CHAPTER 9

Transformative Simulation

To Patient Safety and Beyond

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Summary

This chapter explores uses of simulation beyond its more traditional educational applications, in areas such as design, redesign, investigation and more. It considers the research base and the advantages and disadvantages of using simulation in this context, including the challenges. It identifies how simulation has been used and benefits other industries, with a focus on safety, and finally how simulation can be used to create more effective and safe systems, processes and better service user experiences.

Background

Healthcare simulation has an extensive history and relationship with patient safety. Healthcare simulation has been documented as far back as the Roman Empire (Owen, 2016). In the seventeenth century developments in medicine as a science drove an interest in anatomy and dissection that subsequently became an important component of teaching medicine. This led to the use of cadavers for dissection, and while many bodies were those of convicted criminals, there were not enough to meet training needs. This was exacerbated by a decrease in the number of death sentences at that time (Mitchell *et al.*, 2011). Sadly, this led to the rise of the body snatchers and a rather dark but evolutionary time for medicine and healthcare. As an alternative, the use of wax to provide anatomically correct models also evolved at this time (Schnalke, 1995). This became fundamental in teaching, alongside dissection, which is still used in modern medical education today.

During the twentieth century, with the development of modern technologies, models evolved into manikins that ranged from simple figures to those that were more complex with moving mechanical parts. The rapid increasing power and availability of computers led to further developments that have manifested in the multi-functional manikins we have today. All these developments had a focus on the practitioner learning either a skill or part of a skill. This is important to note in the context of patient safety as the move away from practising on patients was partly an ethical one (Issenberg and Scalese, 2008). Simulation provides an opportunity to practice procedures and processes in a secure environment prior to delivery to patients. While we question the ethics of 'practising' clinical procedures on patients, we have not yet questioned testing systems, processes, improvements and changes out on patients without first simulating them and understanding how this ultimately affects patients and other participants, including staff, and other systems, or how they could contribute to them.

In 2004, David Gaba described simulation as a technique not a technology. He described how simulation can be a driver for patient safety, and how it can be used from an educational perspective across numerous dimensions from competence to performance and team behaviours

(Gaba, 2004). Aggarwal *et al*. (2010) describe simulation as a training tool to improve patient safety, moving away from the assumption of experience equalling proficiency towards a model of demonstration of proficiency. Although neither Gaba nor Aggarwal explicitly suggest that simulation had a role outside of a learning modality, the Covid-19 pandemic highlighted its potential across the world with Health Education England (2020) embracing the role of simulation as part of a wider development suite for systems and work design.

This use is not new and has somewhat developed organically due to evolving needs. In 1989, Simon *et al*. (1989) described the use of a major incident simulation, the Beilinson hospital exercise, to evaluate how the hospital would cope in such a situation. It is important to note that the process was not intended to test delivery of patient care by individual teams. During the 1990s, the use of in situ simulation training by resuscitation teams evolved to also identify and address latent threats to enable safer teamworking (Capelle and Paul, 1996). During the early 2010s, Price, Applegarth and Price (2012) described the use of simulation to better understand the challenges of responding to major haemorrhage emergencies in the operating room. They identified environmental concerns, including too many people attending, non-technical skills, leadership and followership, by testing the system. They combined their approach with the need to develop the skills of participants in such emergency simulations.

Simulation techniques have also been used by others to test equipment, processes and teams. McLellan (1999) described the use of simulation to practice, test and develop trauma team processes. Power *et al*. (2012) demonstrated the use of simulation on a human patient simulator to test equipment designed to detect early deterioration in ventilated patients prior to its use clinically. This approach enabled them to identify any potential errors or flaws in the equipment they were looking to use.

Expansion beyond a pedagogical approach has driven the focus extensively outside the combined educational and developmental tool which Gaba (2004) described, in which the purpose was, essentially, training to address knowledge, skills, attitudes or behaviour. Use of simulation outside of education appears to have been somewhat slow; however, it has been undertaken outside of (and perhaps unnoticed by) the health and care education field but still within healthcare. Oh *et al*. (2008) described the use of simulation to investigate audio tone guidance in cardiopulmonary resuscitation (CPR), while Johnsen and Bolle (2008) also used simulation with a resuscitation theme: to understand how video communication with people calling for help can contribute to improving patient outcomes. Both examples have a focus on improvement of practice within their field with the use of simulation, outside of an 'in situ' setting, to develop new processes. In both cases these techniques have evolved and become more broadly used.

The Covid-19 pandemic led to an international use of simulation within healthcare to design and test systems and processes. Simultaneously, but without any coordination or formal collaboration, simulation teams around the world stepped forward to assist with the systems design, redesign and personnel training, highlighting the valuable role simulation could provide outside of the educational frame. Brazil *et al*. (2020) used translational simulation methods (Brazil, 2017) as part of their preparations with hospital services in Australia. Meanwhile, Wong *et al*. (2021) detailed the development of a programme to train airway management during the pandemic in the UK. This ensured that the participants were better prepared to perform the essential skills despite the constraints related to the use of increased personal protective equipment (PPE) and meeting the requirements of upskilling a large number of practitioners quickly. While this was happening, Sharar-Chami *et al*. (2020), based in Lebanon, reported their use of the SHELL Human Factors model (O'Boyle *et al*., 2005, Hawkins, 1994) to train healthcare practitioners and also to help identify latent threats to practice in the development of their protocols. This widespread use of simulation within healthcare, to not only educate but to understand and develop ways of working, has propelled the use of simulation beyond the boundaries of pedagogy.

Simulation in Other Industries

Simulation is used in other industries to understand how systems interact, how they function, and how people working within the physical or theoretical interact with them and each other (Pedersen, 2012). Simulation can be used to understand the variety of human work (Shorrock, 2016) and the interplay between them together with better understanding of the seven archetypes of work that Shorrock (2017) went on to describe.

Pilots have been using simulators since the invention of flight. They are an invaluable tool for practising in an environment that ensures that they are safe both physically and psychologically. Although it is not possible to train for all eventualities, common factors can be addressed (Landman, 2018). Simulation familiarises pilots with the layout of their cockpits (Proctor and Van Zandt, 2008) informed by further understanding of the cognitive analysis, priorities, and interaction of humans with humans and systems. Simulation also allows them to practise their emergency procedures. However, to learn to fly, practical experience remains part of a pilot's training.

Like the airline industry, the nuclear industry uses simulation for training. Indeed, the organisation EDF Energy describe their nuclear reactor engineers as pilots (Fauquet- Alekhine, 2012) and provide simulation on full-scale simulators (Fauquet-Alekhine and Labrucherie, 2012) giving the operators of the complex safety-critical equipment opportunity to practise and understand how they work and how they contribute to the wider system.

These are just some examples of the use of simulation outside of healthcare, demonstrating elements of the alignment to our traditional perception within healthcare of simulation as a learning tool, and the use of simulation to design, redesign and investigate systems and processes. One commonality seen in other industries is the application of HFE experts in conjunction with the professionals working within the area. Their work, using a variety of methods, including simulation, is vital to understand how we interact on a person-to-person level and also with the complexity of our work.

Human Factors and Ergonomics (HFE) and Its Link to Transformative Simulation

Simulation is one of the tools of the HFE practitioner. For example, Stanton *et al*. (2013) discussed the use of simulation as part of the assessment of mental workload, the Instantaneous Self-Assessment Method (ISA). Within this process, task analysis is undertaken normally with the use of simulation. In multiple HFE methods, task analysis is integral, and simulation is a way — often the optimum — to undertake this. It enables the practitioner to see what happens and question it. This questioning and use of simulation helps to understand the archetypes of work described by Shorrock (2017) and the 'messy reality' in particular. Across healthcare, opportunities for observation, particularly of a rarely performed or personally invasive procedure, is limited. Barriers include rarity and unpredictability, out-of-hours, reluctance from patients — and staff — to give consent and/or challenges to asking for consent. Simulation facilitates planned, timely, safe events ensuring better understanding with unconstrained opportunities to observe, test variations and generally freely explore without issues of consent or safety in a risk-managed process. However, the simulation will be an approximation (though meaningful) and not precisely the 'work done', as described by Hollnagel *et al*. (2006). This is where the debriefing element of healthcare simulation is vital to understand the participants' perceptions, emotions and, thus, their behaviours.

Transformative simulation is also vital in enabling the inclusion and involvement of the silent partners in healthcare that may be forgotten in our quest to improve a process or task. There are several issues that could be a barrier to further development of simulation outside of education. As already described, its role has been used for decades by healthcare practitioners who wanted to explore and understand their world. Most of this has been intuitive and a lot outside of professional fields, but to share this work has been either difficult or not thought worthy as it's 'just what we do'. The use outside of the educational modes does lead to the need for more guidance in how to do this. Of note is the work of Brazil (2017) in the development of the translational simulation methods. This approach, using simulation to identify, challenge and redesign systems and processes, provides one framework to use simulation.

We observe that a significant barrier to sharing and developing this work has been the constraints to meet publishers' requirements to record activity within accepted frameworks that force interventions to look like pedagogy. This significantly limits the opportunities for non-pedagogic simulation to be published, and, when it is, broadcast across the entire panoply of journals, unlikely to be easily found by those who would benefit. Therefore, a framework to guide the field is needed and this is what transformative simulation can add.

The Transformative Simulation Taxonomy

Transformative simulation is used to describe the use of simulation to transform health and care through collective understanding, insight and learning as opposed to pedagogical approaches that are more commonly associated with simulation in healthcare (Weldon *et al*., 2023). The term was developed as a result of an extensive literature review, and engagement with simulation communities of practice. The development of a taxonomy, a set of names and descriptions that are used to organise information in such a way that it is easier to access and share knowledge (Lambe, P., 2007), was generated to help to address the challenges of sharing practice and knowledge.

The objectives of any simulation are the starting point for designing scenarios and events and are fundamental to simulation design more generally (Hellaby, 2013, Issenberg, McGaghie *et al*., 2005). This does not change when using simulation for systems testing, patient care design processes or investigative approaches. It is vital to have an overarching focus on what you wish to achieve. This is where the transformative simulation taxonomy helps to articulate a focus but also empowers curiosity for the unknown. While you have an overarching focus, you are still open to the potential unknowns that could be identified in the simulation or debriefing process.

The umbrella term 'transformative simulation' is made up of seven simulation-based 'Is' (SBI) described by Weldon *et al*. (2023) that give the designer a focus on what they want the simulation to achieve:

Innovation: The introduction of something new or a new way of doing things. This could be a technique for patient care, policy or a new system of work.

Improvement: Using simulation to contribute to the development of something that already exists, such as an established service.

Intervention: Contributes to changing a situation or way of doing things. For example, providing a risk-managed opportunity to disrupt an accepted process.

Involvement: Invites and engages others that may not normally participate or would otherwise have been excluded, with the purpose of generating new experience, building bridges and understanding between stakeholders. For example, providing a risk-managed opportunity for innovative public participation. The collaborative inclusion of patient/public participation is expected as part of involvement.

Identification: The use of simulation to understand what may be happening in a given situation, identifying latent threats and/or error producing design issues — both physical and systems based.

Inclusion: Relates to simulation that invites key stakeholders to share, empower and provide a platform for them to inform and reform relevant elements of health and social care.
Influence: Is the use of simulation to exert influence on someone or something. This can be through demonstration using simulation or may be through presentation of information from a simulation to those who can make change happen.

Although some of these are closely aligned to each other and may overlap, they each have a unique identity and can stand alone as a sole SBI.

These SBIs have been informed by the literature, meetings and workshops, with representatives of the simulation community through online and in-person events, held as part of wider simulation association conferences. This has been augmented through scholarly activity and literature reviews that demonstrate how the SBIs have been used for a significant period of time within healthcare, often in isolation and reported in outlier publications.

The SBIs are helpful in that they identify the overarching objectives of what the simulation is intended to explore. Taking objectives out of the educational and clinical context and language opens up the events that are being designed, empowers a freer framing of the role simulation has, and encourages empowered participation of all stakeholders. This is vital when simulation is being taken out of a clinical and/or educational context and into an area of health and care where the terminology and technology of clinical simulation is alien and could be a barrier to engagement.

In their application, SBIs provide a structural and functional starting point. It is important to be aware, and the taxonomy stresses this, that you may have more than one SBI focus. This is fine, as is the case in educational simulation where you may have multiple objectives. However, within transformative simulation they may be more easily distinguished as primary and secondary objectives for ease of design. For example, you may set out to *identify* the latent threats in a new clinical area but also plan to i*nfluence* the use of simulation routinely for these purposes in a wider scope within an organisation so that it is used more effectively and becomes part of the design processes from the beginning. As a result of this, a second round of simulation might see you contributing to redesign as both an *improvement* and *intervention* but, using your knowledge of SBIs, you could also plan to *include* and *involve* stakeholders in this process.

Once you have identified the SBI(s) that will form your focus (and this may merit thoughtful attention), you can then work to design your simulation. This will involve collaborative approaches and may be a small part of a wider evolutionary or developmental process that, for example, includes information and co-design with ergonomists, information identified from sources such as SEIPS (see Chapter 3 on SEIPS) analysis and a quality improvement team (Carayon *et al*., 2006). In the planning stages, SBIs may also benefit from being informed, in an integrated way, by more familiar project management processes for example, Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis (Heinz, 1982) and Plan, Do, Study, Act (PDSA) improvement cycles (Deming, 2000). Like educational simulation, the simulationist brings their expertise in the use of simulation to the process and will need collaboration with subject matter experts to help inform the design of the simulation. In addition to these traditional input approaches, the inclusion and involvement of SBIs can help to promote the collaboration of all stakeholders.

Application

Figure 9.1 shows how applying simulation may look as a process. This is an example of an approach from the author's (PG) experience of using simulation to develop and change practice; however, there is more than one method to follow, notably the translational simulation approach (Brazil, 2017), and others identified in the literature in the transformative simulation taxonomy paper (Weldon *et al*., 2023). Ultimately, there is no constraint against creating your own path. Undoubtedly, new SBI pathways will emerge as we learn from its application and find it easier to report and share experiences and subject this to peer review in a comparative literature environment.

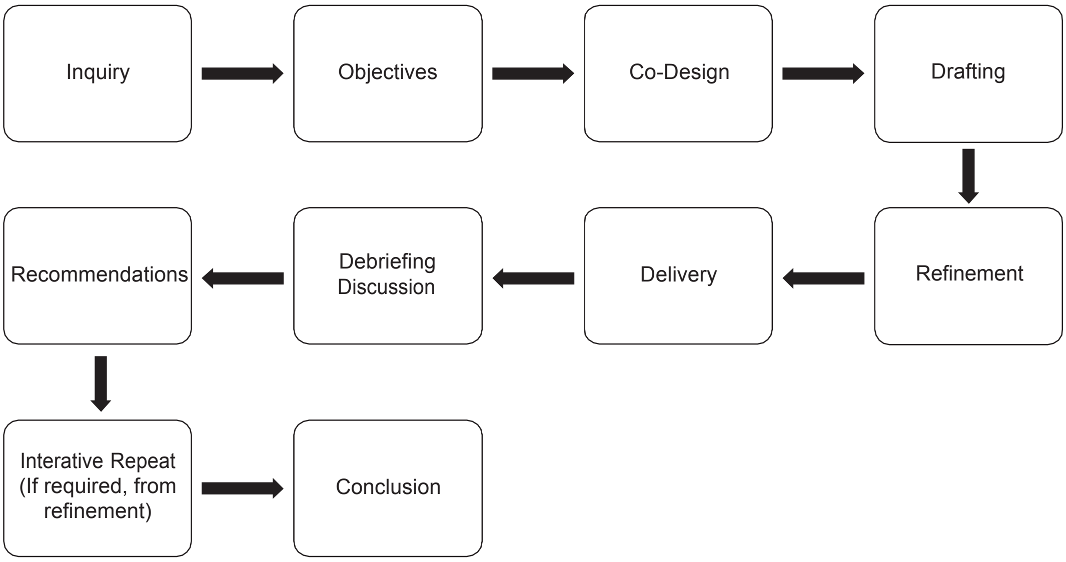

Figure 9.1 Process for Applying Transformative Simulation

While the focus of this chapter has been largely on what transformative simulation can do and how, the true starting point would be the request for assistance. To the authors' knowledge there are no simulation services within UK practice that use a proactive structured SBI approach towards service improvement; they are more likely to be approached with a request to assist. With UK healthcare simulation funding largely supported from an educational perspective based on pedagogic outcomes, this evolving role may be challenging for simulation services. Transformative simulation can help us to move beyond the limitations of learning outcomes as measures.

The **inquiry** stage can be formal or informal. All of the authors have experienced the evolution of a simulation intervention from informal discussions as a starting point. The TS framework helps to provide a structured approach to begin the process. Most National Health Service (NHS) hospitals will have simulation-based education teams that may be approached, however, these are currently not funded or resourced specifically to support this type of work and the need to collaboratively work with system and organisational support is paramount.

Identification of the **objectives** becomes the second stage. This is where the SBIs are identified to help inform and guide the further development. This process is likely to be iterative.

The third step of the process is the **co-design** stage. This incorporates the information gathering and will take into account the input from a variety of sources and could be dependent on the primary SBI that you are working with. For instance, you could be working on an Inclusion or Involvement and, therefore, it would be advantageous to include stakeholders in the co-design phase. You may be working as part of an Improvement and have input from a SEIPS analysis. Whatever your focus, the co-design stage uses the information gained to inform the drafting process. The importance in this phase is on the 'co' part of co-design. From a transformative approach, this is important as it will lead to a simulation that has more meaning for all participating with the knowledge that they/their group had been represented in the design and were not being stereotyped by the designers, or their role being seen as tokenistic or an add-on.

It is important to understand how the intended/imagined outcomes and the consequences/ output that emerges during the running of the simulation is going to be captured, documented, and reported during the debrief, and by whom. Addressing these aspects in the planning phase will inform the focus of the team delivering the transformative simulation event and is critical to the quality of the event.

The **drafting** phase calls on all contributors to the design process to work together with the simulation team so that what is simulated is what had been imagined. This is similar to the development of clinical scenarios and consultation with subject matter experts in the clinical speciality being simulated.

The fifth phase, **refinement**, sees the simulation presented and piloted, and any refinement undertaken. This allows the co-contributors to have an understanding of what the simulation may look like. Piloting, while not only being good practice (INACSL, 2021) in a simulation also allows for changes and manipulations that may help you better understand what you are delivering.

Delivery of the simulation is the sixth phase. This will be specific to the scenario developed. The timeline for this will depend completely on what you want to achieve and how much detail or development is required for the simulation event. The inclusion of participants with little or no simulation experience will require more time to orientate to the process being used. Equally, simulation that is delivered collaboratively will need clear explanation to all participants. The fundamental principles of simulation delivery are still required, regardless of the reasoning behind the delivery.

The seventh phase within a transformative approach is a structured post-event **debriefing discussion**. This will loosely follow a debriefing structure and process. The techniques of a skilled simulation debriefer will be necessary to elicit perceptions of what has happened, opinions, experiences and evaluations in relation to the SBIs. There are two variations from a more traditional simulation-based education debriefing process.

Firstly, the participants may not have any knowledge of simulation, and they may not have any knowledge of healthcare, but their experience of the simulation or what it illicits for them is still valid and owned by them. This means that the facilitators need to be aware and willing to modify their approaches to elicit the experiences (simulation or recall-based). The facilitator must suppress the knowledge they have and be open to the opinions of those who have a differing view from a different perspective than the healthcare professional and/or the facilitator.

Secondly, while the closure approach of most inquiry-based debriefing models is about the participants' take home messages (Orinot and Alinier, 2018), within transformative simulation the take home messages are also for the team facilitating and observing the process being simulated. This may be the same as those who have participated but not always; it needs to be made clear at the beginning of the simulation that this is not an educational event but their contribution may lead to the education of others.

Once the structured discussion has been completed, the eighth stage is that of sharing the observations and **recommendations** with the wider investigators. This could be as part of a discussion or a formal report process. This dissemination of findings should be in a form that records the observations/recommendations with rationale and action points to be referred to and possibly used in the next stage. It is important that participants are aware that observations will be shared and to ensure that participants' confidentiality is maintained. The creation of the safe space is still a valid and expected requirement with transformative simulation. The fiction contract (Dieckmann, 2009, Rudolph, Raemer and Simon, 2014) must be worked at by the facilitators of the simulation, often with more depth.

Simulation design is an **iterative** process with the need to continually adapt and update. There may be a requirement for a ninth stage to be undertaken. Refinement from the information already gained informs a repeat of the simulation to ensure any recommendations work as imagined. Once this has been completed, move to the final stage.

Finally, at the tenth stage, **conclusions**, the summarised observations are shared with the wider stakeholders involved in the process. It is also a chance to reflect and identify how you would develop your processes further.

This approach can appear time consuming but has several advantages. The ten steps break down the overall process into easily manageable segments that allow facilitators to better understand where they are within the process. This demonstrates progress and allows focus on what needs to happen to complete the process.

Following this process also contributes to the succesful change characteristics that Nilsen *et al*. (2020) described where participants have a sense of being able to influence change, being part of the design process both within the simulation and the wider HFE approach.

Conclusions

This chapter has taken the reader through the application of simulation for a non-pedagogical approach. We have explained the background to this and that, in reality, this is not a new use of simulation but is something that has been undertaken with little recognition of its worth within healthcare.

To deliver transformative simulations, there is a need for skilled simulationists and simulation teams to work collaboratively with stakeholders. This collaborative approach, together with support from organisations, can see transformative simulation not only contributing to safer working practices but also to truly holistically designed healthcare.

CASE STUDY 1

Emma Broughton, Head of Education for Simulation at a Tertiary Paediatric Hospital

Background

In 2020, our organisation introduced a surgical procedure that was not previously offered by the Trust. Prior to the introduction of this care pathway, the simulation team were approached to conduct a 'run through' simulation exercise to assist the multidisciplinary team involved in this procedure through rehearsal of the patient pathway between the hospital's neonatal unit and operating theatre.

The **inquiry** focused on transfer between the two care environments. This was deemed to be a high-risk aspect of the patient journey in recognition of the multiple teams involved, and the complexity of tasks associated with transfer to and from the theatre environment.

The simulation team advocated for a full-scale live simulation to accurately reflect the care pathway that this patient cohort would follow. Due to the number of teams involved in this procedure, and the nuances around internal transfers between acute environments, a large-scale exercise was deemed to be more appropriate than several siloed efforts focusing on segments of the patient's surgical care.

The exercise set out to use simulation to inform and influence the patient pathway and SOP for this procedure.

The following **objectives** were agreed as part of a joint needs assessment with the clinical teams:

Innovation

- Rehearse the safe transfer of neonate from NICU to Cardiac Cath Lab.
- Rehearse the set up and walk through of a patent ductus arteriosus (PDA) closure procedure, including positioning of patient and all intra-operative equipment.

Identification

- Troubleshoot the process for patient warming during transfer and surgical procedure.
- Navigate the proposed SOP for closure of Neonatal PDA in the Cath Lab.

What We Did

One month prior to the exercise, the simulation team met with key stakeholders to understand their aims for the exercise and to learn more about the proposed pathway for these patients as part of the **co-design** phase. Input from the clinical, surgical and anaesthetic teams formed the basis for the overarching objectives and focus of the exercise. A date was agreed for the following month based around theatre downtime. Each team took responsibility for securing the personnel, resources and space required to conduct the simulation, the **drafting** and **refinement**, accurately at each point of the patient pathway. Figures 9.2 and 9.3 show the simulation set up.

The stakeholders included theatre team leaders, speciality leads, medical consultants and ward managers. These senior team members played a fundamental role in protecting time for staff to participate in the event. Early engagement was attributed to the fact that a regular in situ simulation provision was already embedded across the Trust, with buy-in from quality and safety leads as well as senior managers. Moreover, the simulation team formed part of a weekly safety committee, where latent errors identified through simulation were reported at a high level. Consequently, the use of simulation as a patient safety intervention was not a new concept for the teams involved and they were already open to a culture which embraced simulation.

Before this exercise, all latent errors captured via simulation were reported within a designated domain of the Trust incident reporting system. This meant that each latent error was reported and followed up separately in a bid to close the loop on each individual risk. As this was the first exercise of its kind, it was felt that a robust and detailed report would be required to prevent the outcomes from being siloed. Moreover, it was thought that a comprehensive report would ensure actions and recommendations were clearly defined and assigned to local action owners where appropriate.

Figure 9.2 Simulated Patient Being Prepped for Surgery

Figure 9.3 Simulated Neonatal Setup on the Operating Table

In seeking out an evidence-based structure for the findings of the simulation, the SEIPS model (Carayon *et al*., 2006) was identified. During **delivery** and **debrief**, the observations from the exercise were mapped to the domains of SEIPS, which provided a useful structure for the session report. Recommendations or actions were assigned to each of the observations, based on the expert input offered by the team members involved.

Lessons Learnt

What Worked Well?

We attributed the success of the exercise to several factors:

- Engagement and input from the clinical teams involved in this patient pathway.
- The opportunity to agree shared goals for the exercise.
- Effective communication with all parties involved.
- Buy-in and presence from senior team members.
- Local ownership of actions and recommendations.
- An open culture which enabled stakeholders to contribute.

The support of the medical consultants, theatre team leaders and clinical leads was central to the success of this exercise. Their engagement with the planning and delivery of this intervention, role-modelled investment in simulation and a commitment to improving outcomes for patients. Furthermore, the exercise was framed as an opportunity to influence and improve the workflow. Anecdotally, this appeared to diffuse some of the anxiety that has previously been observed in response to simulation in these areas of practice. This highlighted the importance of clearly stating the aims and scope for the exercise during the pre-simulation brief.

What Didn't Go So Well?

The timescale for the exercise proved to be the greatest challenge. Two hours of protected time had been allocated for the simulation; however, this extended to four hours. This created a potential risk to stakeholders by placing them under time pressure when they had clinical duties to attend to in preparation for the next day.

Although actions were captured as the event played out, the team were left with a 30-minute opportunity to debrief at the end of the exercise. The debrief was structured by returning to the initial objectives of the exercise while seeking reflections and feedback on each of these points.

Although this helped to draw out the outcomes from the simulation, with 18 participants present not everyone had the opportunity to comment due to the time constraints.

For these cases, parents or carers would usually be present during key moments of ward-based care. Despite this, representation from parents or carers was not considered. This may have been a missed opportunity to seek input from families to help shape aspects of the care pathway, such as checking out of the ward environment.

Evaluation and Impact

From the exercise there was a total of 18 outcomes that led to **recommendations** for future practice. Many of these recommendations related to the physical environment, which was already established prior to the introduction of this new patient intervention. Other outcomes included modifiable factors around communication processes and availability of clinical equipment. A summary of the findings is shown in Figure 9.4 mapped to the domains of SEIPS.

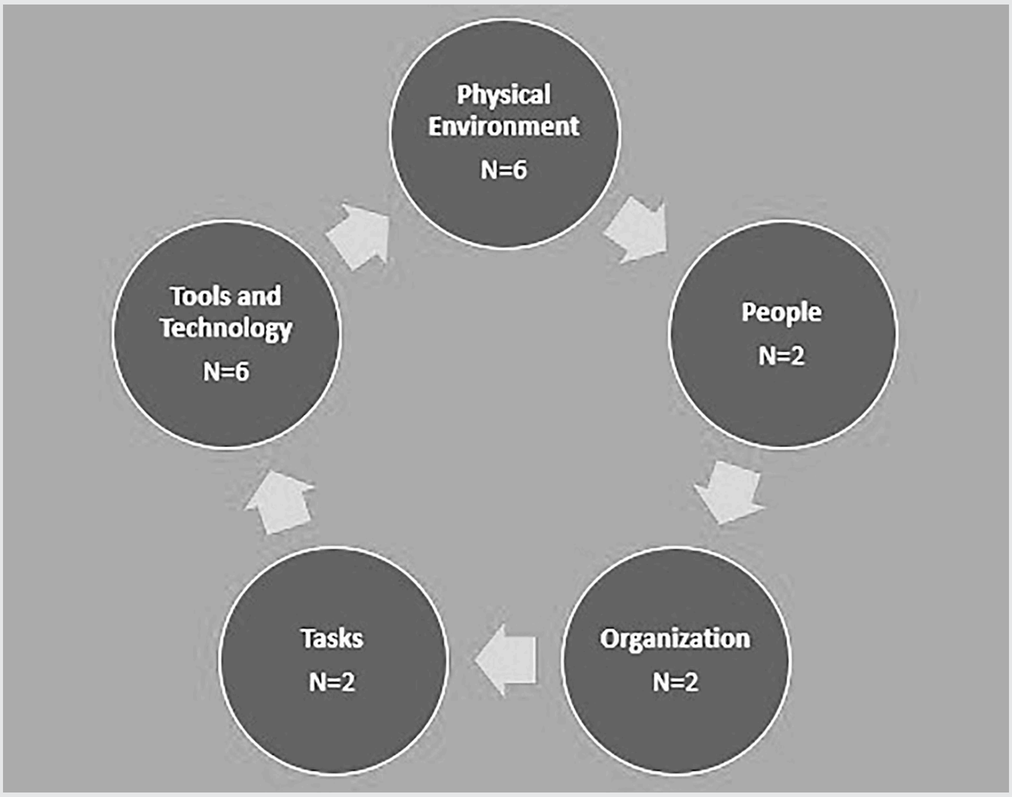

Figure 9.4 Outcomes Mapped to the Domains of SEIPS (2006)

Observations were noted throughout the duration of the exercise, with two facilitators capturing notes. The stakeholders were then taken back through the objectives and timeline of the patient pathway during the debrief and invited to feedback any additional observations or recommendations. These actions were then compiled into a report by the simulation team and shared with all participants.

Due to the nature and scope of this simulation, a standardised session evaluation was not deemed appropriate. Instead, team members were invited to comment on or add to the session report — as they were regarded as the subject matter experts in this case. On reflection, it would have been useful to understand their experience as experts and stakeholders, separate to the outcomes of the session. This is something that has since been implemented in subsequent similar exercises.

This exercise became the first of many applications of simulation to support systems integration within the organisation. Following the success of this initial endeavour, a further 20 exercises have been delivered with 79 latent errors captured and several protocols influenced. A snapshot of the subsequent exercises is provided in Figure 9.5.

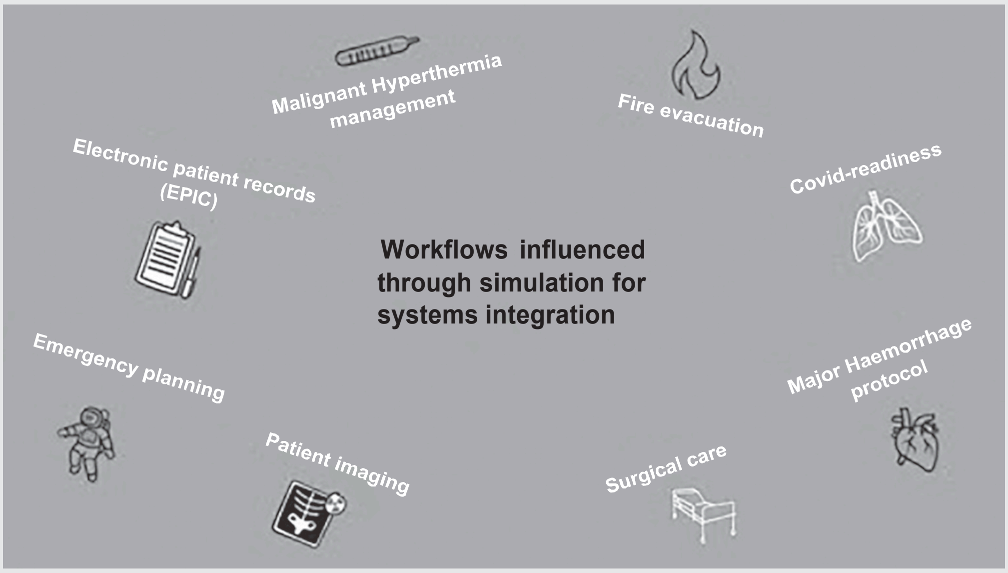

Figure 9.5 Workflows Influenced by Subsequent Simulations

Having input from families could have strengthened the outcomes of this simulation, given the unique insight they can provide from their lived experience. Further, there was only a short turn-around between the exercise taking place and the first patient being treated on this pathway. Had there been more time between these interventions, the simulation could have been revisited to assess the impact of the outcomes from the initial exercise.

Conclusions

Key elements needed to establish a successful systems level simulation:

- Identify protected time for planning, delivery and follow-up.
- Ensure engagement from key stakeholders from the outset.
- Engage stakeholders in needs assessment.
- Invite stakeholders to set the aims and objectives.
- Seek high-level buy-in from the organisation.
- Identify a mechanism for reporting outcomes.
- Ensure local ownership of actions.
- Consider feasibility of repeating the sim to enable evaluation of long-term impact.

The SEIPS model is traditionally used as a tool to examine system safety in the context of live work-flows. In this case study, you could argue that the model was used beyond it's intended scope by being applied retrospectively to analyse and structure findings. Although this approach proved to be an effective way of gleaning focused recommendations from the simulation, had the tool been used prospectively during the simulation, the team may have viewed the simulated workflow through a more focused lens.

The key learnings from the exercise were the value of early engagement from stakeholders; the need to protect adequate time for design, delivery, evaluation and dissemination; and the importance of a mechanism for reporting outcomes. Importantly, the output from this exercise helped to demonstrate the value of simulation to support systems integration. Consequently, this application of simulation has since seen significant growth across the organisation.

Since this simulation intervention was carried out, 15 patients have successfully been treated on this surgical pathway. Beyond the scope of the initial exercise, the following areas are currently being explored for future development:

- Use of the PEARLS debrief model for systems integration exercises (Dubé *et al*., 2019)
- Adopting an iterative approach to assess immediate and long-term impact of simulation interventions.
- Patient and family involvement in the design and delivery of simulation.
- Using simulation to support hospital transformation projects.

For the future, it is our aim to continue to raise the profile of simulation as a tool to enhance, influence and inform our hospital systems, making them safer for patients and workforce alike.

Reflections from the Frontline

- The challenges in using this approach, as ever in simulation, include resources and, more specifically, capability to apply this type of simulation approach effectively. You need to engage, motivate and support participants to be part of something that doesn't follow the traditional expectations and outcome measures of simulation-based education.
- The simulation in the case study took four hours rather than two. This highlights the need for protected time to be allocated to not only carry out a simulation but allowing enough time for a debrief too. This can be difficult to get with frontline staff already under pressure.
- There needs to be 'buy in' across the spectrum of organisations and participants involved prior to and during the simulation process being applied, similar to any processes and projects that necessitate change, and a willingness to act on the outcomes.
- The use of simulation, while not new within healthcare, requires facilitators, often from a healthcare profession background, who are willing to put aside their own informed personal views and apply their expertise in simulation, including analytic observation.
- Transformative simulation offers the opportunity to use simulation differently, with a different focus that encompasses not just patient safety but also the engagement with participants in health and care, engagement with persons that influence health and care, and engagement with systems and processes that impact health and care.
- In the case study, the parents were not involved, and this was a missed opportunity to seek input from them to help shape aspects of the care pathway and gain a different perspective and input.
- A move to develop faculty from outside of healthcare as facilitators could enhance the opportunities for transformative simulation and patient safety as a whole. Including the lay faculty (non-clinical people who are running the simulation) brings a voice to challenge what can often be an approach laden with assumptions within healthcare and simulation.

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