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ORIGINAL RESEARCH

Multiprofessional in situ simulation is an effective method of identifying latent patient safety threats on the gastroenterology ward

Elizabeth Uttley , Deborah Suggitt, David Baxter, Wisam Jafar

Medical Education, Stockport NHS Foundation Trust, Stockport, UK

Correspondence to
Dr Wisam Jafar, Gastroenterology, Stockport NHS Foundation Trust, Stockport SK2 7JE, UK; wisam.jafar@stockport.nhs.uk

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ABSTRACT

Objective In situ simulation (ISS) is an effective training method for multiprofessional teams dealing with emergencies in high pressured environments. A regular ISS programme was organised for the multiprofessional gastroenterology team with a primary objective of identifying, classifying and addressing latent patient safety threats and secondary objectives of improving team confidence and individual role recognition.

Method 22 unannounced ISS sessions (averaging approximately one session every 6 weeks and four participants per session) were conducted between February 2017 and August 2019 involving multiprofessional team members. The sessions centred around the following four common gastrointestinal emergency scenarios: massive upper gastrointestinal haemorrhage; biliary sepsis (cholangitis) and shock; postendoscopic retrograde cholangiopancreatography complications including perforation and cardiac arrest. Following the simulation, the faculty, which included nurses and doctors, facilitated a structured debrief session and action plan to identify and address latent errors.

Results 96 participants from nursing, medical, physician associate and pharmacy backgrounds took part in the simulation programme. Analysis of collected latent safety threats identified the following four themes: education and training; equipment; medication and team working. Analysis of anonymously completed questionnaires identified that 95% of participants had a perceived better understanding of their role and 86% felt more confident in assessing an unwell patient. 96% of participants felt comfortable during the debrief.

Conclusion ISS provides a unique opportunity to train the multiprofessional gastroenterology team in their own high-pressured environment, helping identify and address latent patient safety threats and improve perceived participant confidence and role recognition.

Significance of this study

What is already known on this topic

- In situ simulation (ISS) is a powerful tool for training multiprofessional teams in high risk areas. There is limited published data on its effectiveness in common gastrointestinal emergency scenarios.

What this study adds

- ISS is an effective way to teach the multiprofessional gastroenterology team. It can lead to improved patient safety by allowing the identification of latent patient safety threats.

How might it impact on clinical practice in the foreseeable future

- This report aims to demonstrate that it is time to move away from siloed, classroom-based training for different professional groups. In order to improve interaction, skills and latent safety threat identification, we argued that it is important to train different professional groups together in their natural high-pressured working environment. Simulating real life emergency scenarios, without fear of causing patient harm, provides a learning opportunity which can be simultaneously supported by a trained faculty. With some planning this programme can be replicated in other gastroenterology departments.

INTRODUCTION

Promoting safe care and minimising patient errors in an ever-changing ward environment requires regular training of the multiprofessional team. This is in

contrast to traditional methods that involve educating single professional groups, in isolation and away from their ward environment. The multiprofessional ward team is the first to respond to an acutely deteriorating gastroenterology patient. This team is composed of doctors (training and non-training grades); nurses; healthcare assistants; physician associates; students from medical, nursing, physician and nursing associate backgrounds as well as advanced care practitioners. All provide varying levels of experience, skills and knowledge of the ward culture in emergency scenarios.

As in other safety-conscious professions such as aviation, there has been increasing recognition of the importance of developing non-technical skills.[1] Effective team work relies on each member understanding human factors and each other's roles, which enable them to work collaboratively as an active and safety conscious team participant.[1] Dealing with an emergency scenario on a busy ward with professionals of varying backgrounds, levels of expertise, skill sets and personalities, does not automatically result in the formation of an effective team. This fact may account for the majority of adverse events witnessed in the acute medical setting.[2–4] When teams work well, they provide a system with the potential to mitigate error.[3 4] Therefore, the focus of teamwork training should be on how to become a more effective team member as well as ensuring individual clinical and technical competencies.[5] In situ simulation (ISS) is an educational approach, which provides an opportunity to support the development of team skills.[6–8] It exposes learners to the challenges and complexities of clinical scenarios without the risks to real patients and is widely used for developing non-technical skills.[5 9] ISS offers healthcare professionals of all grades, disciplines and professional backgrounds a chance to come together at the sound of the emergency buzzer and practise these skills. Furthermore, it provides team members with the opportunity to manage factors affecting team performance.[10] In addition to improving teamwork, it enables the uncovering of hidden system flaws in the gastroenterology ward environment or in the organisation (otherwise known as latent safety threats) and is therefore pivotal to improving patient safety.[11] Using ISS to identify latent patient safety threats is well documented in the literature across various disciplines including paediatrics, emergency medicine and obstetrics.[11–15]

It was acknowledged that within the gastroenterology team at Stockport NHS Foundation Trust, there was a lack of joint acute gastroenterology training for the multiprofessional team. A voluntarily provided and delivered ISS programme was introduced as one validated approach to address this, although the obstacles to its introduction were recognised at an early stage.[7 8] Such organisational challenges included learning culture change, limited time, limited bed space, depleted numbers of frontline staff and acuity of patients. Despite this, it was felt to be the most appropriate teaching modality for ensuring optimal participation from the whole multiprofessional team. These challenges have been well cited in the literature, one example being the establishment of simulation to improve non-technical skills in endoscopy.[7]

Main aims of this study

Specialty-specific emergency scenarios were designed by the faculty which included a consultant gastroenterologist to replicate real life cases previously encountered on the gastroenterology ward. The scenarios were used to identify latent safety threats at an individual, team and organisational level and also improve team working skills such as confidence and individual role recognition as secondary outcome measures.

METHODS

This study is of a single-centre training intervention in a large district general hospital in the North West of England. The gastroenterology ward comprises 26 acute medical beds with a mixture of predominantly gastroenterology and hepatology patients alongside general medical patients. The faculty consisted of: a gastroenterology consultant; skills tutor (with a nursing background who conducts both laboratory and ward-based simulation teaching for undergraduates and postgraduates); education fellow and director of medical education. For the purposes of standardisation and quality assurance, at least two of the attending faculty were accredited by the North West Simulation Education Network (NWSEN).[16] NWSEN accreditation involves specific training to include learning theory, human factors and debrief training alongside evidence of experience delivering simulation. Further experience within the faculty included instructor status on life support courses, higher degrees in education and previous experience in simulation facilitation.

In February 2017, the faculty began a regular ISS programme on the gastroenterology ward with a specific focus on emergencies previously experienced on the ward. Some were based around cases where root cause analysis had been required or where coroner's inquest was deemed necessary. These included massive upper gastrointestinal haemorrhage; biliary sepsis (cholangitis) and shock; postendoscopic retrograde cholangiopancreatography complications including perforation and cardiac arrest. The programme was underpinned by the recent key standards published by the Association for Simulated Practice in Healthcare.[17] These standards recommend having clearly defined learning objectives, authentic delivery and a faculty proficient in simulation-based education with subject matter expertise.[17] The primary objective of the ISS programme was to help take measures to improve patient safety by recognising, classifying and addressing latent errors. Secondary objectives concentrated on developing collaborative multiprofessional work by improving team confidence and individual

Table 1 Multiprofessional participants during study period-breakdown

Nurses and healthcare assistants (band 2–5)	Foundation doctors (FY1-2)	Core medical trainees (CMT1-2)	Specialty trainees (ST1-2)	Junior and senior clinical fellows (JCF/SCF)	Medical and nursing students	Trainee physician associates (band 6)	Trainee advanced nurse practitioners (ANP) (band 7)	Pharmacist (band 7)
42 (43.8%)	13 (13.5%)	5 (5.2%)	3 (3.1%)	9 (9.4%)	17 (17.7%)	4 (4.2%)	2 (2.1%)	1 (1.0%)

role recognition. Using a high-fidelity wireless simulation manikin in every scenario, a minimum of three faculty members (which always included a consultant gastroenterologist and senior nurse) ran 22 unannounced sessions over a 30-month period. Each session involved between three and six members of the multiprofessional team (table 1). The participants were not briefed directly before the simulation was due to take place, however, all staff were made aware via email and staff handovers that these sessions would be taking place at some point and given the option not to take part. Consent was therefore assumed by participants opting to join and remain within the simulation. There was an average of four participants for each session and the faculty set a minimum multiprofessional requirement of a junior doctor, staff nurse and healthcare assistant in each session. Three of the faculty were present to witness each scenario which consisted of an acutely deteriorating patient with one of the emergencies outlined above, attended by teams forming for the first time when the clinical scenario started. Given the duration of the study, it was likely that some of the more permanent members of staff would participate on more than one occasion but repeat targeted testing was not a specific objective of this study.

Following each scenario (lasting on average 30 min until the patient recovered or died), a faculty which always included a nurse, consultant gastroenterologist and educational fellow, led a structured debrief session lasting 20 min based on the modified SHARP five step approach that[18 19]

- reviewed the learning objectives,
- discussed how participants felt about the management of the scenario,
- addressed any concerns at an individual, team or organisational level,
- addressed latent patient safety threats,
- reviewed key learning points and
- set plans for future learning at an individual, team and organisational level.

The faculty who observed the scenario by the bedside, prospectively collected data on the emerging latent safety threats. Following each scenario debrief, the three faculty members discussed and tabulated the identified latent safety threats. These tabulated data were retrospectively reviewed and categorised into four major themes as highlighted in box 1. In addition, at the end of each simulation, data were collected on participants' perceptions of the effectiveness of the simulation using feedback forms designed for the programme. These forms were anonymously completed by 100% of participants. Participants were also given the opportunity to highlight any latent errors evident within the simulated scenario through a free text comments box.

Box 1 Latent errors identified during gastroenterology in situ simulation

Education and training
- Lack of awareness of how to activate the major haemorrhage protocol.
- Lack of awareness of in-hours management pathway for unstable gastrointestinal haemorrhage.
- Knowledge gaps on sepsis pathway.
- Knowledge gaps on local antibiotic guidance.
- Lack of familiarity with the ALS algorithm.
- Lack of familiarity with defibrillation (including pads position and energy adjustment).
- Not remembering to check allergy status before administering antibiotics.
- Not remembering to check for hypoglycaemia.
- Not remembering to fully expose the patient during clinical examination.

Equipment
- Shortage of Sengstaken-Blakemore tubes.
- Shortage of Bair Huggers.
- Lack of availability of the ECG machine.
- Junior doctor pagers not working/without battery.
- Personal protective equipment not used.

Medication
- Unsure of terlipressin dose.
- Unsure of antibiotic choice and dose in variceal bleed and biliary sepsis.
- Intravenous paracetamol not readily available.
- Unsure of location of oral glucose gel on ward.
- Unaware of location of O rhesus negative blood.

Team working
- Lack of leadership.
- Lack of appropriate delegation to other team members.
- Lack of task prioritisation.
- Lack of situational awareness.
- Lack of closed loop communication.
- Lack of multiprofessional staff.

Table 2 Action taken following identification of latent safety threats and results of repeat simulation

Action taken following identification of latent safety threats	Repeat simulation following action
Laminated ALS algorithms on resuscitation trolleys (trust-wide)	Algorithm used by permanent team members and those exposed to simulation programme previously
Major haemorrhage protocol training at junior doctor induction/teaching and dedicated acute medical management training days for non-training doctors (trust wide)	Major haemorrhage protocol activated more efficiently
Gastrointestinal bleed simulation for foundation doctors (emphasis on major haemorrhage protocol)	Major haemorrhage protocol activated more efficiently
Laminated major haemorrhage protocol on resuscitation trolleys (trust-wide)	Major haemorrhage protocol activated more efficiently
Multiprofessional team members reminded of uniform policy and asked to wear easily located name badges at all times and asked to introduce themselves at the morning board round (local)	Improved closed loop communication during repeat simulation
Sourcing relevant equipment undertaken by ward management (local)	Improvement in equipment shortages

ALS, advanced life support.

The simulation participants were invited to reflect on their simulation exercise in their learning portfolio but the faculty were not privy to these reflections.

Ethics

The simulation formed part of ongoing training and thus service delivery by the multiprofessional team to which all participants consented; therefore, the faculty felt there were no ethical concerns to warrant formal ethical review. Furthermore, in the presentation of this study, there is no participant-identifiable information or direct quotation. At no point did any participant withdraw their consent to be part of the simulation.

RESULTS

Table 1 provides a breakdown of participant demographic. Box 1 shows the latent patient safety threats identified by the faculty and participants. These have been divided into four themes: education and training; equipment; medication and team-working. Action taken to address these threats is shown in table 2 alongside early observed evidence of resultant change in practice by those undergoing repeat simulation.

Feedback (received from 100% of participants) following the ISS suggested that 95% of participants perceived they had a better understanding of their role and 86% felt more confident if a similar emergency case were to be faced. Ninety-six per cent of participants felt comfortable during the debrief. Qualitative comments have not been included in this paper which instead focuses on latent errors.

Table 3 allows those in management roles to understand the risk associated with the identified latent safety threats by using a standardised risk assessment tool developed by the National Patient Safety Agency.[20]

DISCUSSION

This study demonstrated some of the potential benefits of regular multiprofessional ISS training in identifying latent patient safety threats in common gastrointestinal emergencies. It adds to the work performed in other centres which also identified themes similar to those outlined in box 1 including, for example, lack of awareness of trust policies including major haemorrhage protocol.[21] In future work, joint planning and subsequent pooling of data with that from other centres performing similar work would help further consolidate our understanding and extrapolate what methods work best for latent safety threat identification, correction and consolidation. The programme led to the identification of a number of latent patient safety threats and provided the opportunity for corrective measures to be put in place, to reduce the possibility of live threats leading to actual patient harm. Table 2 outlines some of these key corrective measures.

Our experience has identified several recurring latent safety threat themes including education and training, equipment, medication and team-working errors. The lack of Sengstaken tubes was easily remedied and these are now readily available should they be required. Lack of knowledge as to how to activate the

Table 3 Highlighting the risk assessment score of some of the identified latent safety threats

Latent errors	Risk score (using the 2008 National Patient Safety Agency risk matrix)[20]
Ward shares an ECG machine	Minor consequence and almost certain likelihood=10 (high risk)
Unable to contact Junior doctors about simulated deteriorating patient as they did not have working pagers	Moderate consequence and almost certain likelihood=15 (very high risk)
Ward did not have Sengstaken-Blakemore tube to manage deteriorating simulated patient.	Moderate consequence and unlikely=6 (moderate risk)
Ward does not have their own Bair-Hugger	Minor consequence and possible likelihood=6 (moderate risk)

major haemorrhage protocol posed a significant risk to patient safety and our concerns were cascaded to the organisation's transfusion committee. As a result, all resuscitation trolleys now have a laminated copy of the protocol available and a member of the faculty delivers major haemorrhage protocol teaching at the foundation doctors' induction in addition to that delivered by a member of the transfusion committee. Similarly, recall of, and access to, the ALS algorithm was deficient. Following collaboration with the resuscitation committee, it was agreed that laminated copies would be attached to every resuscitation trolley as an aide-mémoire. Further simulation following implementation of the algorithms has led to their use among simulation-exposed participants whereas simulation-naïve participants did not use the algorithms.

Cardiac arrest scenarios were included in our programme as formal ALS certification by the Resuscitation Council (UK) only occurs once every 4 years.[22] The ISS programme in gastroenterology provided multiprofessional ward staff with the opportunity to rehearse and practise ALS skills in a time pressured but safe environment.[23–25] The advantages we observed were numerous, including identifying equipment shortages, highlighting knowledge and experience gaps and improving familiarity with resuscitation equipment, thus potentially improving patient safety.[11 23]

Anonymised feedback forms completed by 100% of participants suggest that they are more confident to handle real-life scenarios and have a better understanding of their own role.[6 26] It is well recognised that in order for experiential learning to be effective, learners need to have time to receive feedback and reflect on their performance.[27] Within our ISS programme, this opportunity is provided immediately after the simulation during the debrief, which is delivered by the whole faculty. This helps multiprofessional team members develop additional skills including critical thinking, clinical reasoning and clinical judgement.[28] Furthermore, 96% of the participants felt comfortable during the debrief, emphasising the importance of a thorough debrief by faculty.

Challenges/limitations

Despite the programme's perceived success, the faculty met some challenges. Scarcity of available bed space particularly during the winter period coupled with staff shortages and patient acuity resulted in the rescheduling of five sessions during the study period. Overcoming these challenges and reducing the likelihood of further cancellations was made possible by engaging ward managers, ward sisters, matrons and ward consultants in the process. By witnessing the benefits of ISS first hand, these colleagues helped maintain momentum and enthusiasm by identifying appropriate staff members as well as facilitating an appropriate bed space and releasing staff when the emergency buzzer was sounded.

This study was unable to precisely quantify the differences in performance and latent safety threat identification between simulation-naïve and simulation-exposed participants due to the rotational nature of junior doctors and high turnover of multiprofessional staff. However, some of the staff did undergo repeat testing (as it happened that they were present for more than one simulation as the programme ran over 30 months). The faculty observed that these simulation-exposed participants performed better than those who were simulation naïve. This observation must be read in the context of inherent rater bias as the faculty were not blinded to those who were or were not simulation naïve. In future studies to reduce this bias, we could consider video recording the simulation exercise and asking faculty to rate performance independently of each other using standardised tools. The programme has now moved to other wards and specialities which may make it easier to capture and objectively measure change in performance of the previously exposed ISS gastroenterology participants as they rotate around the hospital and undergo repeat simulation.

One final concern for the programme was the potential stress that unannounced ISS may have on its participants and thus the subsequent impact on learning. It would be useful to compare unannounced and announced ISS in gastroenterology to ascertain whether the perceived stress and impact on learning differs between the different members of the multiprofessional team. A recent study in the emergency department setting comparing announced and unannounced simulation did not find overall a significant difference in participant-perceived learning or stress; however, in the subgroup analysis, doctors perceived unannounced ISS as less stressful than announced ISS.[29] In another study in an obstetric emergency setting unannounced ISS was recorded as especially stressful, particularly among midwives.[30]

The faculty prospectively collected data on emerging latent safety threats during and immediately following each simulation scenario. However, the sessions were not video-recorded and an unvalidated checklist was used to detect latent safety threats. This limits further retrospective analysis of the scenarios and also limits comparison with other studies which use validated checklists. For future consideration, one commonly used feedback form in simulation is the validated simulation effectiveness tool-modified (SET-M) questionnaire; however, this is targeted at nursing professionals.[31] There are numerous other tools for assessing the multiprofessional team but work remains to validate and evolve such tools in order to ensure the most appropriate one is matched to each simulation context.[32]

The multiprofessional gastroenterology ISS team comprised of participants forming an emergency team for the first time (table 1) and it was therefore pivotal to ensure individual members within the team

explored the skills needed to work effectively together. It is crucial that all team members feel able to actively participate, practise critical thinking, demonstrate closed loop communication and vocalise their thoughts to ensure the best possible outcome for the patient.[6] Box 1 highlights that the ISS programme identified team working errors as one of the four latent safety threat themes. Ensuring team members understand the importance of non-technical skills in successful resuscitation is pivotal and supported by studies in other high pressured emergencies such as cardiopulmonary resuscitation.[33] For existing staff to gain appreciation of this, there will need to be a change in learning culture and as such, ISS provides a useful opportunity to promote this with a trained faculty, planning and organisational support.[34] Furthermore, reinforcement of non-technical skills with regular ISS allows an evolving multiprofessional workforce to better understand each other's roles, contributions and limitations especially in the context of high risk gastrointestinal emergencies.[24 35]

Sustainability and wider rollout

Given the success of the programme, the ISS faculty have branded themselves as SIM@THEHILL, with social media accounts, a WhatsApp group and t-shirts to help raise the profile across the organisation. Educational leaders at the trust's Joint Medical Education and Foundation Board meeting (JMEFB) have been updated with SIM@THEHILL's progress and the executive team have been invited to witness the programme live on the gastroenterology ward. The project has now spread to encompass the following seven different clinical areas: paediatrics, acute medicine, orthopaedics, cardiology, diabetes and endocrinology, medicine for older people and the emergency department. Each clinical area has an identified consultant lead who helps design and tailor the scenarios to meet the learning needs of their multiprofessional team. To quality assure the programme across the other clinical areas, the core faculty are part of the delivery team. A significant amount of time has been spent developing the programme to ensure it is a teaching and development opportunity, which can be used to identify latent safety threats and can also be extended to include a wider array, of technical and non-technical skills.

CONCLUSION

In conclusion, our results have demonstrated that ISS provides a unique opportunity for multiprofessional teams to come together on a regular basis in a high pressured, time restricted environment to practise gastrointestinal-related emergencies and provides an excellent opportunity to identify latent patient safety threats, resulting in individual, local and organisational change. The programme may also help improve participants confidence and role recognition within an evolving multiprofessional team.

Twitter Elizabeth Uttley @SIMTHEHILL1

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ORCID iD

Elizabeth Uttley http://orcid.org/0000-0001-5150-6376

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