-centred, but were unable to function as a team, communicate effectively for shared decision making or recognise and highlight patient safety concerns. The facilitators mainly guided rather than facilitated proceedings. Despite having completed a theme of interprofessional education (IPE) designed to develop team working abilities, final year healthcare students were unable to function as a student team in order to apply theory to practice. The findings highlight how an interprofessional simulation at the

end of an undergraduate curriculum offers a litmus test on student readiness for teamworking. The findings support an IPE curriculum with a set of theoretical principles aligned to a set of team working skills in readiness for participating in an UIPSims. In addition, facilitators should be trained on the principles for IPE as well as on best practice for simulations. Briefing is vital, enabling students to come together to form a team and find their collective voice. Observational research offers a powerful evaluation tool illuminating what is happening in these teaching situations. More research on the constituent components of UIPSims is required.

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Introduction

Interprofessional education (IPE) is now an accepted teaching method to advance team working capabilities strongly associated with improving patient safety (WHO 2010; Frenk et al., 2010; Manser, 2009; Jones & Jones, 2011; Hamdy, 2018). Simulation is a natural place for interprofessional learning (IPL) because it offers the opportunity for students from different professions to combine their uniprofessional competence to safely resolve patient problems (Buckley et al., 2012; Palaganas, Epps & Raemer, 2014; Anderson, Gray & Kim 2016; Health Education England, 2016). Despite the growth in undergraduate/pre-registration interprofessional simulations (UIPsims)* there is little directive research to highlight the differences between uni- and interprofessional undergraduate simulations.

Uniprofessional opportunities for students to rehearse clinical episodes are becoming more commonplace with the development of University and hospital-based simulation training centres (Scalese, Obeso & Issenberg, 2008). Simulations may include specially designed simulation wards, clinics or homes where the patient is represented by either a low or high-fidelity manikin, or standardised actor (Barrows, 1993). They also include virtual, computer and procedural models and in-situ simulations in clinical environments (LeRoy, Youngblood, Harter & Dev, 2008). Simulation-based training claims to build

* Throughout this paper the term undergraduate will be used for first level training which results in enrolment onto professional registers of practice. We recognise that for some cohorts of professional students the correct term is pre-registration training as some are already graduates.

competence in knowledge, skills and behaviour in a stress-free environment where patients cannot be harmed (Cook et al., 2011; Salas, Paige & Rosen, 2013) and as a panacea for bringing about safe care (World Health Organisation, 2011; Heath Education England, 2016; Institute of Medicine, 2015). Despite a growing body of knowledge about the educational design of simulations (Issenberg, Mcgaghie, Petrusa, Gordon & Scalese, 2005; Khan, Tolhurst-Cleaver, White, Simpson, 2011), there are calls for greater pedagogical understandings (Motola et al., 2013; Dieckmann, Friis, Lippert & Østergaard, 2012). Currently far more simulations take place at the post-qualified stage of learning than at the undergraduate stage, and UIPSims remain under-researched and poorly articulated (Palaganas, Epps, Raemer, 2014; Zhang, Thompson & Miller, 2011).

UIPSims in preparation for acute care settings, mainly use simulated wards/units and focus on a clinical moment of collaborative practice (Buckley et al., 2012). These UIPSims bring several challenges.

The first is pedagogical design. In the acute setting clinical episodes are chosen, for example, a hospital admission. These require both profession-specific competence, for example, the clinical ability to complete an accurate medical history for building a diagnosis, and interprofessional competence. The interprofessional component includes listening and sharing information between practitioners, for example, a paramedic passing on information to a nurse using a communication tool such as SBAR (Situation, Background, Assessment , Recommendation) and interprofessional decision making (Liaw et al., 2014; King et al, 2016; Salas, Shuffler, Thayer, Bedwell, Lazzaea, 2015; Meurling, Hedmasn, Fellander-Tsai & Wallin , 2013). Students must be clear about the

learning outcomes which may separate or combine, the clinical intervention - the 'team-task' with the collaborative work of the student team, the 'team-process' - or focus only on the team processes (Salas et al., 2015). Where team processes are assessed there should be clarity about how behaviour is tested; assessment tools are available such as the Interprofessional Team Observation Feedback Tool (iTOFT), which articulates the expected behaviours (Thistlethwaite et al., 2016).

The second challenge is a range of sensitivities which Interprofessional Learning brings to the management of diverse student groups. Existing UIPSims offer few recommendations on how to design these interactions ethically. Consideration must be given to factors such as the authenticity of the chosen situation, the student clinical level of training and competence in and awareness of the discourses used by different professions (D'Eon, 2005; Smith et al., 2015). The large numbers of students that result from combining different professional undergraduate schools has led to many students becoming observers rather than participants, which defeats the object of the UIPSims (Buckley *et al*., 2012; Nyström, Edelbring, Hult & Dahlgren, 2016a).

Finally, some students, such as therapists and pharmacy students, are less likely to have access to these acute clinical simulation settings when compared to nurses and medical students. As a result, these students are less comfortable in the simulated environment and less prepared to engage in the learning.

To date, comprehensive reviews and early education 'guides' on simulation as a teaching method have placed emphasis on the importance of feedback and agreement

on the need for repetition. However, the challenges discussed above indicate the need for more research on instructional design and pedagogical understandings for UIPSims (Issenberg et al., 2005; Motola et al 2013 Khan et al., 2011; Ahn et al., 2015; Nyström, Dahlberg, Hult, Dahlgren, 2016b; Diekmann, Friis, Lippert & Østergaard, 2012).

Placing Interprofessional Simulations into Undergraduate Curricula

In one region in the UK, three universities, agreed a set of aims and learning outcomes for achieving collaborative competence in the undergraduate professional curricula for professional courses (Table 1). Interactive learning events were designed beginning with classroom workshops (Strand One, early training), focused on team working theory and progressing to later experiences (Strands Two and Three, mid to late training), when learning takes place in clinical teams (Anderson, Smith & Hammick, 2015). Strand Three, for students towards the end of their training included learning on patient safety, relating to communication, leadership, raising concerns, team working and situational awareness (Anderson, Thorpe, Heney & Petersen, 2009). The expansion of our local simulation suites enabled students to complete this learning as a UIPSim. This paper reports on the evaluation of the UIPSims completed by students at the end of their training. The findings were intended to feed back into the IPE curriculum theme to illuminate whether students were ready for interprofessional collaborative practice and also to highlight how to better prepare and support students in an interprofessional simulation.

INSERT TABLE 1 HERE

Methodology

The mixed methods evaluation study sought to combine traditional evaluation (questionnaires) with direct observations supported by video recordings; to combine quantitative with qualitative research methods. The strength of this theoretical approach was the synthesis of different methods to produce convergent findings; this was felt to be more likely to generate new understandings (Lingard, Albert & Levinson, 2008). The felt experience of the students was investigated using the qualitative components in preference to rating scales which are more simplistic and may be subject to misinterpretation. Student behaviour was investigated using naturalistic observations, a branch of ethnography, rarely used in education, which enables a researcher to "gather live data from real situations" (Cohen, Manion and Morrison, 2005.

Data Collection

A pre and post-course questionnaire was designed in which students self-rated against the learning outcomes using a 5 point Likert scale, ranging from 1 'little learning', to 5 'a great deal'. Students also evaluated the learning using free text comments.

Observations were conducted by an independent researcher with experience of ethnography (SB), supported by video recordings. The semi-structured observation consisted of observing in real time and recording field notes. The notes were mainly quick jottings including descriptors of behaviours and some conversations as noted with speech marks (Lincoln & Guba 1985). The observation focussed on the process of teamworking and patient safety. The researcher was non-interventionist and practised

reflexivity throughout the observation, mindful and self-aware to ensure accurate judgments were made about what was observed.

The setting for the observation was a simulation centre which had been modelled on a modern ward, consisting of 4 bay areas, each with 4 beds. For the completion of these UIPSims, students were assigned to small interprofessional groups which rotated around the 4 ward bays. In each bay one situation was staged; students either watched, seated away from the activity as observers, or stepped up to be participants. Every student was an active participant in at least one bay. The simulations in the four ward bays comprised, i) a patient admission, ii) a patient transfer to surgery, ii) a collapsed patient on the floor and iv) a patient requiring a written prescription. The independent researcher who was observing, discreetly stood in the corner of the simulation bay (ii) in which the patient required transfer to surgery as outlined in Table 2. In this simulation the role of the patient was fulfilled by a high-fidelity manikin with vocals supplied by a concealed technician.

INSERT Table 2 HERE

The bays were supported by trained facilitators who permanently worked in the simulation unit. They were mainly nurses, employed by the simulation centre and locally trained in simulation set-up, briefing and debriefing techniques. The facilitator introduced the simulation to the students in a briefing and led a post scenario student group debrief, allowing students to participate in problem-solving and consider new

strategies for moving forward. Each simulation lasted approximately 30 minutes with 10 minutes activity and 15 minutes debrief. Debriefing followed accepted models, allowing students time to relax, share immediate emotions and provide descriptions of what happened, including what went well and what could have been improved. The facilitator guided learning implications and involved participants and the observing students (Fanning & Gaga 2007). The facilitators' professional preparation had not included training on IPE. The facilitators had recently been introduced to the iTOFT (Individual Teamwork Observation and Feedback Tool) for feedback on collaborative behaviours. This was also shared with the researcher observer as a possible metric for observing student team processes and collaborative behaviours (Thistlethwaite et al., 2016). The researcher also used the iTOFT tool as a reference because it had expected interprofessional team working behaviours. These researchers focus was however on what was taking place as the simulation unfolded.

The sample comprised final year medical students and nurses allocated from acute care clinical placements, second year operating department practitioners (ODPs), also on placements, and final year pre-registration pharmacy students directed to the activity as they had few clinical components to their course. All the students came together for a pre-simulation workshop on patient safety in which they worked in small (n=4-9) interprofessional groups. They remained in these groups for the UIPSims. Students were asked to consent to the research during the morning teaching. They were informed about the one rotation when they would be observed by an ethnographer and video recorded.

Data Analysis

The quantitative data were analysed using SPSS (version 24). The students' free text comments and the researchers observation field notes were analysed using thematic analysis (Braun & Clarke, 2006). These data were evaluated following Braun and Clarke's principles, looking for "patterned response or meaning within the data set" (p 82) against the interprofessional behaviours expected, including interprofessional communication, teamworking including leadership, situational awareness, shared decision making and speaking up. The written student comments were read separately by the two researchers (ES and SB) and then together to agree the main code themes and sub-themes. The video recordings were also observed separately and then together and were compared to the researchers observational notes to agree common meaning and to confirm the identified themes and to highlight additional elements (Merton, 1975).

Ethical permission was granted for this study through the relevant universities' processes (Ethical Application Ref: esa1-f2b1, 2014).

A research steering group was established consisting of clinical representatives from the local NHS acute care, NHS simulation facilitators and undergraduate teaching leads, academic representatives from the nursing, pharmacy, ODP and the Medical School and the ethnographer.

Results

A total of 277 students attended 7 workshops. However, one UIPSims could not take place leaving 230 who attended a workshop and went on to complete the simulations. Due to some technical issues video-taped recordings of only one set of student cycles were made available. Medical students (n= 119) attended every session, the remaining students comprises several ODPs (n= 17), pharmacy students (n=72) and nursing students (n= 22). When nursing students were missing members of the clinical skills qualified nursing team took their place (Table 3).

INSERT TABLE 3 HERE

Of the evaluation data, 193 out of 230 questionnaires (84%) were complete, with matched pre- and post- sections present. Self-assessment using the 5 point Likert Scale indicated that all students increased their learning against the course learning outcomes. The only exception was the ODP students who felt that they had not progressed their understanding of situational awareness; a dominant aspect of their training. Pharmacy students felt less confident on their ability to speak out following the simulation (Table 4).

INSERT TABLE 4 HERE

The qualitative data confirmed the popularity of the simulations for learning. All the comments were positive and highlighted the value of learning together with students from all the professional groups. Themes included the importance of learning in a real clinical setting; "*Great insight on how potential hospital ward situations could be handled*"

(pharmacy student). The relaxed friendly and fun learning environment helped them work together; "*Really fun and interactive…they each made a point in an enjoyable way*", (pharmacy student). Students appreciated the importance of learning about human factors and the part they play in patient safety; "*To think about the importance of patient safety, safe checks and handover information*", (nursing student); "*The simulations were good and highlighted important safety issues*", (ODP student). Team working and how people interact was a prominent theme; "...*interesting to learn about the other roles of the MDT and how to communicate and work best together*" (nursing student); while others spoke of about becoming more self-aware concerning human factors and patient safety*; "*Being put under pressure in the simulation" (medical student). The feedback was highly valued, "Great simulation session and really informative good feedback", (nursing students); "*Good discussion thank-you*", (medical student); "…*very enjoyable - insightful, thank-you*", (ODP student).

Observation Findings

The observer also identified that overall the students had enjoyed the simulation.

Regarding the conduct of the simulation and the learning environment, the observer noted that on several occasions the student teams were large (n=9). This impacted on the clinical space for the simulation. In addition, the numbers of students and variations in professional mix sometimes made it difficult to allocate students to balanced interprofessional teams. On some occasions there were too few or too many students. Concerning the set-up, the behaviour of some students indicated they had little prior knowledge of the technical

capacities of the high-fidelity manikins. Lacking this knowledge, students were sometimes left wondering what the SIMM-Man would and would not 'tell' them. The field notes stated on one occasion: "The nurse-facilitator did not explain to the students how the simulator operated, or what its capabilities were. Without this foreknowledge students may miss cues or make false assumptions". There were some situations where authenticity was challenging; for example, the manikin was unable to simulate skin colour changes with administration of oxygen. Most students seemed able to accurately interpret the various signals and read-outs produced by the bedside monitors.

Few of the participating student teams took notes during the patient handover process (the briefing by the facilitator). This meant that much of the information imparted by the facilitator during the briefing was lost. Few students took the name and contact details of the nurse, precluding follow-up. For the larger groups there was little time to ask questions and for all participants and observers to be involved. The 30-minute rotation of the simulations meant there was limited time for reflection meaning student teams generally failed to draw on differences between professional roles.

Concerning the process of the simulation and how students responded to the task:

- **Teamwork and leadership**: Students had been allocated into Teams which then formed in a haphazard fashion, with a leader emerging, rather than being chosen on merit. Few teams took time to decide who should perform which role in the team. Most students seemed unfamiliar with the team-formation protocol 'forming, storming and norming (Tuckman, 1977). Leadership and followership was

haphazard; sometimes the leader became so dominant that other team members were marginalised, occasionally to the point where they contributed little.

- **Interprofessional Communication**: Students generally tried to keep the patient informed and calm; their approach was patient-centred and professional. The students seemed unable to structure their own communication. Intra-team communication tended to be erratic, with prime-movers sometimes not vocalising their reasoning, actions and conclusions. Participants seemed unaware of the use of structured communication tools such as SBAR.

- **Situational awareness:** This was generally poor throughout. Team members often just focused on a single issue (coning of attention). Coning meant that important symptoms and indicators were frequently overlooked. However, Team members rarely panicked, and most behaviours were measured. Most students remained calm throughout.

- **Shared decision making:** More accurate diagnoses could have been made had students been more willing to listen to patients' pronouncements and share their insights. Consider the case (Mr Wall - Figure 1) a patient waiting for surgery to his left arm. The paperwork identified his right arm as requiring surgery. Despite frequent and loud exclamations from the patient, no team identified the paperwork error before administering morphine. Loud exclamations from Mr Wall included: "*I fell on my left*"; "*The pain is on the left*"; "*I need painkillers, please*". Mr Wall also screamed (loudly) whenever a student held his left arm. Doses of morphine ranged from 2.5-5.0 mg.

- **Speaking up and empowerment:** Most student-participants were observed to believe everything they were told and everything that was written (in, for example, patient records). Few practiced methodical scepticism. During the end-of-simulation debrief, the observer thought it advisable to remind students that they should action the ABC safety mantra - **A**ssume nothing, **B**elieve nobody, **C**heck everything. Initially, there appeared to be high levels of trust in systems, especially patient records and those performing handovers. The inability of students to vocalise throughout the simulation undermined team situation awareness and compromised distributed cognition. Throughout the level of 'read-back' (where the recipient of an instruction vocalises it, thereby allowing the giver of the instruction to verify that there has been no misunderstanding) was inadequate.

Analysis of the four cycles of videoed simulations offered further examples of important interactions (verbal and physical), providing a useful supplement to first-hand, real-time observations. The video revealed the power of the facilitator unintentionally to pre-configure the simulations through the pre-allocation of roles. During these cycles the facilitator often took control so that the team roles were not decided by the students; rather, they were decided by the facilitator. Because of the facilitator's scripting of roles, the videoed sessions did not test the students' knowledge of, and ability to apply, team-work theory. The simulations that were videoed were rehearsals for the delivery of a particular therapy (for example, the alleviation of acute pain). The team leaders - always medical students - were most involved and active. The pharmacists were least involved and generally passive. Nevertheless, pharmacy students' situation awareness seemed

reasonably good. They were usually 'in the loop'. The facilitator seemed eager throughout to interject when students floundered.

Outcomes and Discussion

Undergraduate/pre-registration simulations are growing and becoming a preferred teaching method to rehearse profession-specific competence in preparation for practice (Rogers, McConnell, Jones de Rooy & Lombard, 2014). The growth in simulation centres provides the opportunity to build capacity for large scale IPE simulations involving the right combination of students , at the right time of their training to practise the combination of 'task' profession-specific work and 'process' team working (Salas et al., 2015). Our ability to run the UIPSims was only possible because our local teaching facilities had introduced a new simulation centre. It makes sense that all final year students should practise interprofessionally in order to experience completing care in a real setting. Given that few education providers have been able to replicate the training wards established in Sweden, UIPSims become the attractive option (Wilhelmsson et al., 2009). Our UIPSims, placed at the end of training, were perceived by the IPE curriculum team to be a positive additional learning experience and an important way to test prior learning from the curriculum interprofessional theme (Liaw et al., 2014; Lockeman et al., 2017; Anderson, Smith & Hammick, 2015).

The evaluation methods used in this study, especially the addition of observation, revealed a plethora of concerns that need to be addressed. One benefit of the observation was the

opportunity to consider the context and process factors during the simulation. We now share these with educators with a view to developing a more informed theoretical and pedagogical framework for such learning. Our findings shine a light on student weaknesses and the need to reconsider how IPE curricula are framed and how UIPSims can be effectively incorporated.

The students were representatives of final year medical, pharmacy, ODP and nursing students and had all completed early theoretical and later practice learning on teamworking (IPE curriculum theme). When faced with a straightforward transfer of a patient to theatre, they could not, in this UIPSim: i) form a team, because they deferred to the facilitator; ii) conduct a safe handover of information using communication tools such as SBAR; iii) identify and raise patient safety concerns and ask for the care episode to stop; iv) bring themselves to question authority and written records. In general, they behaved submissively and had poor situational awareness. On the positive side, they could manage the patients in a professional manner and perform clinical procedures. We can now see that the prior work of the interprofessional curriculum, had not fully prepared these students, who will work together in acute hospitals (nurses, ODPs medical and pharmacy students), for their transition to qualified collaborative practice.

Armed with these insights, and reflecting on our practice, we advocate that students should not come together for UIPSims until they have been given the knowledge, skills and behaviours appropriate to the 'craft' of teamworking and have spent time in simulation units both uniprofessionally and interprofessionally so they are confident and familiar with

the environment. The level of complexity of these UIPSims should increase year-on-year towards the management of complete clinical episodes of care. They need to be prepared so that they are receptive to the idea of collaborative labour and they need to have been given feedback on their developing competence. The ingredients we need to transfer to performance and which appeared to be missing were how to;

i) introduce themselves and share their level of experience

ii) state their competence and be reflexive

iii) structure communication using communication tools such as SBAR, use read back and safely handover information across the professions

iv) engage in listening for the purpose of actively constructing meaning

v) be inquisitive and confident to speak up and challenge

vi) order or prioritise and sort information (sense-making)

vii) understand the concept of team formation (forming, storming, norming, performing etc., Tuckman 1997)

viii) know the roles and responsibilities of team members so that they can direct tasks appropriately

Much of this content has its roots in teamwork learning relating to human factors (Weaver et al., 2010; Manser, 2009; Waterson & Catchpole, 2015). The findings lend themselves to a curriculum framework with theory as before but more practice (see appendix our suggested curriculum framework). Additional learning on human factors is strongly linked to IPE

(Anderson, Gray & Kim, 2016). It may be irrelevant whether the above pieces are taught interprofessionally or uniprofessionally, but essentially these aspects must be understood an demonstrated by the individual student before coming into a clinical team situation to demonstrate team 'task' and 'process' issues. This aligns with research evidence that failures in patient safety are associated with poor teamwork and human behaviour in groups (Weaver et al., 2010). We argue that such skill sets should be attained towards the end of undergraduate training when profession-specific competence is also more fully developed.

These findings pose questions for curriculum planners because it could be argued that leaving such UIPSims to later in a curriculum leaves little time for students to improve. Students should possibly be ready for such complex simulations in their penultimate year of training, taking the final steps to direct assistantships within clinical contexts. Adequate space and time for the theory of team working and human factors must come in the early years aligned to regular short practical sessions. These practice sessions could be short simulations to practise some of the respective constituents of the final coproduction of interprofessional working, for example, communication techniques. We were mindful that some of our students were less familiar with ward set up simulations, for example the pharmacy students, who had only prior experience of simulated pharmacy dispensing practice. All training health and social care students require access to practical environments although not necessarily highly fidelity simulation centres.

The role played by the facilitator of UIPSims is critical. Well-intentioned facilitators were observed leading and directing students, behaving as instructors rather than facilitators. In our opinion, this prevented students from finding their own level and indeed their 'own voice', or a 'collective voice', in the required space. The student participants were unable to work things out for themselves and for the team. The facilitators, senior clinical nurses, required more detailed instruction relating to the need to remain outside of the simulation activity as observers of both the collaborative and task elements of the simulation (Nyström, Edelbring, Hult & Dahlgren, 2016a). The facilitator role has three phases; i) the briefing to provide information and set up; ii) the actual simulation, where students should be left to enact the situation; and iii) the debriefing. In general, there has been a great deal of research on de-briefing follwing simulations and we argue that the emphasis in UIPSims must move towards briefing (Figure 1). Faculty must put as much effort and resource into briefing set up and simulation processes (the pedagogic journey) as it does into de-briefing. Contrary to what happened in this event, facilitators should replicate what happens in practice, handing over patients' information in a quiet place, away from the patient, leaving students time to prepare for their task and form a team with allocated roles. More emphasis is needed on understanding the sensitivity and professional differences present in interprofessional facilitation (Reeves, et al., 2016; Reeves, Lewin, Espin & Zwarenstein, 2010). IPE curriculum design must ensure that learning is authentic for the different student participants, that students' competence is matched and that the different professional discourses are accommodated (D'Eon, 2005; Smith et al., 2015).

INSERT Figure 1 HERE

The study has several limitations. The role of the researcher observer, who remained reflexive throughout, may have been constrained by the size of the student groups (making some of the observations difficult), the limited time for the observations and the lack of video recordings due to technical problems. Some aspects of the simulation were less authentic (for example, the giving of oxygen was simulated). The sample was compromised by the lack of nursing students on several occasions; this was a chance factor because students were not released for this learning from some wards; this has been rectified. Data collection was further set back by the impossibility of using the iTOFT tool in such a short and busy clinical episode; it was not feasible to score three students performing at the same time. This tool, however, could provide formative feedback during preparation for a simulation session. Finally, it is recognised that the evaluation data are based on self-perception scales rather than validated measures and that statistical analysis was compromised by student numbers.

Conclusions

This study asks questions about the instructional design for interprofessional educators wishing to set up UIPSims. Placed in the final year of study, UIPSims can test students' learning at the end of the IPE learning trajectory where there has been a coherent learning pathway from early theory to IPL in practice (Anderson, Smith & Hammick, 2015). Patient safety should be integrated into the interprofessional curriculum and be supported through content within UIPSims. Both profession specific learning and process elements of teamworking should be integral to the UIPSims instructional design. This allows for students to practise both their profession-specific work (their role or

scope of practice) and team processes for safe patient-centred collaborative care. As well as profession-specific competence, team processes should be rehearsed. These include learning how to form a team, how to delegate tasks, how to constantly inform each other and reflect together on progress and on what it means to 'speak up' and raise patient safety concerns within an open and trusted team culture. We would advocate for uni professional before interprofessional preparation, especially where large cohorts prevent all students accessing the practical experiences. Students who have less access to simulation units can practise for these human interactions in classrooms but must be brought into simulations wards/suits to be made to feel comfortable and relaxed prior to any UIPSims.

Facilitators must be given more time for the set up and briefing before the student team enters the UIPSims. Students must be given space to prepare, read notes, think together and form a team before entering any clinical space where there is a real or simulated patient (actor or manikin). Those who facilitate UIPSims must be fully immersed in the andragogy of IPE so that they understand the sensitivities and differences that students bring and should set up the space for them to work together creatively. During the simulation facilitators must let the interprofessional student team find their own voice; and any supportive intervention by facilitators should be invited and requested by the students, rather than imposed. Observations on team process should use a tested observation tool which has been clearly explained to the students before they start. Debriefing must follow the protocols for simulation now well tested and understood.

We advocate for more observational studies of UIPSims to further inform and advance pedagogic design.

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Table 1

Three Strand Model Aims for the Beginning Middle and End of Undergraduate Training

Strand One: Overarching Aims **Early phase of training**	**Strand Two: Overarching Aims** **Middle phase of training**	**Strand Three: Overarching Aims** **End phase of training**
• To explore what is meant by team working in health and social care • To begin to apply a theoretical understanding to team work • To become familiar with your chosen profession and others • To consider the outcomes of team working for promoting person-centred collaborative care.	• To apply the theoretical basis of team working • To gain a richer appreciation of roles and responsibilities of practitioners • To analyse effective collaborative team practice • To consider your future contribution to person-centred team working	• To provide context(s) for applying developing working competence to practice • To analyse and reflect on challenging real situations to consider solutions to improve team based care • To develop an understanding of how individual professional competencies complement those of other professions • To develop an understanding of team working in modern health and social care practice.

Table 2: The Observed Simulation

General Data		Observations	
Name	Henry Wall	**Respiratory Rate**	23 bpm
D.O.B	28/10/1946	**Chest**	Clear
Address	I Lower Street, LE21AA	**Oxygen Saturation**	92%
Gender	Male	**Heart Rate**	127
Hospital ID	S123456	**Blood Pressure**	96/55
Ward	Surgical	**Allergy Section**	NKDA
Prior Location	ED	**Cap Refill**	3 seconds
Prior Doctor	GP Mr Jam	**Temperature**	36.2
Family History	Nil of note	**BM**	6.0
Consultant	Mr Chisel	**Weight**	75kg

Background to The Scenario: The story
A 71 year old man on the Orthopaedic Surgical ward waiting theatre for repair fractured humerus and expected to follow the current emergency case in theatre. The anaesthetist telephones and asks the ward to give the patient a once over final check and deliver the patient to the theatre reception.

Past Medical History	
Medical	Social
N/A	N/A
Drugs from Home	Drugs started
No relevant drug history	None - but patient keeps stating the anaesthetist promised the junior doctor would give some pain relief before theatre.

Scenario Direction
Students: This scenario can involve a student ODP, nurse, a medical student a pharmacist. **Set up: Patient: High Fidelity Manikin** dressed in a patient gown, not marked but apparently ready for theatre and is complaining of pain (to the left shoulder if asked). Patient to cry out if any movement or touching to the affected area occurs. Bed, monitor, BP, SpO2, Sim Bay set up as Surgical ward. Bed side cabinet. If not effectively treated the patient can be placed to go into shock. **Patient Notes**: Theatre checklist, drug chart, consent form and blood form. Missing notes and X ray apparently with the anaesthetists at theatre reception.

Pre-brief: A 71 year old man awaiting theatre, being held in the Orthopaedic Surgical ward while awaiting previous emergency theatre case to finish. The anaesthetist telephones and asks the ward to give the patient a once over observation check and theatre check and deliver the patient to theatre reception.

Scenario: The patient to pressure the student to give pain relief. The patient has incorrect wrist band, and incorrect details on the consent form, blood form and theatre check list (the details in the documents all match but show the wrong site). Facilitator can end the simulation if pain relief has been given and the incorrect details are not noticed or noticed but not communicated between the team. The facilitator can question and encourage students to check paperwork and this situation discussed in the debrief. Once the mistake is noticed the scenario ends and the discussion begins.

Debrief: Students to assess capabilities relating to clinical management and team working. The facilitator to discuss Serious Untoward incidents – including wrong site surgery, incorrect patient identification, capacity and consent.

Figure 1: Instructional design for Interprofessional Facilitators role in Interprofessional Simulations

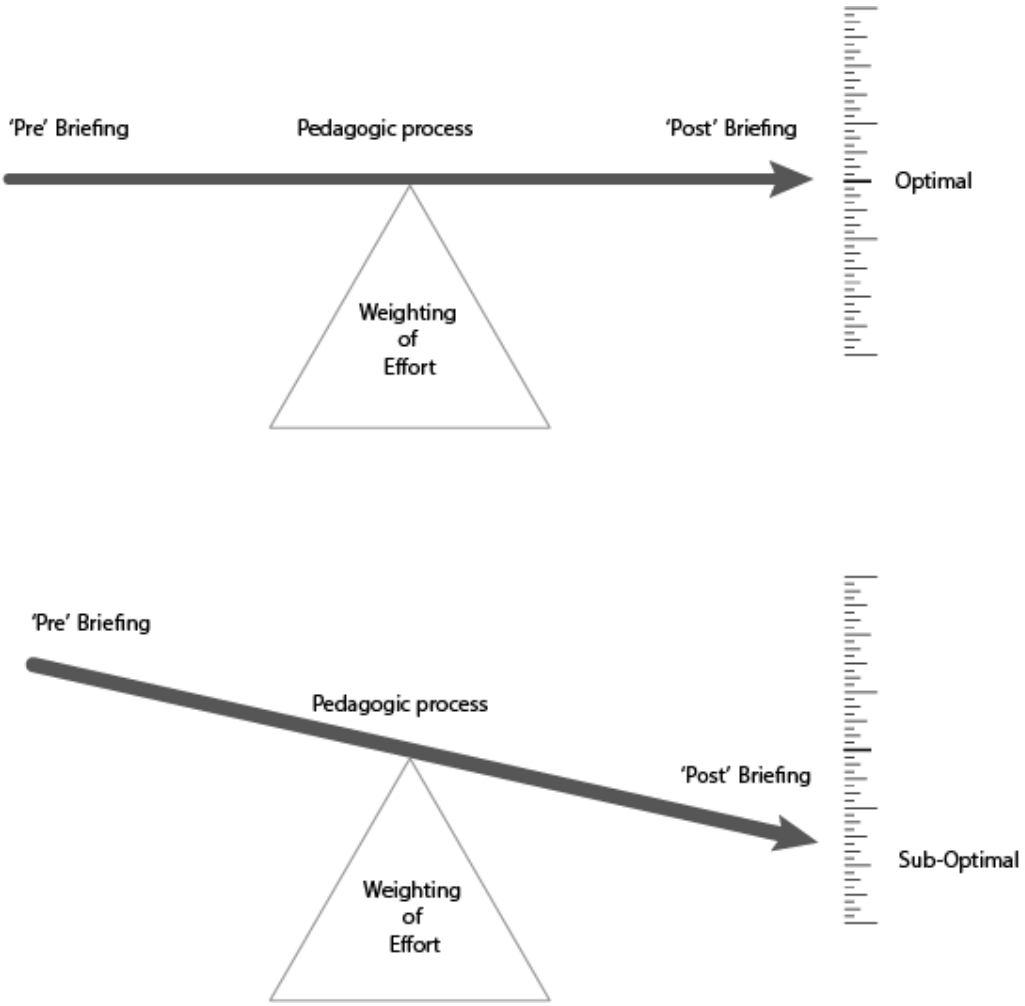

Table 3: Series of Simulations

Date of teaching	Total Number of students	Composition of student groups	Interprofessional simulations
24th June 2015	22	22 Medical *Nurses were expected but did not attend*	Yes Using qualified nurses from the simulation centre
23rd September 2015	37	20 Medical 17 ODP* *Nurses were expected but did not attend*	Yes Using qualified nurses from the simulation centre
11th November 2015	35	16 Medical 19 Pharmacy *Nurses were expected but did not attend*	Yes Using qualified nurses from the simulation centre
20th January 2016	56	19 Medical 37 Pharmacy *Nurses were expected but did not attend*	Yes Using qualified nurses from the simulation centre
23rd March 2016	32	25 Medical 7 Nurses	Yes
11th May 2016 *Excluded from the study*	47	21 Medical 26 ODP	No Only morning theory teaching because of staff sickness in the simulation centre.
14th September 2016	48	17 Medical 15 Nurses 16 Pharmacy	Yes
Total: 6 events	**277 (230 completed)**	**119 Medicine** **17 ODP** **22 Nursing** **72 Pharmacy**	**6 learning sets were IP with one uni professional.**

*ODP: Operating Department Practitioners

APPENDIX: Curriculum Theory Underpinning Skill Sets Pre - IPE Simulations (includes elements of human factors)

Skill Set	Learning Content with Theory Examples	Competence
A **Student can form a team**	• Team formation and structure) Tuckman (1965), Belbin, team roles (Belbin, 2012) • How relationships are formed (Relational coordination, Gittell 2002; Hierarchy and power, Kitto et al, 2011) • Team working dynamic and relevant theory (Social capital; Bourdieu, 1997) • Know how to introduce yourself and inquire about others - social skills • Understand modern roles and responsibilities of professionals and scope or practice • Respect for other professions • Person-centred care • Know how to assemble and bring together the right expertise for the specific patient need	**Knowledge:** Classroom teaching on theory Role play; lectures; blackboard e-resources. Practice settings **Shows and Shows How**: Simulations (or uni) which expect student to select the right team members and demonstrate the related aspects of forming norming and storming. Simple simulations where they learn how to introduce themselves to one another and interrogate colleagues for relevant information on skills, knowledge, experience and preferences etc
B **Handovers and exchange of information**	• Communication Techniques (Tools e.g. SBAR see WHO 2011; TEAM STEPPS) • Confident vocalising • Message sending, receiving and acknowledging (see WHO, 2011) • Clarity and understandings (jargon of terms across professions) • Active listening techniques • Writing skills and use of e-technology	**Knowledge**: Classroom teaching on theory Practising with simulated patients Use of web sites on patient experiences www.patientvoices.com Placement learning when observing professionals **Shows and Shows How**: Interprofessional (IPL) simulation sessions
C **Leadership and Followership**	• Theory and frameworks on leadership skill sets (NHS Leadership Framework 2014) • Theory and frameworks on leadership and followership process (Lee, 1993) • How to connect across systems and systems thinking (Waterson &Catchpole, 2015) • Collaborative leadership	**Knowledge**: Classroom teaching on theory Application in leading MDT's in role modelling **Shows and Shows How** : IPE simulations sessions, clinical ward assessments, leading a team meeting etc.
D **Recognising risk**	• Learn how to say stop - this is unsafe (See WHO 2011) • Raising concerns • Clinical governance and quality controls • Identifying positive cultures to overcome negative ones • Understanding bias • Identifying unsafe teams	**Knowledge:** Classroom theory Application within practice settings Attend Morbidity and Mortality meetings and case reviews **Shows and Shows How**: IPE simulations sessions, can be uni or IPE. Shows how to stop a clinical episode where things have gone wrong and or anticipates potential problems and errors. Reports and escalates error to senior team members.
E **Emotional maturity**	• Goleman (1998) the theory emotional intelligence • Capacity for empathy • Negotiation skills • Capacity for self-reflection, reflective practice and second order reflection (Wakerhausen, 2009) • Self-moderating • Techniques such as mindfulness • Listening skills	**Knowledge**: Classroom theory Simulations with actors to test emotional resilience and self-control Dealing with challenging behaviours **Shows and Shows How:** Simulation sessions on managing professional behaviour as observed in a simulation

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Resources

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APPENDIX: Career Calendar for Application of Theory

	Undergraduate Immersion	Foundation Year Becomes an expert	Specialist … CPD Shows mastery
A	Works towards applying theory by demonstrating an ability to form a team	Knows theory, roles and responsibilities of team members in given contexts, forms and supports team formation	Becomes a role model in forming an effective team
B	Demonstrates effective handover skills in face-to-face, phone calls, and using e-technology	Competent, timely and relevant exchange of information both uni professionally and interprofessionally	Becomes a role model in effectively handing over information
C	Is aware of the theory of leadership in a collaborative setting and can support and show abilities to direct others in a team	Works within a medical team and interprofessional teams to lead and follow as required	Leads a team and develops a culture of patient-centred interprofessional working values
D	Knows how to use local systems and report concerns to the relevant member of the patients team	Reports threats and errors and is able to intervene as required	Can perceive and identify risks making sure team members constantly check for patient safety issues
E	Has gained an ability to receive feedback and reflect on personal development needs	Understands own and is aware of others strengths and weaknesses	Has resilience, insight and can reflect from their own professional stance and that of other professionals

Table 4: Quantitative Analysis

Question	Mean pre Medical n=92	Mean post Medical n=92	P* value	Mean Pre ODP n=17	Mean Post ODP n=17	P value	Mean Pre Pharmacy n=69	Mean Post Pharmacy n=69	P value	Mean pre Nurse n=15	Mean post Nurse n=15	P value
My ability to evaluate **effective communication** for patient safety	3.37	4.1	-6.609 *P*= 0.000	3.5	4.17	-3.051 *p*=0.002	3.3	4.0	-4.923 *p*= 0.000	3.4	4.0	-2.646 *p*=0.008
My ability to evaluate the importance of **handover or transfer of patient data i**nformation	3.4	4.2	-6.728 *p*= 0.000	3.7	4.2	-2.46 *p*=0.014	3.2	4.0	-5.238 *p*= 0.000	3.3	3.9	-2.296 *p* =0.013
My ability to consider **situational awareness**	3.2	4.1	-7.305 *p* = 0.000	3.6	4.1	--1.727 *p*=0.084	3.4	4.1	-5.007 *p*= 0.000	3.0	4.7	-2.126 *p* =0.033
My **leadership** abilities	3.0	3.9	-6.537 *p*= 0.000	3.1	3.7	-3.207 *p*=0.001	3.1	4.1	-5.365 *p* = 0.000	3.2	4.1	*p*
My ability to assess the strengths and weakness of **colleagues in a team**	3.2	4.1	-6.441 *p*= 0.000	3.2	3.8	-2.658 *p*=008	3.3	4.1	*p*	3.1	3.9	-3.051 *p* =0.002
My ability to **speak out** and challenge	2.8	3.8	-6.769 *p*= 0.000	3.2	4.1	-2.506 *p*=0.012	5.0	4.0	-5.103 *p*= 0.000	3.2	4.07	-2.972 *p*=0.003
My ability to support **open team cultures**	2.9	4.0	-6.527 *p* = 0.000	3.2	3.9	-2.972 *p*=0.003	3.0	4.1	-6.007 *p*= 0.000	2.7	3.7	-3.217 *p*=0.001

*Non-parametric 2 tailed test: Wilcoxon Signed Ranks Test