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The International Journal of Clinical Skills looks forward to contributing positively towards the training of all members of the healthcare profession.

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Foreword

Clinical skills change lives…

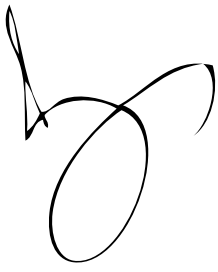
Dr. Abigail Boys & Regina (October 2010)

Amidst the fast paced achievements in international healthcare and education, it is important not to forget what clinical skills mean in reality for our patients – clinical skills change lives.

After having initiated the charitable society Willing and Abel in 2008, many health care professionals have had the pleasure of using their specialised and expert clinical skills to help children of developing nations requiring specialist surgery. An example is 13 year old Regina who was born with a tumour fatally spreading across her face (congenital lymphangioma) – she successfully underwent major surgery at The Royal London Hospital (United Kingdom) in December 2010 and now continues to lead a normal life in Ghana, West Africa (www.bbctelevision.co.uk).

Such success exemplifies a fundamental strength of the clinical skills community in its ability to evolve and adapt to meet the challenges and expectations of a modern healthcare arena. Healthcare professionals need to have clinical skills training which will allow them to meet present and future challenges, which include an ageing population, multiple morbidities and increasing patient expectations.

There is no doubt that the International Journal of Clinical Skills provides an excellent forum for the global healthcare community to further clinical skills research, as well as advancing the training of students, academics and health professionals. I wish the International Journal of Clinical Skills continued success for its admirable work in this important field.



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Simulation learning in health care: is there evidence of transfer to the workplace?

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Abstract

There is evidence that health care professionals and students enjoy and value learning from training using medium-fidelity computerised patient simulators, but less evidence that skills and learning acquired are transferred from such training to clinical areas and subsequently enhance the provision of care.

This paper reports the results of focus groups where recently qualified medical and nursing students (n = 13) working in one London (UK) hospital were asked to provide evidence of transfer to their settings, some time after enacting life-threatening scenarios in interprofessional training sessions.

They most frequently reported instances when interpersonal skills and understanding acquired in the training, were of direct application to the clinical areas where they worked. There was less evidence of the transfer of clinical skills and of learning not directly applicable to the current clinical area.

The study was small and relied on self-reports, but nevertheless throws light on the existence and nature of knowledge transfer after interprofessional simulation training. It thus supports the use of this training method and its findings can be used to inform larger studies.

Introduction

The use of simulation in health care education has increased enormously during the past ten years. One reason for this is the difficulty in obtaining adequate training opportunities (for example, restrictions on hours that junior doctors can work and shorter patient stays in hospital). Another is the development of increasingly sophisticated simulation mannequins that are able to mirror many human functions, e.g. respiration, pulse and a reasonably realistic ability to communicate. This has enabled educators to replicate specific scenarios which are not easily available in the practice setting [1] and has facilitated learners to acquire and practice skills in a safe environment. The ultimate aim of using this method is to improve patient safety through exposing participants to situations they potentially might meet in clinical practice.

Simulation of this sort is useful in providing newly-qualified healthcare professionals with a chance to practise skills they have already been taught: this is important, as research shows that newly qualified doctors and nurses do not feel clinically competent [2, 3]. For brevity's sake, the term simulation will be used in this paper to mean the use of medium fidelity computerised patient simulators, although we recognise that simulation is a far more inclusive term [4].

The use of simulation in training assumes that what is learnt in training will be transferred to the practice setting. Currently there is little robust evidence for this [5]. However, research in a range of disciplines has identified numerous factors that are associated to some extent with the successful transfer of training: trainee characteristics (cognitive ability, experience,

personality and motivation); work environment factors (support, climate, constraints and opportunities); training interventions; learning outcomes; trainee reactions [6, 7].

Analoui [8] proposes a 'socio-technical' model of training, dividing learning into task-related and social-related. These are the equivalent of what are often known in the health care literature as clinical and human or non-technical skills (e.g. communication and team-work) [9]. He also distinguishes between 'on-the-job' and 'off-the-job' training, concluding that a combination of the two may be best to promote transfer to the work place. On-the-job training by definition takes place within and is restricted to the scope of activity that occurs in practice; off-the-job training allows for experience and learning beyond that scope.

This paper reports a study of training provided for recently-qualified doctors and nurses in a London (UK) hospital. They were required to immerse themselves in simulated scenarios with a medium-fidelity computerised patient simulator. The sessions took place in the hospital education centre's clinical skills laboratory. The scenarios were expressly designed to facilitate both task- and social-related learning.

The training was clearly off-the-job: it did not take place in a clinical setting and it involved members of a number of different clinical teams. Off-the-job training is generally intended to result in learning that is relevant on-the-job, but in this case the training exposed participants to simulated episodes unlikely to occur frequently where many of them worked. Thus, learning was not of immediate and direct relevance to the clinical settings where they worked, though of general importance and relevance to their professional roles, in which they are expected to be able to act appropriately in clinical emergencies. We therefore distinguish between 'direct relevance' and 'general relevance' learning and use these categories, together with social- and task-related learning, to frame the analysis of the data (Figure 1) and to clarify what sorts of transfer took place.

Figure 1: Categories of learning (Adapted from Analoui) [8]

	Task-related	Social-related
Direct relevance		
General relevance		

Methods

The training

The inter-professional simulation training was provided for newly-qualified nurses and for doctors in both Foundation Year 1 and Foundation Year 2 training (hereafter referred to as FY1 and FY2 respectively). All participants were employed in an inner London acute hospital. The training lasted one day and involved four acute care scenarios (see Box 1 for an example).

The scenarios were developed to meet the intended learning outcomes of the Foundation Programme for FY1 and FY2 doctors and of the newly qualified staff nurses Development Programme. Life-threatening scenarios were deliberately chosen, as recently-qualified staff cannot be assumed to have encountered unpredictable events such as these, yet need to be competent in assessing and managing them. Each participant had the opportunity both to observe and participate in scenarios. After each scenario, there was a debriefing session that lasted up to forty-five minutes, to facilitate learning through self-reflection and discussion with participants and facilitators. The programme ran from August 2009 to May 2010.

Box 1: Example of an inter-professional simulation scenario

'Mr Peter Brown' - Anaphylaxis

Participants
- Newly qualified staff nurses, FY1 and FY2 doctors

Learning outcomes
- Perform a bedside checking procedure to ensure the correct patient receives the right blood at the right time
- Formulate a plan of care appropriate to local policy for a patient receiving blood products
- Systematically assess a patient, evaluate findings and recognise the signs and symptoms of anaphylaxis
- Work as part of an interdisciplinary team

Patient
- Peter is a 46 years old man, with a wife and two children
- It is one day after TURP surgery (transurethral resection of prostate)
- He has a continuous bladder irrigation
- He is on 2 litres of oxygen via nasal cannula and is also receiving a blood transfusion
- He will develop mild anaphylaxis which worsens if not treated
- No known allergies

Computer parameters
- Initial: HR (heart rate) 108; BP (blood pressure) 100/60; SaO_2 (oxygen saturation) 95%; RR (respiratory rate) 20
- Deteriorating: HR 128; BP 85/40; SaO_2 90%; RR 28
- Further deteriorating: HR 134; BP 78/32; SaO_2 87%; RR 30
- Breath Sounds - initially clear then wheezing
- Tongue swollen

Past Medical History
- None of note

De-brief topics
- Management of anaphylaxis
- Team working
- Communication
- Referrals

Methods: evaluation

The programme was evaluated using two methods, questionnaires and focus groups. A full application was made to the local National Health Service (NHS) Trust Research Ethics Committee for approval, which judged that this was unnecessary as the project should be classified as service improvement. The questionnaire data are not reported here as they broadly repeat the findings of a previous study [10] and are not of direct relevance to the question addressed in this paper, which is concerned with the transfer of learning to the workplace.

All participants were asked to attend a focus group some months after attending the training. The aim of the groups was to look for evidence of the transfer of learning into the work place and the topic guide reflected this aim. The focus groups were audio-recorded and hand-written notes were also taken. The audio records were partially transcribed and the data were analysed thematically.

Findings

51 doctors and 24 nurses took part in the training. Five focus groups were held between May and July 2010. The focus groups were attended by 3 doctors and 10 nurses (Table 1). Five focus groups were planned; however, in two cases, only one person attended, so those individuals were interviewed using the same topic guide. For convenience, all the focus group sessions will be referred to as groups, even when they took the form of individual interviews. The data presented in this paper use the typology (member code number) as shown in Table 1

Table 1: Focus groups – membership and duration

Focus group	Membership	Duration in minutes	Member code number
1	3 doctors	40	D1, D2, D3
2	1 nurse	20	N1
3	5 nurses	47	N2, N3, N4, N5, N6
4	3 nurses	22	N7, N8, N9
5	1 nurse	26	N10

Transfer of learning to practice: task-related, direct relevance learning

Although participants generally believed that this sort of transfer had taken place, they were mostly unable to provide specific instances, even after probing, with one exception:

"The patient had a polyp [and required surgery], *he was on aspirin and warfarin. I assessed the patient, I spoke to the doctor, the patient need not to be on the medication. If I wasn't in the simulation, I wouldn't pick up the idea to know that the patient needed to stop his aspirin and his warfarin."* (N10)

Transfer of learning to practice: task-related, general relevance learning

Several nurses described how the simulation training had acquainted them with aspects of health care that they would not experience on the wards where they worked. One who worked on a specialist ward said that the simulation had given her an idea of what general nursing was like. Another noted that she had never observed in real life the set of signs and symptoms used in one scenario. One had learnt about the care of asthma patients, whom she did not usually nurse.

Another nurse recalled an unusual instance of the transfer of task-related knowledge to a clinical situation that was not his regular work-place:

"I was working at the London marathon… I spotted the signs and symptoms [of hypocalcaemia] *from doing the simulation here – really exciting! Because I was listening to the doctors' feedback, that's how I learnt it. Without that, I wouldn't have known."* (N2)

Most of the reported transfer was social-related, as the next two sections demonstrate.

Transfer of learning to practice: social-related, direct relevance learning

Both doctors and nurses reported how simulation training had improved their understanding of each other's roles and how this helped them to act more purposefully and collaboratively on the ward. The pace of work on the wards tends to reduce opportunities for inter-professional dialogue, with a resulting loss of understanding; simulation training had given participants a fuller experience of inter-professional working.

"On the ward, you are working as a team, but you're not behind the same curtain doing the same thing together, as in simulation." (N7)

A doctor agreed; simulation had given her a chance to observe nurses at work, as ward work did not:

"You see what the nurses do, what their different responsibilities are. On the wards, you work in silos and don't see this – nurses call you to do something and off you go. Doctors don't see the nursing assessment." (D2)

"[Simulation] *gives you a bit more appreciation of the full pathway from the initial nursing assessment and you can see and understand a bit more how and why delays might happen, and how and why nurses may come to the conclusion they come to, and what things have triggered them to come to you."* (D1)

This was particularly valued with reference to being on-call, where doctors may be given sketchy information: it was useful to have acquired *"a little bit of understanding of what they are likely to have done and what they are likely not to have done, and therefore what you need to think about doing, when you first arrive."* (D1)

Similarly, simulation training enabled nurses to understand more completely the medical role:

"You understand better what is expected of junior doctors, so you go to a more appropriate doctor with a request." (N7)

"I wouldn't now be expecting a new doctor to intubate a patient who can't breathe." (N2)

Nurses also felt doctors appreciated nursing roles and skills more, as a result of the simulation: *"Regarding one or two doctors, after doing the simulation, they respected us more, seeing what we know and what we can do. They know we're quite dependable and they can feel more confident in the information they're being given. That became clear in the simulation, that we are able to keep an eye on where things are not going so well. And that's what's changed a little bit."* (N3)

A particularly valuable transfer from training was noted by nurses who felt empowered as a result of the simulation training to question doctors about their decisions: *"It's also increased my confidence to challenge the doctors. You sit there, you know the patient, they know more about the biological and medical, but you know more about the patient, and you can become the patient's advocate – 'She normally takes this…', you speak on behalf of the patient. For the doctor, it is just, 'let me just prescribe an anti-emetic' – but we know the patient, what we'll give them, what effect it will have. So this simulation has given me more confidence to work hand in hand with doctors."* (N3)

"I had it today with a prescription for diamorphine that was prescribed incorrectly and I had the confidence to challenge [the doctor] *because of the simulation."* (N2)

Transfer of learning to practice: social-related, general relevance learning

Some of the social-related learning reported did not transfer to the work situation because of the nature of the ward: *"I've never been in a situation when I was working with doctors trying to save someone's life, everyone doing their bit, someone taking the lead."* (N6)

Also, social-related learning might not transfer directly because of how the ward is organised: one nurse said that handovers on her ward were one-to-one, so she had found the team handover during simulation enlightening. It follows, although she did not make this point explicitly, that this piece of learning would not be of direct use to her on that ward, though likely to be so in the future, when working elsewhere.

Discussion

It is clear that there are more data relating to social-related direct relevance learning than to the other categories. Our study therefore shows that transfer does take place after simulation training, predominantly of this type.

It is not surprising that task-related direct relevance learning is reported only infrequently: as pointed out above, the scenarios were chosen because they are life-threatening, but unpredictable and unusual in many specialties.

There were only limited data relating to both categories of general relevance learning. This does not mean that no transfer will occur, but it may do so in the future, when participants work in other clinical settings. However, such transfer cannot be taken for granted, because of failure to retain learning [11]. This may also happen within shorter time-spans, of course: ideally, simulation training would be facilitated by workplace mentors and supervisors, so that they can maximise post-training opportunities for consistent reinforcement and feedback. Alternatively, training teams could share details of the scenarios and discussions in simulation training sessions with those health care professionals responsible for mentoring training participants. Mentors would then be able to reinforce and build on learning from the training, potentially enhancing the quality of patient care provided by the team.

Our findings suggest that future research into transfer of learning after simulation training should focus on social-related direct relevance learning. The inter-professional basis of the training provided in this study was crucial to the reported transfer. The evidence base for the effectiveness of inter-professional learning is inconclusive and inadequate by the high standards of systematic reviews [12]. However, there is evidence that safe patient care is positively associated with organisational cultures that value affiliation, teamwork and participation, and negatively associated with hierarchical cultures [13].

This study has a number of limitations, including the fact that few participants, particularly doctors, joined the focus groups. The evidence of transfer is only provided by self-report, which may not be reliable: it is recognised, for example, that self-assessment of clinical expertise cannot be relied upon [14]. In this case, however, it was accounts of transfer rather than expertise that were invited. Resources did not allow us to make objective measurement of transfer to practice, although to do so would be challenging: daily practice may not provide participants with opportunities directly comparable to the scenarios used in simulation training, and extended before and after observations of participants working with the same colleagues would be necessary to measure communication improvements during unusual and unpredictable events.

In any case, it is very difficult to assess the contribution of any particular sort of training to novice health professionals developing expertise. Health care professionals are influenced by a wide range of formal and learning opportunities (experience and practice, the example and/or the advice of colleagues and peers, and continuing professional development), so that it is difficult to attribute any outcome to a single cause. Individual staff may not recall the origins, single or multiple, of their own, by now familiar, skills and knowledge. Eraut [15] found that *"a person may be socialised into the norms of an organisation without being aware either of the learning or of what some of the norms are…* [researchers had difficulty in] *getting respondents not only to describe their job when many aspects of it were likely to be taken for granted, but also to progress from that description to discuss the nature of the competence and expertise which enabled them to do that job."* [15, pages 118-119]

For these reasons, evidence of transfer might have been expected to be sparse and participants reported more transfer than might have been expected. Given the important role of good communication and teamwork in protecting patient safety [9], reports of the transfer of social-related direct relevance learning are to be welcomed. In particular, it is important to patient safety for team members to be able to challenge each others' decisions, although it is widely recognised that nurses have difficulties in challenging doctors [16]. In enabling recently-qualified staff to challenge colleagues on the ward, simulation training helps to flatten the hierarchies of the teams where they worked, thus nurturing an important structural ingredient of a patient safety culture [17].

Conclusion

Since it is already known that learners enjoy and value simulation [5], satisfaction surveys are less urgently needed than follow-up studies of transfer. Participants in this study were able to identify transfer of learning from simulation training to practice, particularly of social-related skills, in ways that are likely to contribute to safer patient care. The study was small and its findings cannot be taken as robust, but should help to inform larger and more complex studies.

Declarations

The authors have no financial or other interests to declare in relation to this paper.

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