

The effect of an interprofessional clinical simulation on medical students

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Background. Teamwork as an outcome for graduates implies the understanding and appreciation of the roles, responsibilities and skills of other professions. An interprofessional education (IPE) event was initiated as a simulated management of a multiply traumatised patient in the acute phases of his injury, relevant to both medical and nursing students. The objective was to explore medical students' reflections on the value of this clinical simulation.

Method. A mixed-methods study was done, using a convenience sample of 5th-year medical students ($N=96$). Participants wrote a multiple-choice question (MCQ) test and either actively participated in the simulation or observed the actions through a one-way mirror. The simulations were facilitated by experienced skills trainers. On completion, the participants repeated the MCQ test and took part in a facilitator-led debriefing. The latter was audiotaped and students could submit written reflections. Written comments and transcripts of the audiotapes were analysed thematically.

Results. Participants' average test scores improved significantly ($p<0.001$) from 63.5% before the simulation to 68.6% thereafter. Five themes emerged from the reflections: (i) difficulties with implementing knowledge and skills; (ii) importance of teamwork; (iii) skills necessary for teamwork; (iv) effect of being observed by peers; and (v) IPE in the curriculum.

Conclusions. Medical students gained clinical knowledge during the simulation and became aware of their lack of skills, knowledge, and opportunities to acquire and practise skills required for effective teamwork.

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Interprofessional education (IPE) emphasises interactive learning with and from members of other professions, aimed at improving patient care.^[1]

Interdependence in education and the understanding and appreciation of the roles, responsibilities and skills of other care workers are vital to strengthen health systems.^[2] It has been advocated that an interprofessional approach should be integrated in the education of health professionals^[1] to contribute to overcoming difficulties in communication and teamwork in care services, as well as helping to change attitudes and reduce stereotyping between professional groups.^[3] Despite increased recognition and a variety of initiatives, projects and events, and a sentiment that things are headed in the right direction,^[4] many healthcare professionals enter practice without sufficient training in the delivery of interprofessional care.^[2]

The learning outcomes extend across the range of relevant knowledge, skills and attitudes deemed necessary for confidence and capability in the practice of collaborative care.^[5] By participating in collaborative care activities, students are challenged to interpret what happened and construct meaning through their personal experience. This new construct of meaning is then incorporated into the student's existing knowledge.^[6]

The context for clinical education can be created in a simulation exercise with a safe, structured and supportive environment that links the lecture room and clinical practice.^[5] A simulation also seems to have a beneficial effect on the acquisition of technical skills, the development of higher cognitive skills such as clinical reasoning and decision making, analytical and communication skills, and on psychomotor and procedural skills.^[7]

As trauma resuscitations require a co-ordinated response from a diverse group of healthcare providers and form part of the curricula of a variety of professions, it was decided to create an IPE event that reflects the reality

of a traumatised patient during the acute phase of his injury. The focus of this one-time event was on short-term outcomes such as clinical skills, knowledge and attitudes required for shared management of a traumatised patient.

Aim

The aim of this study was to explore the effect of an interprofessional clinical simulation on medical students.

Method

A mixed-methods study was done on the effect of interprofessional clinical simulation on medical students at the Medunsa Campus Skills Centre of the University of Limpopo, 25 km north-west of Pretoria, South Africa.

The following tools were developed and reviewed by the medical and nursing lecturers from the Skills Centre: (i) a 20-item multiple choice question (MCQ) test related to trauma management, validated by five lecturers involved in clinical simulation; (ii) a scenario for the simulation of the management of a multiply traumatised patient; and (iii) a guidance and assessment tool, based on a theoretical and skills competency framework for students of both professions, to determine the outcomes, responses, and actions, and the required equipment. Ethical permission was obtained from the Medunsa Research and Ethics Committee.

The simulation comprised two acute phases:

The pre-hospital phase: A standardised patient (SP) portrayed a 25-year-old technician who had been working on the roof of the Skills Centre when his screwdriver fell and rolled away. He managed to grab the screwdriver but lost his balance and fell about 6 m from the roof. He sustained injuries to his chest and a stab wound to his right arm. Students were expected to provide emergency care and transport the patient to the emergency room.

The initial in-hospital phase: The SP was replaced by a high-fidelity simulator to simulate difficulty in breathing due to a pneumothorax as well as a deep stab wound to his right upper arm. Students had to provide initial emergency care as a team.

Sample

Attending the simulation was mandatory for 5th-year medical students ($N=120$). Those who were willing to participate in the study signed an informed consent form and became the convenience sample ($n=96$), i.e. the participants. Fourth-year nursing students ($N=39$) were also invited to join the exercise. Sixteen students consented, but withdrew from the study before participating in the simulation. Both student groups had already completed lectures on trauma in their respective curricula and had acquired psychomotor skills in the Skills Centre required to manage a traumatised patient.

Pre-simulation

Both student groups were orientated in class on what was expected of them in the simulation, using a video featuring the facilitators resuscitating the 'patient'. After signing consent forms the participating students wrote the MCQ test.

Simulation

As there were many students and only three afternoons available, the simulation was duplicated in concurrently running sessions. The students were divided into six groups of about 25 students. Three medical students and one nursing student from each group were invited to take part in the simulated resuscitations, while the rest observed, guided by a checklist, through one-way mirrors. The team was expected to manage the patient's airway and assess his breathing, oxygen saturation, blood pressure as well as levels of consciousness and pain. They had to administer oxygen, stabilise the cervical spine with head blocks, obtain a history, do a full secondary assessment to identify the simulated injuries, insert two intravenous lines, perform a needle decompression of the chest, suture the laceration on his arm, assess the distal pulses and motor function, pass a urinary catheter and insert a nasogastric tube. Students also had to provide information to and comfort the patient throughout. At this stage the nursing students withdrew from the study and were replaced by newly registered nurses. The simulations were facilitated by teams of experienced medical, nursing and paramedic skills trainers.

On completion of the simulation, the participants repeated the MCQ test and took part in a facilitator-led debriefing that was audiotaped. They also completed a post-simulation questionnaire on readiness for IPE and perceptions of their own and other professions. The findings and written comments on the post-simulation questionnaire will be reported in a separate paper. The comments and transcripts of the debriefing audiotapes were individually analysed by three researchers who reached consensus on five themes and used verbatim quotations to illustrate some of the respondents' views.

Results

The average percentages for the pre- and post-simulation MCQ tests were calculated and compared using the McNemar test.^[8] The mean score for the post-simulation test (68.6%) was significantly ($p<0.001$) higher than that for the pre-simulation test (63.5%). Qualitative content analysis was done on the optional written comments on post-simulation questionnaires and the audiotapes of the post-simulation debriefing. The four researchers

made summative notes of the verbal and non-verbal communications and their personal experiences. These notes were compared and discussed and the corresponding items of information were grouped together and organised in themes. The following five themes emerged:

Theme one: Implementation of knowledge and skills

Participants experienced difficulty in translating theory into practice during the simulation. Some factors contributing to erring, such as not noticing the patient's level of consciousness decreasing, may have been the added pressure of performance, time limitation due to the reality of dealing with a dying patient, lack of structure in their thought processes, and realising possible lack of long-term retention of studied material.

'It's tougher than you think, because someone is crashing there, the blood pressure is going down and you think you're losing the person and your mind slips.'

'My biggest challenge was remembering what needs to be done ... , everything just comes and comes. It was just "chakalaka" [spicy South African vegetable relish] and all mixed up.'

'I realised that in order for one to be perfect, one needs to practise, practise and practise. The theory is there, but application is confusing.'

'Overwhelming, you try to remember stuff that you learnt, but it was not coming.'

They also realised that their skills needed some practice and appreciated the opportunity to practise in a safe environment:

'Rather make mistakes on something that is not living than killing someone inadvertently in casualty. I would have made these mistakes and the patient would have died.'

Theme two: Importance of teamwork

Participants reported the following:

- a clearer understanding of the nurses' scope of practice:
'I did not realise that she [nurse] could suture the arm ... '
'They [nurses] are very capable of taking care of a patient, even more than I and have lots of advice to give and experience to share.'
- that teamwork provides a platform to share ideas, exchange information and learn from one another:
'... other professions are as important as mine and I must trust their judgement and be open minded to learn from them.'
- their understanding that a team doesn't function effectively if team members do not trust, appreciate and respect each other:
'I learned, as a member of the health team, we have to respect each other and not look down upon another profession as each profession in the team is important in its own right.'
'They [nurses] are there to help us with the patient problem and are very useful because they remind us what we have not done.'
'... it is important to value the judgement of colleagues.'
It was interesting that participants observed that the nurses perceived themselves to be not as valuable as other team members.
'Other professions [nurses] should stop limiting themselves and stop sitting in the corner, they should stand right next to the doctor.'
- that working as a team creates a feeling of achievement and will improve patient care:
'We cannot stand alone and do the work, we need other professions to do the work better.'
'We need to involve other disciplines more to achieve optimum care for our patients ... '
'Working together is wonderful.'

Theme three: Skills needed for working as a team

Participants realised which skills, other than clinical skills, they need to acquire:

Leadership. They reflected on the need to clearly delegate work and direct team members.^[9]

'In the beginning there was no leader ... no one took the initiative to start the whole thing.'

'I have learned how to take [the] lead [in] an emergency situation, and also how to follow another colleague when he is in charge of an emergency.'

Clear communication. This competency is most commonly emphasised as needed for collaborative practice and teamwork. There was a realisation that the team members need to articulate more clearly.^[10]

'I have to be a good leader and have good communication skills.'

'I did not know who should suture the wound, no orders were given.'

'We lacked on the communication part.'

Theme four: Effect of being observed by peers

Some of the participants who actively participated in the simulation in front of their peers reflected that they felt intimidated and nervous, as they were being watched by their peers. The large number of onlookers, and because everybody was not as exposed to criticism as the participants in the simulation, added to their uneasiness.

'I think this is a good initiative, but it should be done by small numbers of students so that participation is maximum with no bystanders only the examiner, so that students can confidently participate without psychological inferiority and fear due to the large number of group mates.'

'I was nervous because I was being watched.'

Theme five: IPE in the curriculum

Participants expressed the need for IPE to become a formal part of their curriculum as they realised the need for better understanding of professional roles. Students also realised the potential of learning from each other:

'We strongly need to interact with other professions. We should start working together or have tutorials/discussions to improve on our knowledge and skills.'

'It should be done on a regular basis.'

Discussion

IPE was generally well received by participants. The outcomes concur with recent studies that report participants' positive attitudes towards this mode of education, gains in their knowledge (understanding of roles and care content), team skills, leadership, and communication.^[1] One key competency of interprofessional collaborative practice for patient-centred care not addressed by participants was negotiation for conflict resolution.^[11]

Participants noted that the simulation in a controlled environment was a good learning experience, supported by the increase in test scores. However, the significant increase in knowledge, as measured by the MCQ test related to trauma management, can be ascribed not only to learning with members of another profession but also to the repetition of the test and the simulation itself.

Participants experienced difficulty in translating the theory they acquired in class into practice and prioritising actions during the simulation. Strategies such as interactive and experiential teaching are well suited for enhancing their practical skills and considered essential to the successful delivery of IPE within student groups with diverse levels of experience.^[3] Simulation provides the ideal educational strategy, as it demands practical experience with an interactive element that is authentic and true to the principles of

adult learning.^[10] The use of 'real' patient scenarios in simulation is therefore highly valued as a vehicle for small-group, mixed professional learning.^[12] Interdependence in education also highlights the importance of understanding and appreciating the roles, responsibilities and skills of other healthcare workers.^[2] IPE literature reviews describe the outcomes as the development of team-related competencies such as mutual respect, role knowledge and clarification, patient-centred care, and team communication. Interprofessional teams form an integral part of the vision of interdependence in education and highlight the importance of understanding and appreciating the roles, responsibilities and skills of other healthcare workers.^[2]

It is noteworthy that some participants felt intimidated being observed and preferred less exposure to peers, especially those they did not know. Being watched is intimidating^[13] and discomfort due to peer assessment is reported as having a negative impact on the co-operative, non-judgemental atmosphere of groups.^[14]

Participants commented on the need for IPE to become a formal part of the curriculum, which concurs with the general satisfaction with these training activities expressed in the literature.^[1] A global scan on IPE revealed that, although research evidence shows that IPE should be a mandatory component of every health professional's education, only 38% reported that this activity was mandatory for all students.^[15]

Conclusion

Medical students gained clinical insight during the simulation and became aware of their lack of skills and knowledge, as well as the value of shared learning. Evidence from the literature and perceptions of our students indicate that IPE could be very beneficial to all students if integrated into the formal curriculum, with sufficient time for all students to participate, preferably without being observed and assessed by peers.

Our study confirms that IPE at Medunsa is a beneficial mode of education and in future should foster an interest in designing and delivering these structured learning experiences in the various curricula at our institution. IPE events have the potential to expand students' understanding of the contribution made by other professionals and to give them the opportunity to acquire and practise skills required for effective teamwork.

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