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Integrated simulations to build teamwork, safety culture and efficient clinical services: A case study

Abstract

Background: Simulation methodology and frameworks were used to build teamwork and a safety culture, and to establish efficient clinical services within the procedure centre of a newly constructed, stand-alone, fully digital greenfield hospital. Rapid ramp up of surgical services required significant recruitment, and onboarding necessitated training of nursing and other perioperative support staff.

Methods: A two-day, immersive integrated simulation activity was carried out with the interprofessional onboarding staff participating in their usual roles. During the simulation, staff had the opportunity to apply newly acquired skills and knowledge to all stages of a patient's clinical journey through the procedure centre, including use of the integrated electronic medical record (ieMR) and non-technical skills.

Results: Department processes and workflows were rehearsed in real time before the procedure centre opened to patients. A safe environment was created for staff with formal prebriefing and debriefing delivered at the commencement and conclusion of the simulation activity.

Discussion: The integrated simulations reduced uncertainty and streamlined service delivery for staff who participated in the training, with simulations also used to foster interprofessional team training for clinical workflows. The simulation process allowed interprofessional teams (e.g. nurses, support staff, surgeons) to interact with one another prior to the facility opening.

Keywords: simulation, operating theatre, procedural, debrief, ieMR

Introduction

Simulation is increasingly being used in health care settings to allow staff training to occur in a controlled environment. Termed 'in situ simulation', this model allows deliberate practice and assessment of cognitive, psychomotor and affective skills of individuals within the actual work environment.[1] Key to the successful design and delivery of the simulation activity in this case study was ensuring that the planned simulation program could be delivered to staff across all clinical areas in the procedure centre thus integrating both perioperative and digital integrated electronic medical record (ieMR) processes and workflows. It has been shown that the effective use of in situ simulation fosters interprofessional team training and a culture of safety essential for high performance.[2]

This paper will describe how integrated simulation methodology and frameworks were used to build teamwork, safety culture and efficient clinical services within the procedure centre of a newly constructed, stand-alone greenfield hospital. The simulation activity

was delivered as a component of the training and induction program for staff new to the hospital. The simulation activity focused on testing processes and workflows within the procedure centre and training new clinical and non-clinical staff before the hospital opened to patients. The simulation was delivered as an integrated activity with the project digital team who coordinated and managed staff training for the ieMR. At the time of writing, there had not been another fully digital, greenfield hospital opened in Australia.

Background

The Surgical Treatment and Rehabilitation Service (STARS) is a new, 182 bed, fully digital, greenfield facility that welcomed its first surgical and procedural patients on 8 February 2021. The procedure centre at STARS has seven operating theatres, three procedural rooms, two Post Anaesthesia Care Units, a central sterilising unit (CSU) and a day surgery unit.

The initial project brief for the new service was that the procedure centre would open only gastroenterology services and the

Table 1. Stages of the simulation process

Stage 0	Planning	• Identify objectives and expected outcomes of the activity. • Identify key stakeholders for the activity and any initial physical or technology constraints, staff information needed, available resources and required resources. • Determine if any upskilling of simulation team is required.
Stage 1	Preparation	• Analyse all available data. • Form training team for activity (encourage interprofessional team members). • Engage with key stakeholders. • Identify how many simulations are required. • Finalise draft simulation activities on a standardised template. • Schedule regular simulation reviews with the training team. • Conduct tabletop walk-through when simulation drafts are completed.
Stage 2	Rehearsal	• Re-engage key stakeholders and arrange time to walk through the entire simulation in the designated clinical area if possible. • Make any required changes to simulation. • Repeat rehearsal of simulation if required. • Ensure required resources are available for the activity.
Stage 3	Delivery	• Allocate members of the simulation team to facilitate appropriate simulation activity. • Prebrief participants, deliver simulation, debrief participants. • Gather feedback and evaluation forms from participants.
Stage 4	Debriefing	• Debrief simulation team and training team members.
Stage 5	Evaluation and reporting	• Make any required adjustments to written simulation. • Review simulation participant feedback and evaluations. • Provide written report to department leads and key stakeholders. • Recommend adjustments to process and procedures where appropriate and relevant. • Provide required education support to clinical area after the simulation activity.

Table 2: Constraints

Physical constraints	Technological constraints	Staffing constraints
• Project team located in a building off site. • Unable to enter hospital building site.	• No prior ieMR experience. • ieMR was built for STARS during project. • Workflows needed to be developed. • ieMR training occurred on different hospital builds. • Hardware fit-out unknown.	Mixed staffing model for anaesthetics. Desire for STARS to adopt interprofessional approach. Unknown requirements of STARS education research alliance (SERA). Several changes to workforce model. Simulation experience of staff unknown.

CSU in 2021, with surgical services scheduled to commence in 2022. However, in light of the worldwide COVID-19 pandemic, by the end of May 2020 it was announced that surgical services would be commissioned 12 months earlier to assist with post-pandemic recovery management. When planning commenced for the training and induction program, and the utilisation of an integrated simulation model, recruitment of hospital staff had not begun and a final workforce model was not yet available. It was unknown what level of perioperative experience the staff recruited to STARS would bring. Thus, an innovative approach to inducting and orientating new staff in a new facility was needed to rapidly build a cohesive team.

Objective

This paper aims to describe the simulation process applied in this case study, which can be adapted for use in clinical settings to orient staff and test workflows and processes. Specific case study examples will be used to assist with demonstrating the stages of the simulation process (see Table 1), which are based on prior simulation education and experiential learning of the STARS perioperative team.

The simulation process

Planning (Stage 0)

The objective communicated by project leads was to develop an integrated induction and orientation program for the new staff that would commence in the procedure centre at STARS, incorporating simulation activities where appropriate. Previous greenfield hospital sites had been opened within Queensland; however, opening a new hospital as a fully digital greenfield site had not previously occurred. As a result, benchmarking against other integrated programs was not possible. Our program approach was developed from the perioperative nurse educator's prior simulation experience and informed by literature.

Operating theatres and procedural centres are made up of interprofessional teams that follow clearly defined processes supported by policy, procedure and legislation. Throughout the development of the training and induction program, the perioperative nurse educator and clinical coaches worked in collaboration with key stakeholders – including nurse unit managers (NUMs); the nursing, medical and anaesthetics directors; project leads and subject matter experts – on process, policy and procedure development through a series of working parties. Initial planning for the training and induction program commenced with some isolation and constraints (see Table 2). These were worked through systematically and shared with additional team members as these staff came on board.

The initial outcome measure nominated by the perioperative nurse educator for the integrated training program was that recruited staff will be work ready and provide safe patient care at the completion of their assigned induction and training program.

Preparation (Stage 1)

Clinical nurses who had successfully obtained a position at STARS joined the training and induction team approximately four months before the scheduled onboarding date for new STARS staff.

The clinical nurses fulfilled a coaching role during the final project stages. The clinical nurses reported after onboarding that they had no prior experience with writing and facilitating simulation activities. It was essential to build their knowledge of simulation for

the activity to be successful, so reprioritising of activities occurred. Simulation education and support was provided by the perioperative nurse educator to the clinical nurse coaches during this stage of the process.

The clinical nurse coaches were assisted to develop and write simulations using the simulation quality improvement tool template (see Appendix 1). The simulations were written, developed and tested over a three-month period. Practice standards of the Australian College of Perioperative Nurses (ACORN) and Australian and New Zealand College of Anaesthetists (ANZCA) informed the design of the simulation content. Digital workflows and the models of care developed during the project were also reviewed and incorporated into the simulation design.

The priority at this stage was to determine what was achievable and what was required to ensure a trained and work-ready nursing team. With the challenge for our team being to bridge the gap between architectural plans and real-world efficient and effective patient care,[3] the perioperative induction and training team focused on developing key simulation scenarios. These simulations were designed to bring together individual training activities from the induction program, processes, workflows, non-technical skills and all professional groups into the clinical space.

A foundation patient journey simulation was written. This simulation covered the patient's perioperative journey from arrival to the procedure centre through to discharge after the procedure. Additional simulations were written by the training team which added to the foundation patient journey simulation for each specific area. Activities such as specimen handling, calling for medical imaging assistance, accessing the automated medication dispensing system (pyxis, med station and Anaesthetic A station) and providing pain relief to a patient were included into the simulations developed. Integrated into each stage of the patient's journey was the use of the digital ieMR and the related workflows.

Table 3: Simulations

Operating theatre and procedure rooms	Post Anaesthesia Care Unit (PACU)
1. Normal patient journey 2. Can't intubate, can't oxygenate (CICO) 3. Specimen management 4. Malignant hyperthermia 5. Blood management 6. X-ray / Image intensifier (II) required 7. MRSA (endoscopy suite) 8. Allergy (endoscopy suite) 9. Normal patient (double procedure endoscopy suite) 10. Equipment failure (endoscopy suite) 11. Aggressive patient	12. Normal patient journey 13. Patient requires a surgical review 14. Patient requires pain protocol 15. Management of aggressive patient 16. Patient requires x-ray, post-surgical procedure

A total of fourteen integrated simulation scenarios were written; the planned scenarios were interprofessional activities that engaged with relevant departments outside of the procedure centre, where required. A point of concern raised by the team during preparation was that there were still key decisions and workflows outstanding as the simulations were being developed. There was also some conflicting information on processes that included other departments, such as transporting of a specimen to pathology. Therefore, there were 16 patient scenarios in the final simulations (see Table 3). The team acknowledged that the simulations would be updated when additional information became available or decisions were endorsed.

For the simulation activity to be successful, multiple simulated patients were required. This provided a logistical challenge which was overcome with a creative solution that allowed the challenge to be managed in house. New staff onboarding to STARS were to be used both as patients and in their usual roles for the activity. This ensured that all new staff participated in the simulation activity over the two days. Staff were split into two groups with half of the new staff acting as patients and the other half as staff members on the first day of the simulation and then swapping over on the second day. It was felt that this approach would maximise learning opportunities and promote team building and use of non-technical skills.

Digital trainers were engaged and assisted with creating patient profiles in the ieMR that covered a variety of surgical specialities and procedures. Patient profiles were staged so that staff could interact with the ieMR during the simulation as they would for an actual surgical patient. It is reported in literature that digital transformation of a hospital is a disruptive event and can cause a decline in time efficiency, described in literature as digital deceleration.[4] By providing new staff with the opportunity to practice using the ieMR during the simulation and prior to the hospital opening, it was hoped that the potential impact of digital deceleration would be decreased at STARS.

An invitation to participate in the simulation activity was extended to other professional groups after consultation. We experienced good engagement from other groups including medical and administrative staff, theatre support officers and staff from inpatient surgical ward, pathology/blood bank, pharmacy and digital support. Once the initial drafts of the simulations were completed, they were peer-reviewed and the perioperative NUMs were invited to complete a walk-through of the simulation with the training team. If required, the simulation flow was adjusted, and additional walk-throughs were completed. Collaboration with other key stakeholders occurred to refine sub-processes within the simulation scenarios before the final simulation documents were signed as ready for the rehearsal stage of the process.

The simulation activity was planned to run on the final two days of the training and induction program. This included having four operating theatres and one endoscopy room as part of the activity, with each patient completing a full patient journey. In total, the team was aiming for twenty patients to pass through the department on each of the simulation days. This target was above the scheduled number of patients who were booked for procedures in the first week of STARS welcoming patients.

Rehearsal (Stage 2)

Two individual simulations were delivered to key stakeholders prior to the simulations being finalised for use in the training and induction program:

1. a foundation simulation of a patient journey through the operating theatre
2. a foundation simulation of an endoscopy patient journey through the procedure rooms.

Each simulation was delivered as a structured and orderly run-through of a patient journey from admission to the unit at reception to discharge from the unit post-procedure. Throughout the simulation, participants were given the opportunity to provide in-time feedback. However, rather than immediately adjusting the planned simulation process based on this feedback, the feedback was noted on the simulation template and discussed at the facilitated debrief. This approach allowed experienced personnel to apply their collective skills without interruption and subsequently allowed them to review and discuss the advantages and disadvantages of their behaviours, decisions and actions.[5]

The debriefing following the simulation activity involved the interprofessional team, the participants in the simulation and the observers of the simulation. The debrief used a plus–delta framework to document things that went well during the simulation (pluses) and opportunities for improvement (deltas) or things that didn't work well. Pluses are items that the individual or team want to maintain and build upon. Deltas are things that can be changed so the individual or team may be more effective. Ideally an effective plus–delta debrief generates two lists of behaviours which prompts further discussion, reflection and learning.[6]

The simulated journey of an endoscopy patient was rehearsed with key stakeholder's present. At the completion of the first simulation rehearsal there were still questions and undefined processes that needed to be finalised before the workflow of the patient journey through the endoscopy suite could be endorsed and the simulations used for onboarding new staff. Examples of concerns raised in the debrief by participants included the digital and clinical workflows for specimen management and the pathway for dirty scopes to be transported for reprocessing. Members of the training team and department leaders took specific actions from the rehearsal debrief to follow up at the conclusion of the first simulation activity. A second simulation rehearsal was facilitated a week later. It was determined at the completion of the second simulation rehearsal that the endoscopy simulations could now be used for training the new staff.

Delivery (Stage 3)

The simulations were held on the final two days of the training and induction program. Approximately 140 nursing staff and anaesthetic assistants participated in the simulation activity. Additional professional groups were also invited to participate; these included medical staff, patient support officers, administration staff and staff located in other

departments including medical imaging and the surgical ward. Each simulation session included a prebrief, simulation activity and debrief. Staff came to the simulation activity with a basic understanding of what the processes would be in the department, and the relevant applications and digital systems that would be used, after attending classroom sessions with facilitators. The simulations were designed to provide an opportunity for staff to consolidate training, knowledge and newly gained skills by rehearsing processes and care delivery in their clinical area. The training simulations were slower and less structured than the rehearsal simulations; however, adherence to policy, procedure and perioperative standards were maintained. This approach allowed time for staff members to identify when they were unsure and seek assistance from support options that were available to them (i.e. digital floor walkers, clinical nurse coaches, perioperative nurse educator) when required. The staff actively worked through the relevant simulated processes at each stage of the patient's perioperative journey either independently or with support. There were also several parallel processes that could be observed as staff worked through the training simulations, including:

- testing staff and identifying how the proposed processes were interpreted and applied by staff in the clinical space
- testing the suitability of the processes that had been put in place through the project
- testing if staff could use the digital systems (e.g. ieMR) after they had received classroom training
- ascertaining if the combined processes and systems worked together as expected.

Prebrief

A training team prebrief session was held with the clinical nurse coaches prior to the prebrief session for the new staff members. Significant support was provided to the clinical nurse coaches to ensure that they were comfortable with their simulation and how they planned to run their simulation session.

A prebrief was held for all simulation participants and support staff prior to the simulation activity commencing. A prebriefing sets up clear expectations for participants who may have variable simulation experiences.[7] The perioperative nurse educator encouraged staff to fully engage in the activity and reinforced that a priority was ensuring the psychological safety of all simulation participants. It was discussed with staff that during the simulation activities it is safe to make mistakes and trial new processes. The perioperative nurse educator encouraged staff to report any identified safety or efficiency concerns to a member of the training team. In a psychologically safe environment staff members do not fear disciplinary action or punishment for admitting mistakes – they speak up, discuss problems and mistakes, learn from others and solve problems. These behaviours ultimately result in improvements in systems and processes that lead to safe environments for both patients and staff members.[8] During the prebrief, half of the staff were allocated to either a specific theatre, procedure room, post anaesthetic unit or day surgery unit to be a part of the team for the area. The other half of the staff were allocated to the role of the patient for the activity. The flow of the simulations through their operating theatre or procedure room (e.g. normal patient journey, specimen management, CICO, x-ray or image intensifier required) was discussed with participants. Digital support facilitators were allocated to an area and participants were then taken to their specific area and a smaller huddle of the specific teams was facilitated by the clinical nurse coach allocated to the area. Staff allocated to the role of the patient were taken to the procedure centre waiting area to get ready for admission.

Simulation activity

The first simulation activity for all teams was a normal patient journey and then the complexity of the simulations was gradually increased. This allowed the team to settle into the activity and their allocated area. This approach helped staff become familiar with other team members and the processes related to caring for their patient. Effective information flow between perioperative phases, physical locations and clinicians affects the quality of care that perioperative teams provide.[9] We wanted minimal stress to be placed on staff and relationships to allow team work to grow organically throughout the simulation activity as acute stress has been shown to affect decision-making and teamwork.[10] The ieMR training domain was used for the simulation activity throughout the entire patient journey. Staff members in each of the operating theatres were provided with a simulated patient list that had been generated from the ieMR by the digital team. During the simulations staff were encouraged to follow and test clinical processes and workflows. All issues and questions raised by the staff during the activity were explored and corrected in real time.

The simulation activity used four operating theatres and one endoscopy room with four patients in each room. Each patient

completed a full journey through the department and were cared for by an interprofessional team of staff including administration officers, nurses, theatre assistants, doctors, allied health practitioners, medical imaging staff and pharmacists. For the first day of the simulation activity the plan was to facilitate 20 patient journeys. In practice, the simulation was ceased after 18 patients had passed through the department. The total simulation run time was approximately five hours.

For the second day of the simulation activity adjustments were made based on educator observations and feedback from the training team and participants. One of the simulation scenarios was changed from CICO to blood management. This change occurred to ensure that management of two key emergency scenarios was explored with staff. The simulated patients were decreased by one patient in the operating theatres due to the time it was taking for staff to work through the activity. The number of simulated patients allocated to the endoscopy rooms was left unchanged as this group was not experiencing the same time challenges. The total simulation run time for day two was four hours.

The PACU staff were able to use the ieMR and the Pyxis medication station to check and administer medications to patients. Staff practised retrieving and preparing patient-controlled analgesia devices for patients. Patients were discharged from the PACU to the day surgery unit and simulated discharge of patients from the procedure centre to home was also practised.

End of activity debrief

Properly facilitated debriefing sessions enable simulation participants to feel comfortable with being open and honest about their simulation experience.[11] A debrief was held on each day of the simulation activity for the participants and support staff and was led by the perioperative nurse educator using a plus–delta framework. It was reiterated to staff that the debrief was a safe space to share thoughts, experiences and feedback, and that debriefing is an essential part of participating in simulation activities. If multidisciplinary perioperative teams are to meet their learning objectives they must reflect on their experiences and test their understanding of knowledge gained.[11] The clinical nurse coaches then took the staff back to their clinical areas and held an additional debrief that was focused on a specific clinical area. Feedback provided by participants indicated that the second, smaller debrief proved to be a great team building and information-sharing exercise for the new staff.

Debriefing (Stage 4)

After the first day of simulation training, a debrief was held with the training team by the perioperative nurse educator to determine if any changes needed to be made to the activity before it was facilitated again the following day. The feedback and information obtained in this debrief informed some minor adjustments to the simulation for the following day, including the removal of one patient from the list in each operating theatre. It was also decided that a simulation on blood management would replace the CICO simulation for the second day of the simulation activity.

Evaluation and reporting (Stage 5)

Evaluation occurred at different key stages of the project. Primary evaluation of the patient journey simulations was the first evaluation activity completed when the two simulations were reviewed and adjusted after desktop activities and walk-through rehearsals with key stakeholders. The purpose of the primary evaluation was to ensure clinical accuracy and simulation efficiency before delivering the simulation to participants.

During the development of the simulation activity the training team determined that Kirkpatrick's evaluation model would be appropriate to assist with final evaluation of the activity. Kirkpatrick's model has four levels: reaction, learning, job performance and organisational impact. It is outcome and objective orientated and is a summative evaluation model.[12]

Key evaluation data was collected by the training team through conversations and observations during the simulations and from participant feedback given during plus–delta debriefing and participants' written feedback collected via an optional questionnaire. A secondary simulation evaluation was completed at the end of the first day of the activity by the training team. This evaluation led to some minor changes and improvements to the planned activity for the following day. Participants were encouraged throughout the activity to self-evaluate, reflect on their practice and take the opportunity to consolidate their skills. Some participants did seek assistance from a member of the simulation team if additional support was required.

All feedback collected was reviewed by the perioperative nurse educator and the clinical nurse coaches. The feedback was compiled and given to the nursing director and

NUMs to review (see Appendix 2). The simulation team reported that level 3 evaluation on Kirkpatrick's evaluation model was achieved for the simulation activity. Staff were observed applying and consolidating learnings from didactic ieMR training sessions and orientation activities in the procedure centre throughout the patient journey and additional scenario simulations. It was not possible to assess if level four of Kirkpatrick's model, organisational impact, was achieved as the facility was not yet operational.

Discussion

Ensuring that all project objectives were met and a successful in situ simulation was delivered proved to be both a challenging and rewarding experience for the training team. Planning a successful training and onboarding program for a large number of staff whose experience and skill set were largely unknown required a unique approach. The training team recognised that it was essential that newly recruited staff were provided with the opportunity to consolidate learnings from didactic sessions and test newly developed workflows and processes in the clinical area before the facility welcomed patients. Petrosoniak et al.[2] define in situ simulation as a team-based training technique conducted in the actual patient care environment using equipment and resources from that unit and involving actual members of the health care team. Adding to the simulation being delivered in the actual procedure centre we integrated ieMR workflows into our patient journey simulations and ensured that support staff were available to help simulation participants when they required assistance. Because the objective of an ieMR is to facilitate the complete patient journey across all hospitals, units and professions in a health service organisation,[13] we felt that it was essential for the simulations to include as many ieMR workflows as possible for participants to practice their newly acquired knowledge and skills. Taking an integrated, in situ and interprofessional approach to our training simulations made the development and facilitation of the simulations complex and unique.

We felt our most valuable simulation was the foundation patient journey simulation. Nickson et al.[14] state that testing new health care facilities through simulation can trial workflows, address ergonomic issues and identify latent safety threats before 'going live'. The patient journey simulation was the first simulation written and tested by the training and induction team. This simulation followed the complete perioperative patient journey and informed the development of the additional simulations. Brazil[15] reports that designing simulations to focus on systems and processes rather than knowledge and skills can assist with embedding processes and procedures and offer diagnostic opportunities when preparing to open new facilities or services. Once the foundation simulation was written and finalised it was then possible to begin writing other simulations for the activity.

Although this paper describes the application of a framework for simulation development for our new facility, the proposed framework is flexible and can be applied in other settings to support the development of teams and safety culture, and to test workflows and processes. We recommend using a quality improvement approach when developing a simulation activity for clinicians if there is limited simulation experience within the simulation faculty, as this framework is widely understood in health care and is adaptable and flexible. Other health care organisations who may choose to adopt this framework could consider designing a research project in addition to using this simulation framework to support design and facilitation of a simulation. Our team determined that running a parallel research project was out of scope for our team and this activity.

We observed a noticeable difference in staff behaviour between the first and second day of our simulation activity. Staff communication improved and group discussions occurred organically. The teams demonstrated improved efficiency and confidence with the use of the ieMR and patient flow through the department. Many of the barriers to good teamwork and communication in health care can be attributed to organisational, educational and cultural factors.[16] It was unclear if the behaviour improvements observed were due to staff becoming more comfortable with their role, with using the ieMR, with their team members or with the overall simulation activity. The clinical nurse coaches reported that feedback received from participants during the simulation activity had led to them reflecting on the activity and changing their plans for how they would approach patient care, staff allocation and the completion of key activities on the first day that patients were welcomed into the department.

Incorporating processes and staff from different departments in the simulation activity proved to be valuable. For example, it was discovered that the PACU was not listed as an available location on the hospital task allocation service. This meant that it would be a manual process for staff to request patient

transport from PACU to the ward, which is inefficient. Once identified in the simulation, this issue was resolved by the relevant support team. Medical imaging staff were also able to come into the procedure centre and familiarise themselves with the department layout and identify the most appropriate pathways for them to bring their imaging equipment into the rooms.

There were constraints that occurred with the simulation activity delivery that were largely out of the control of the induction and training team. These constraints included difficulties with the ieMR training domain, not being able to allocate monitors to the patients during the simulation activity, and some equipment not being available in the department. Involving the CSU in the simulation activity was not possible due to the department needing to focus on completing the processing of instruments for the opening of the hospital. An additional constraint was that the department opened following a pre-determined surgical ramp up. This meant that there was still a progressive onboarding of staff after the department began treating patients; thus, several staff members did not get the opportunity to participate in the simulation training prior to 'going live'. It is unknown at this time if this affected their transition into the department.

In summary, the key lessons learnt from this project are:

- A structured simulation model assisted the clinical coaches to stay focused and on track during the planning and writing of the simulation activity.
- Staff appreciated the opportunity at the end of the two-week induction and training program to consolidate and rehearse learnings from didactic classroom sessions and to socialise with other staff members prior to the facility welcoming patients.
- Using external people in the role of simulated patients instead of new staff to the hospital may have provided different experiences and outcomes from the activity.
- Remaining flexible and adaptive throughout the entire project and adjusting the simulation activity as processes and policies became finalised was essential.
- Having new staff participate in simulation activities and debriefing and welcoming their feedback during the training and induction program has ensured that these activities have become a part of the work culture at STARS.

Conclusion and recommendations

Using integrated simulation as a methodology to support development of processes and procedures, introduction of new procedures and testing of workflows within clinical units can seem like an overwhelming activity to develop and implement. However, this is an achievable task for all clinicians when a structured approach is adopted and consultation with subject matter experts and key stakeholders occurs.

Our recommendations for clinicians wanting to undertake a large-scale simulation activity include:

- Nominate a designated lead who may or may not have prior simulation experience.
- Determine what the key priorities are for the simulation and what the criteria for inclusion in the simulations will be.
- Complete walk-throughs or rehearsals of the simulation activity before the activity is delivered to participants. Make any last-minute changes required to the simulation at this point.
- Create a safe environment for staff by providing a comprehensive prebrief and debrief for all simulation activities.
- Ensure participants in the simulation perform their usual roles for the activity so that all learnings from training can be transferred into clinical practice.

The advantage of writing and facilitating process simulations is that they can be run using a scaffolded approach by gradually increasing the number of different sub-processes included within an overall process, if required. It is also possible to step back to the beginning point of a process and revisit the tasks for that section of the process.

As department and organisation requirements can change rapidly, it is also essential to design project or service/process simulations that are adaptable and flexible to meet identified needs. As our department continues to transition to a business-as-usual model, we have identified additional opportunities where we can use simulation to build and refine our surgical service and we have a department where staff are now familiar and comfortable with simulation.

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References

1. Motal I, Devine LA, Chung HS, Sullivan JE, Issenberg SB. 2013. Simulation in healthcare education: A best evidence practical guide. AMEE Guide No. 82. Med Teach. 2013;35(10):e1511–30. DOI: 10.3109/0142159X.2013.818632
2. Petrosoniak A, Auerbach M, Wong A, Hicks C. In situ simulation in emergency medicine: Moving beyond the simulation lab. Emergency Medicine Australasia. 2017; 29:83–88. DOI:10.1111/1742-6723.12705
3. Barlow M, Dickie R, Morse C, Bonney D, Simon R. Advances in simulation documentation framework for healthcare simulation quality improvement activities. Adv Simul. 2017;2(19). DOI:10.1186/s41077-017-0053-2
4. Staib A, Sullivan C, Cabilan C, Cattell R, Eley R. Digital transformation of the emergency department-inpatient interface (EDii): Integration for future innovation. Australian Health Review. 2020;44(5):666–71. DOI: 10.1071/AH18176
5. Gaba D. The future vision of simulation in healthcare. Qual Saf Health Care. 2004;13(suppl 1);i2–i10. DOI: 10.1136/qshc 2004.009878
6. Cheng A, Eppich W, Epps C, Kolbe M, Meguerdichian M, Grant V. Embracing informed learner self-assessment during debriefing: The art of plus–delta. Adv Simul (Lond). 2021; 6(1):22. DOI: 10.1186/s41077-021-00173-1
7. Walsh BM, Wong AH, Ray JM, Frallicciardi A, Nowicki T, Medzon R et al. Practice makes perfect: Simulation in emergency medicine risk management. Emerg Med Clin North Am. 2020;38(2):363–82. DOI: 10.1016/j.emc.2020.02.003. PMID: 32336331
8. Fencl J, Willoughby C, Jackson K. Just culture: The foundation of staff safety in the perioperative environment. AORN J. 2021;113(4):329–36.
9. Stucky C, De Jong M, Kasper C. A network analysis of perioperative communication patterns. AORN J. 2020;111(6): 627–41.
10. Medwid K, Smith S, Gang M. Use of in-situ simulation to investigate latent safety threats prior to opening a new emergency department. Safety Sci. 2015;77:19–24.
11. Hibberson M, Lawton J, Whitehead, D. Multidisciplinary simulation training for perioperative teams: An integrated review. JPN. 2021;34(2):e-3–e-13. DOI: 10.26550/2209-1092.1111
12. Reio TG, Rocco TS, Smith DH, Chang E. A critique of Kirkpatrick's evaluation model. New Horizons in Adult Education and Human Resource Development. 2017;29(2):35–53. DOI: 10.1002/nha3.20178
13. Eden R, Burton-Jones A, Sullivan CM, Staib A. Digitising an Australian university hospital: Qualitative analysis of staff reported impacts. Aust Health Rev. 2020;44:690–98. DOI: 10.1071/AH18218
14. Nickson C, Petrosoniak A, Barwick S, Brazil V. Translational simulation: From description to action. Adv Simul (Lond). 2021;6(1):6. DOI: 10.1186/s41077-021-00160-6
15. Brazil V. Translational simulation: Not 'where?' but 'why?' A functional view of in situ simulation. Adv Simul (Lond). 2017;2:20. DOI: 10.1186/s41077-017-0052-3
16. Volk MS. Improving team performance through simulation-based learning. Otolaryngol Clin North Am. 2017;50(5):967–87. DOI: 10.1016/j.otc.2017.05.008. PMID: 28915950

Appendices

Appendix 1: Simulation quality improvement tool

Stage 1	Presentation				
Plan		Do			Study
Predicted process/outcomes		Was the process or outcome achieved? (Please circle one.)		• Observe simulation • Record observations • Analyse data	• Compare data to predicted process/ outcomes • Debriefing data analysis (What? Why? How? When?)
1.1	Patient arrives at hospital on day of procedure.	Yes	No		
1.2	Patient presents to administration officer on ground floor. Patient takes lift to Level 2, procedure centre, and presents to administration officer at reception desk.	Yes	No		
1.3	Administration officer checks patient details are correct and processes admission file.	Yes	No		
1.4	Allergy/alert status checked/ confirmed.	Yes	No		
1.5	Administration officer places ID arm band on patient.	Yes	No		
1.6	Admission nurses notified of patient arrival. • Will there be physical CDC? • Where is it? • Where will it go once the patient is processed by administration officer?	Yes	No		
1.7	Administration officer to complete patient information tracking board.	Yes	No		

Appendix 2: Compiled feedback

Integrated workflow scenarios day 1

Facilitator feedback obtained on the run

From medical imaging participant:

- door shut on C arm of II when it was being brought into theatre
- call for 30 minutes in advance
- Karen to advise where contrast is going to be kept
- different types of contrast Omnipaque, Visipaque (used when people have a known reaction to contrast), Ultravist
- x-ray went well in theatre
- ward collected the patient without issue
- when nerve centre was used to try and order a bed and transfer it was noted that PACU was not a location listed on nerve centre.

Feedback from PACU CN:

- PACU buzzers not showing in OT
- PACU team leader to pay attention to patient name
- nerve centre not working properly, no PACU listed
- no contact number for wards
- need to work out the bed process from the ward
- when it was simulated that a patient went straight to ICU there was no communication to PACU. This feedback was provided to the staff in this theatre from the PACU CN.
- Should the BP cuff come with the patient from theatre to PACU?
- important to always discontinue pain protocol in the ieMR even if it is not used (safety issue)
- no IV poles available
- no bins available.

Plus–delta notes taken from overall debrief at end of the activity

Plus	Delta
• communication • teamwork • friendliness • admin staff did really well • problem solving was undertaken • everybody kept a level head • seeing how ieMR fits within our daily activities • facilitators did a really good job	• hand hygiene practices not so great • anaesthetic start time needs to be uniform • some confusion about when 2nd and 3rd pre-op checks should be done • anaesthetic assistant won't be able to get drugs if they need to pick up the patient • location of emergency resuscitation equipment • TSOs were not in endo • MRO process from admissions • need a whiteboard in theatre to identify staff • surgical safety checklist – be mindful you cannot bring previous practices to STARS and expect them to happen • pre-op patient privacy • PACU difficult to communicate with TSOs. Are spare dect phones available as we don't have time to call several different phone numbers? • Does a patient need to be awake for the surgical safety checks to be undertaken? • people don't know each other AO staff – Day surgery staff • flow of beds – need to discuss workflows with NUMS and bed storage • no one told the last patient for the simulation that they had been cancelled • nobody asked patients about COVID-19 • AOs to ask what procedure the patient is having done

Integrated workflow scenarios day 2

Notes on the run:

- Some confusion witnessed in PACU when a code button was pushed with which way to bring the resuscitation trolley to the patient bed side.
- 4 x theatres with 3 x patients in each theatre. 1 x GE room with 4 x patients

Plus–delta notes from final activity debrief

Plus	Delta
• calmer flow in theatre space • good to see the patient journey • approximately five staff members present who did not attend simulations on the previous day • a staff member who was playing the role of a patient stated that even though she knew it was not real she still got nervous being taken into the theatre but found the staff friendly and caring • smooth patient experience	• endoscopy flow worse today • anaesthetic assistants require more assistance with ieMR • it is important to share infection status of patient with PACU • have a team huddle in areas prior to case to confirm details • anaesthetic questions – need to be communicated