

Enacting Translational Simulation: A 24-hour Human Biocontainment Simulation Incorporating Patient Participation and Video-Reflexive Ethnography

Mary Wyer

mary.wyer@sydney.edu.au

The University of Sydney

Jaimie Henry

Westmead Hospital

Gwendolyn L. Gilbert

The University of Sydney

Patricia E. Ferguson

Westmead Hospital

Matthew V.N. O'Sullivan

Westmead Hospital

Ramon Z. Shaban

The University of Sydney

Kavita Varshney

Westmead Hospital

Su-Yin Hor

University of Technology Sydney

Method Article

Keywords: Translational Simulation, Methodology, Video-reflexive ethnography, Person-centred care, Patient participation, Healthcare improvement, High-consequence infectious diseases, Human biocontainment

Posted Date: October 9th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10686579/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.
[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Translational simulation is increasingly used to examine and improve healthcare systems in real-world contexts. This approach is particularly relevant in human biocontainment settings, where opportunities to learn from managing high-consequence infectious diseases (HCIDs) are rare. The aim of this paper is to describe the application of the translational simulation conceptual framing to the design and implementation of a continuous 24-hour in situ simulation in an operational human HCID biocontainment centre, incorporating video-reflexive ethnography (VRE) and a real infectious disease inpatient. The simulation was conducted in a tertiary biocontainment centre using a scenario involving the admission and management of a patient with suspected Ebola disease. A real infectious diseases inpatient (who did not have an HCID), receiving routine care in the hospital, participated in the simulation. The conceptual foundations of the study were grounded in safety and quality improvement within a complex adaptive system, and person-centred care. VRE was used to generate and analyse data. Video data collected during the simulation were used in nine group video-reflexive sessions involving healthcare workers, and a separate reflexive session with the patient. The audio-recorded reflexive sessions were analysed using the Special Pathogen Operational Readiness Self-Assessment (SPORSA) framework. The simulation demonstrated the feasibility of a continuous, time-extended translational simulation embedded within routine healthcare delivery. Implementation required substantial organisational preparation, including governance approvals, workforce coordination, identification of a suitable inpatient participant, and operational support. Inclusion of a real inpatient enabled exploration of both system functioning and lived experience of care. VRE supported collaborative examination of healthcare practices and enabled patient perspectives to inform staff reflexive discussions. The approach generated system-level insights relating to workflow, communication, infection prevention and control, staffing, patient experience, and healthcare worker experience. This paper provides the methodology and a practical example of how translational simulation can be operationalised through explicit consideration of purpose, process, and conceptual foundations. By integrating a continuous 24-hour design, patient participation and VRE, the study extends current methodological approaches to translational simulation. Importantly, it demonstrates how patients can contribute not only to care delivery, but also to the understanding, evaluation, and improvement of healthcare systems.

Introduction

Translational simulation describes an approach to simulation that shifts focus away from applying simulation as primarily a tool for education, training and competency assessment (1), towards examining and improving workflows, infrastructure, governance, risk and safety in real-world contexts (2, 3). Recent *in situ* simulation (ISS) studies have been used to inform the current conceptual framing of translational simulation (3, 4), for example by assessing the operational readiness of new clinical units, prior to commissioning, to identify latent safety threats (5-7).

In parallel, other simulation-based research has also been established as a method for studying complex healthcare systems that are difficult or impossible to observe directly (8), including healthcare settings

where opportunities for learning from real clinical events are limited. One such setting is the management of patients with high-consequence infectious diseases (HCIDs).

Outbreaks of HCIDs, including viral haemorrhagic fevers such as Ebola, are low frequency but high-risk events. Care is typically conducted in highly specialised biocontainment centres (9, 10) due to clinical complexity, the high risk of infection transmission, high morbidity and mortality rates and potential consequences for healthcare systems and communities (11). These units provide enhanced isolation, specialised infrastructure to support infection prevention and control, and coordinated care systems. Together, these reduce the risk of onward disease transmission to healthcare workers (HCWs), other patients, and the wider community (11). The sporadic nature of outbreaks, which are often geographically remote from established healthcare facilities, means that opportunities to learn from real-world clinical experience are extremely rare (12). Simulated drills and exercises have therefore become a cornerstone for biopreparedness (13), including simulated patient transfers from an external facility, such as a referring hospital or airport, to a HCID biocontainment centre (12, 14, 15).

At the time of the study reported here, the biocontainment centre study site, which was opened in 2023, had never been activated for the clinical care of a patient with suspected or confirmed viral haemorrhagic fever. Therefore, there was limited local experience to inform how biocontainment systems, workflows and care processes would function during a patient admission. Instead, staff at this setting have adopted a research methodology known as video-reflexive ethnography (VRE) to collaboratively examine and improve proposed workflows and care processes, through simulation exercises (16, 17). VRE methodology foregrounds frontline expertise and collective interpretation of care, in order to understand and improve healthcare practices (18). This methodological orientation aligns well with the objectives of translational simulation, including understanding how healthcare systems function in practice, making visible the conditions that support safe and effective care, and identifying opportunities for system improvement. (3, 19)

In these VRE studies, and in other large-scale biocontainment exercises (12), researchers have relied on manikins or actors to represent patients. Whilst valuable for system-based testing, these methods are unable to capture the lived clinical, relational and organisational dynamics that shape patients' experiences of care delivery, particularly over time. Evidence from medical education suggests that real patient encounters are perceived by HCWs as being more authentic and impactful than simulated encounters (20-22). However, as far as we are aware, no previous biocontainment simulation has included an inpatient volunteer.

To address these gaps, we developed a continuous 24-hour in situ (3) simulation within an operational biocontainment centre, incorporating a current hospital inpatient as a key participant, receiving routine care under biocontainment conditions. Using the frameworks described by Brazil and Reedy (3) and Nickson et al. (19), we discuss below how we have conducted translational simulation in this unique healthcare environment, exploring the purpose, process and conceptual foundations of the simulation design, and highlighting the particular contributions of VRE as a data generation process. In this paper,

our objective is to report the lessons-learned and offer suggestions for improvement for those embarking on similar large-scale simulations. The data and conclusions generated through video-reflexive sessions will be reported separately.

Methods

Brazil and Reedy (3) conceptualise translational simulations in terms of their *purpose, process* and *conceptual foundations*, extending previous work by Nickson et al. (19), by recommending that the conceptual foundations of simulation design are explicitly articulated, in addition to the purpose, to guide the choice of methods and tools used during the simulation process. Below, we draw on Brazil and Reedy's (3) conceptual model, particularly its emphasis on explicating the study's conceptual foundations. We also draw on Nickson et al. (19) Input-Process-Output model, which provides a useful structure to describe how the purpose of a simulation guides how it is planned, delivered, and translated into outputs.

Conceptual foundations

This study is grounded in the field of safety and quality improvement, particularly practice-based and pragmatic approaches that treat safety as a collaborative "situation-based, embedded and transactional day-to-day accomplishment" (23). A key concept behind these approaches is exnovation (24), described as the explication of the hidden and taken-for-granted competencies of practices and practitioners, as critical resources of safety. Exnovation is akin to the 'Safety-II' concern for the importance of understanding how safety is produced, compared to a 'Safety I' focus on causes of error and harm (25). Exnovation also foregrounds the realities of healthcare as a complex adaptive system, characterised by unpredictability, paradox and interdependencies (26). An exnovative approach to safety therefore requires methods that recognise the "complex interdependencies between healthcare professionals, teams, technical skills, bodily intuitions, discretionary practices and the organizational, practical, physical and technical environments" (23) (p.7).

Importantly, patients are increasingly recognised as active participants in these collaborative practices (27), and patient experience is now widely acknowledged as a critical measure of health care quality and a key source of insight for system improvement (28). The other conceptual foundation for this study therefore is person-centred care, which emphasises the importance of understanding healthcare not only as a series of clinical and organisational processes, but also as an experience for patients and families (29). Together, these conceptual foundations recognise healthcare as a complex and interconnected system of situated work and lived experiences and emphasise the importance of engaging those who provide and receive care in efforts to understand and improve practice (18, 29).

Purpose

The purpose of the simulation was both exploratory and focused on improvement. As noted above, our centre had developed extensive policies, procedures and guidelines for HCWs, drawing on international experience and best practice. We had tested and improved several of these procedures, such as in previous simulation studies (16, 17). However, given the non-linear nature of healthcare delivery, especially given the unique setting and integration of the Biocontainment Unit, we needed to understand how these workflows might interact, over an extended period of time. As Plsek and Wilson (30) noted, "the interactions within a complex adaptive system are often more important than the discrete actions of the individual parts" (p.746).

The importance of this systems approach was identified by Pfafflin *et al* (12), who described the multiple lessons learnt during an extended simulation at the Charité Universitätsmedizin Berlin. In this simulation an actor patient presented to the emergency department and was transferred to the High-Level Isolation Unit, where they deteriorated and subsequently died (12). Their simulation enabled testing of internal workflows, emergency response and postmortem procedures, and identified issues such as communication problems arising through unexpected interactions.

The design for our simulation therefore required a 24-hour, plausible patient admission scenario, with integrated clinical workflows and clinicians working under realistic clinical and environmental demands. Moreover, patient experience would be central to the simulation. Identifying this purpose was fundamental in ensuring that translational simulation of this complexity would generate meaningful data and drove the use of specialised methods as described below. To achieve this, we identified the need to include a volunteer inpatient, receiving routine care in our hospital facility.

Input

Simulation planning and stakeholder engagement

The simulation planning team comprised an interdisciplinary group of core biocontainment staff, led by a clinical academic with extensive expertise in VRE and patient involvement in research. Members included two nurse educators, a clinical nurse consultant, two infectious diseases physicians, an intensive care physician and a clinical pharmacist. The team provided broad subject matter expertise and experience, ensuring that the intended purpose of the simulation was functionally aligned with the design.

The overall time frame from initial concept to execution was approximately 24 months. Planning began in early 2023, with delays at several stages, including ethics approval for patient inclusion, and workforce planning constraints particularly for nursing staff. Seasonal pressures and organisational capacity further delayed scheduling. The simulation was conducted on the 12th and 13th of March 2025. Executive sponsorship of the project from senior clinicians and hospital administrators was crucial in achieving release of staff to participate.

Problem identification – what were we trying to accomplish?

The simulation planning team identified that the central question was to understand and identify opportunities to improve the level of preparedness of the facility, to admit and continue management of a patient with a suspected viral haemorrhagic fever (Ebola), over a 24-hour period. To address this challenge, the simulation was designed around existing biocontainment activation procedures and clinical protocols for unit activation and patient management. The unit routinely uses the Special Pathogen Operational Readiness Self-Assessment (SPORSA) framework (31), to support HCID preparedness activities and identify key domains of organisational capability (see Table 1). This framework helped define the organisational context in which preparedness was being examined (and was also used for data analysis). The resulting simulation design therefore sought to generate insights into system functioning, preparedness capabilities, HCW experiences and patient experiences across a continuous 24-hour admission. The key characteristics and their rationale are described in Table 2.

Table 1: SPORSA Hospital Readiness Assessment Domains & Capabilities

Original Domains
1. Physical Infrastructure
2. Environment and Infection Control
3. Personal Protective Equipment
4. Training & Exercises
5. Emergency Management
6. Pre-Hospital
7. Intake and Internal Transport
8. Treatment and Care
9. Personnel Management
10. Laboratory
11. Waste Management
12. Decedent Management
13. Research

From <https://netec.org/readiness-assessments/hospital-assessment-areas/>

Table 2: Key Simulation Design Characteristics and Their Rationale

Characteristic	Rationale
Continuity of care without programmed interruptions	• Observation of activities and interactions over an extended period, including staff shift changes and handovers, operational flow and staff fatigue
Clinical realism	• Removing the need for a “fiction contract” or fidelity constraints • Encouraging clinicians to observe “work as done” rather than “work as imagined” • Exploration of unanticipated events • Assessment of processes to complete clinical tasks (e.g. venepuncture)
Integration of clinical workflows, rather than isolated task-based activities.	• Exploration of unanticipated interaction between clinical workflows, such as conflicting task instructions or work methods • Improving inter-disciplinary interactions

Ethics

Ethics approval for this study was granted by the Western Sydney Local Health District Human Research Ethics Committee (2020/ETH00553).

Process

Simulation design and delivery

Study setting and context

The study was conducted in a purpose-built biocontainment centre, located in a tertiary healthcare facility in Sydney, New South Wales, Australia. The centre comprises six rooms, including four negative-pressure isolation rooms and two quarantine-class rooms equipped to provide critical-care (32). Designed for the management of patients with HCIDs, the facility incorporates specialised infrastructure including on-site waste decontamination, negative-pressure air handling and remote audio-visual communication links (33).

The patient received routine care in one of the quarantine rooms, while the HCWs followed biocontainment protocols and wore high-level PPE. No other patients were admitted to the centre at the time of the simulation.

Participants

Staffing reflected the anticipated requirements for care of the patient with a viral haemorrhagic fever; with four nurses and one doctor rostered per shift across three shifts over the 24-hour period. In total, 12 nurses and 3 doctors were required.

Clinician participants were drawn from a cohort trained in HCID care, all of whom undertake biannual competency training in biocontainment procedures and PPE. They represented a range of disciplines including intensive care, infectious diseases, infection prevention and control, and emergency medicine. Active engagement with participants' home units and managers, supported by backfill funding, was critical to securing workforce release and ensuring all simulation roles were filled (see Supplementary materials).

A volunteer, from the infectious diseases ward, participated in the simulation and receive routine care under biocontainment conditions. Potential participants were screened by infectious disease consultants for clinical stability, anticipated length of stay, and willingness participate. One patient provided written informed consent and remained in the biocontainment room for the full 24-hour period.

Involvement of a patient from the infectious diseases service provided functional alignment with the anticipated characteristics of an HCID admission, such as fever, tachycardia and the need for transmission-based precautions. This was a major enabler of realism and staff engagement.

Patient safety and ethical considerations

Participation was voluntary and the inpatient volunteer was explicitly informed that they could withdraw from the simulation at any time without impact on their clinical care. Clinical management remained under the oversight of the treating infectious disease team, with escalation pathways established to ensure rapid review in the event of a clinical deterioration. The hospital resuscitation team was informed of the simulation and clinical activity in the unit.

The patient was invited to consent to videorecording and this consent at could be withdrawn at any time. The patient declined to be in frame and consequently camera positioning was modified to avoid capturing the patient wherever possible. Any footage in which the patient was inadvertently visible was either edited or excluded from use in the video-reflexive sessions.

Measures were also implemented to support patient comfort, wellbeing and autonomy throughout the simulation. This included provision of a personal entertainment device, flexibility for visitors, and the option to pause the simulation if required. Regular check-ins were conducted by the admitting doctor during daytime shifts and by the clinical academic lead overnight.

Video-reflexive ethnography (VRE) as the central methodology

The design and conduct of the data collection, learning conversations and analysis (19) in this simulation study was guided by video-reflexive ethnography (VRE). VRE is a collaborative and interventionist methodology that facilitates collaborative exploration of tacit practices and habitual

behaviours that are often overlooked in the everyday busyness of hospital life (18), enabling participants to refine safe practices and improve suboptimal ones. VRE also provides a means of examining and reshaping team processes and collective working strategies (34, 35), supports negotiation of multiple perspectives; and helps to develop shared understanding and collective competence (36). Video-reflexive studies have also focused on patient experience by including patients as active participants in video-reflexive activities (37-39).

VRE is undergirded by four methodological principles: (1) *Exnovation*, noted above, foregrounds the inherent capability and adaptive expertise of practitioners to create safe and high-quality care amidst the complexity of their work. (2) *Collaboration*, involves participants in not only generating video footage of their collaborative practices, but also interpreting this footage together and identifying opportunities and strategies for practice improvement in group 'reflexive sessions', akin to debriefing sessions. (3) *Reflexivity*, supports the reflexive learning of participants in these reflexive sessions through the collaborative viewing of work practices 'from a distance', inviting multiple perspectives and questioning of taken-for-granted practices. (4) *Care*, emphasises the psychological safety of participants throughout the process, recognising the vulnerability and potential discomfort inherent in inviting scrutiny of people's work practices (18).

Staff psychological safety and the principle of care

Psychological safety was supported through structured pre-briefings conducted before each shift. Participants were orientated to their roles, informed that the simulation was intended to support organisational learning, rather than assess individual performance and advised that videorecording would occur throughout the simulation. Participants could request recording to cease at any time, though no requests were made. Meals were also provided throughout the simulation period to support wellbeing.

Following each shift, debriefings were conducted to capture immediate reflections, support staff wellbeing and identify any issues requiring attention. These debriefings differed from the subsequent video-reflexive sessions, which focus on collaborative examination of work practices.

Consistent with the VRE principle of care (18), participants were offered the opportunity to privately view recordings in which they appeared, before it was shown in group reflexive session. They could request that footage be excluded from use or choose not to attend the particular sessions. Reflexive sessions were facilitated to encourage discussion of contextual influences on practice rather than individual blame (40). While these measures supported psychological safety, a degree of vulnerability was recognised as an inherent part of the reflexive learning processes (41).

Data collection

The data collected for analysis were 1) video footage of patient care and other biocontainment activities, and 2) audio-recordings of video-reflexive sessions. Other data collection included notes written on

whiteboards located near the staff station for *ad hoc* recording of events, and by an infectious diseases physician during post shift informal debriefs.

Video data collection

Video data were collected throughout the simulation to support subsequent video-reflexive analysis. Video recording was coordinated and undertaken by the clinical academic with expertise in VRE. Multiple recording devices were used to capture different perspectives of care delivery, including two handheld video recorders for mobile observational footage, a wearable action camera (GoPro HERO) placed at the head of the patient’s bed to capture his perspective; and fixed inbuilt cameras in the patient’s room and the PPE doffing area. The inbuilt room cameras collected visual data only (no audio), with footage stored on a secure application on the centre’s computers. All video data were transferred to and stored securely on a research laptop immediately following completion of the simulation.

A total of 23 hours and 34 minutes of video footage were collected across handheld cameras, fixed room cameras and patient perspective recording devices. This footage formed the basis for eleven video clips used in the subsequent video-reflexive sessions (see Table 3)

Table 3: Video-reflexive data collection and participation

Measure	Value
Total hours video collected	23:34
Number of clips created	11
Number of staff video-reflexive sessions	9
Number of patient video-reflexive sessions	1
Total number of reflexive session participants	32

Reflexive session data collection

After the simulation, the clinical academic nurse reviewed the video footage and organised it into broad categories aligned with the selected SPORSA domains (Table 1). (31). Within each domain, a series of short videoclips (1-6 minutes) was developed to support subsequent video-reflexive sessions. Consistent with the collaborative approach of VRE (18), participants were involved in determining which footage was viewed and discussed. No requests were made to withdraw footage.

Ten video-reflexive sessions were conducted over a five-month period involving 32 participants (Table 4). Nine sessions involved HCW and one involved the patient participant. Staff sessions were facilitated by either an experienced VRE researcher external to the biocontainment service or the clinical academic nurse researcher. External facilitation supported open discussion, reduced assumptions regarding local practice.

The patient session was conducted the day after the simulation and explored selected footage relating to care delivery and activity within the room. The session occurred in the patient's hospital room and could be paused or discontinued at any time.

Healthcare worker sessions were organised around one or more SPORSA domains. The PPE domain was explored across several sessions because of its central role in biocontainment care and its close relationship with infection prevention and control practices. The waste management domain was also explored in two sessions due to its importance to mitigating the risks associated with handling infectious waste. Repeating these sessions enabled a broader range of participants and stakeholders to contribute to analysis.

Participants represented infectious diseases, infection prevention and control, critical care and pharmacy services. Sessions were delivered in hybrid format, both in person and via videoconferencing to maximise accessibility.

Table 4: Overview of video-reflexive sessions

Session/Date	SPORSA domain	Length (min.sec)	Participants (n)*
Session 1 14 Mar, 2025	Treatment and care	74.09	1 (patient)
Session 2 2 May, 2025	PPE	67.41	13
Session 3 2 May, 2025	PPE	61.12	5
Session 4 6 May, 2025	PPE	33.47	2
5 Session 28 May, 2025	Intake and internal transfer & Treatment and care	73.02	9
Session 6 18 Jun, 2025	Treatment and care (medications)	56.08	8
Session 7 3 Jul, 2025	PPE	57.02	11
Session 8 9 Jul, 2025	Environment and Infection Control	47.19	7
Session 9 15 Aug, 2025	Waste management	59.39	12
Session 10 18 Aug, 2025	Waste management	34.19	8

* Some participants attended more than one video-reflexive session

Data analysis

Audio-recorded reflexive sessions were transcribed and coded, independently, by two researchers using the SPORSA domains as an initial analytical framework (31). Following framework coding, data within each domain were analysed inductively to identify themes that reflected participants' experiences, observations, and recommendations.

Output

Learnings were identified by participants during reflexive sessions across multiple areas, including coordination and workflow complexity during activation; communication and clinical performance constraints associated with PPE; infection prevention and control challenges with zoning and glove decontamination; interactions between clinical workflows and the built environment; staffing requirements and role clarity across different phases of care; as well as insights into both patient and HCW experiences of biocontainment care.

Latent safety threats were also identified, particularly at the interfaces between tasks, roles, equipment and physical spaces. These highlight the importance of understanding how system elements *interact* in a dynamic and interdependent complex adaptive system, where risks can be located in these interfaces, rather than within discrete procedures or tasks. The exnovative approach undertaken, using VRE, also demonstrated the value of collaborative analysis of care practices in a complex setting, foregrounding the expertise and agency of both staff and patients who were not only able to identify risks, but also to suggest changes and design strategies to address these risks. Detailed reports of these findings, including their implications for system redesign and clinical practice, will be disseminated internationally in subsequent publications. Findings have already informed local service development and have been disseminated through presentations to healthcare leaders, at conferences, specialist biocontainment networks, and national and international professional audiences. Ongoing dissemination activities include engagement with healthcare organisations involved in HCID preparedness.

Discussion

Through the integration of a continuous 24-hour *in situ* design and a real inpatient volunteer, undergirded by the conceptual foundations of exnovation and person-centred care, this study demonstrates how translational simulation can be used with VRE to examine healthcare system function, patient experience, and care delivery within an HCID setting. In doing so, it provides a worked example of translation simulation in a context where opportunities for learning from real world clinical encounters are inherently limited. Importantly, the study demonstrates how patients can contribute to translational simulation not only through participation in care, but also through participation in the interpretation and improvement of healthcare systems. We have described an application of process, aligned with purpose and conceptual foundations as described in the Brazil and Reedy (3) model; below, we offer our reflections on these aspects of translational simulation.

Reflections on process

Translational simulation requires careful attention to how simulation activities are designed and delivered to ensure they remain closely linked to real clinical systems and improvement goals (3). A key feature of this study was the use of a continuous 24-hour design. This allowed examination of biocontainment care across multiple phases of activity, including activation, ongoing patient management, overnight operations, staff handovers, and periods of lower clinical demand. This provided

a broader view of system performance than is typically available through shorter simulations, which may not capture how workflows, workload, team interactions, and operational challenges evolve over time.

The integration of simulation with real clinical care blurred traditional boundaries between simulation and practice, enabling more authentic interactions to be visible in exploration. For example, staff followed normal workflows worked within real constraints and responded to real clinical changes. During the simulation, the patient experienced a genuine clinical deterioration, characterised by the development of a fever exceeding their normal temperature range. This event required activation of the hospital's live rapid response system, and implementation of appropriate management measures within the biocontainment environment. The event provided an unplanned opportunity to evaluate the centre's capacity to respond to acute clinical deterioration under biocontainment conditions. When simulation safety guardrails are effective, innovative and not needlessly prohibitive, capturing these events significantly enhances both learning and testing outcomes. This supports the idea of translational simulation as part of routine organisational learning, rather than a separate activity (42) .

At the same time, our approach faced several challenges. Significant time and coordination were required to gain institutional approvals, organise workforce participation, and identify an appropriate inpatient. Implementation was also more resource intensive than anticipated, due to limited availability of research personnel. A single researcher coordinated most of the video capture. There were technical challenges, including failure of the fixed GoPro device to capture patient-perspective footage; this required a change to handheld camera recording. Fixed inbuilt cameras supported coverage of key areas, such as the doffing room, although the absence of audio, with these devices, limited analysis of the communication processes for this footage. Future simulations of this scale would benefit from a larger team of researchers with expertise in VRE to support video recording.

What we were able to achieve in this study, was clearly enabled by strong, consistent organisational support, key stakeholder engagement throughout, adequate resourcing, and careful planning to be implemented effectively. As noted by Nickson et al. (19) translational simulations can be costly and therefore need to be justified by their likely benefit. We find that Brazil and Reedy's (3) model offers a framework by which such justifications can be developed and strengthened, through careful planning and alignment of purpose, methods, and underlying conceptual foundations.

Video-reflexive ethnography and translational simulation

This study articulates and demonstrates the use of VRE as a process-method in translational simulation. VRE is designed to make everyday practices visible and therefore amenable to change, allowing HCWs to reflect together on how they work and identify issues that may not be obvious during routine care (18). In our simulation, system processes became visible to a wide range of stakeholders, including managers, clinical leaders and clinicians who were not directly involved in the simulation, as well as staff who were present for only part of the exercise. The video-reflexive sessions were therefore able to support structured reflection and debriefing on system processes, team interactions, care delivery and patient experience across multiple professional and organisational groups. This supported shared

understanding across clinical and organisational roles helping to connect frontline practice with broader system oversight and improvement efforts.

There is a strong and growing body of literature which demonstrates the power of this methodology to assist HCWs to collectively explore what is working well, as well as to identify the patterns of behaviour, workflow challenges and safety risks that can be improved (17, 36, 40, 43). In this literature, VRE is typically used to examine real clinical scenarios, to enable engagement with the complexity of everyday practices, including the interruptions and uncertainties inherent in busy healthcare environments. It has been argued that while simulation in more controlled settings can stimulate reflection on specific actions or events, it may leave “the remainder of our everyday habits untouched” (44). Some researchers have noted that, video-reflexive approaches used within simulations may not fully enact the core principles of VRE. In particular, *exnovation* may be limited to brief, structured interactions relating to discrete tasks, and *collaboration* may be confined to facilitated analysis of video footage (45). For this reason, such approaches have been described as ‘video-reflexive *methods*’ rather than video-reflexive ethnography (16, 17, 45).

In the present study, the distinction is less clear, as the simulation of a patient with Ebola disease was combined with the care of a real inpatient within a different clinical environment. We have maintained our use of ‘video-reflexive ethnography’, as the study involved real patient care within a real clinical context. This distinction may be useful for researchers considering the use of video-reflexive approaches in simulation-based studies.

Reflections on purpose and conceptual foundations

A key feature of translational simulation is its attention towards understanding how complex healthcare systems operate, as the contexts within which patient safety, quality care, and preparedness are accomplished (3). This explication of exploration as an integral aspect of improvement is shared with VRE, which offers *exnovation* as the logic by which frontline practitioners and patients are, or can become, active agents of change within the complex healthcare practices that they are expert and experienced in (23). By treating safe and high-quality care as an ongoing accomplishment by experts who practice in workplace environments that are not always predictable, VRE offers a methodology by which they can, together, intervene in these workplace environments to improve the conditions that support safe care. This treats them as active agents in learning and healthcare improvement, not simply “targets of improvement” (3) through educational, administrative or environmental changes.

Previous VRE studies have demonstrated the value of involving patients and families in examining healthcare practices including end-of-life care (38), infection prevention and control (34, 37) and dementia care (39). Several of these studies have also incorporated patient perspectives into reflexive discussions with healthcare workers (41). In this study, we showed how person-centred care can be brought into translational simulation using video-reflexive methods.

The inclusion of a real inpatient, as an active participant in reflexive activities, whose perspectives were subsequently fed back to the healthcare workers, recognises patients as contributors to knowledge improvement, and reflects a commitment to understanding care through the eyes of the person receiving it (29). The patient was not only a recipient of care within the simulated biocontainment admission but also contributed to the interpretation of that care during analytical phases. The patient's position in the simulation changes to an active contributor rather than a passenger, broadening our understanding of their role in complex adaptive systems and in improving the healthcare system itself. Moreover, the patient can offer insights at multiple stages of the translational simulation process.

Our study therefore expands the kinds of conceptual foundations that can inform translational simulation, by incorporating person-centred care. We also propose an extension to the stated purposes in Brazil and Reedy's (3) model; where exploring 'how the system works' can also include 'how care is experienced'; and improving healthcare can include not only teams of healthcare workers as agents of improvement, but also patients, their families and carers.

Implications for Practice and Future Research

These findings have several practical implications. First, extended *in situ* translational simulations may improve understanding of how healthcare systems function over time, particularly during complex or high-risk scenarios. Second, including the perspectives of a real inpatient can strengthen simulation by providing insight into how care is experienced. Actor patients can offer this to some extent, but we would argue that caring for a real patient - who is receiving actual clinical care, and experiencing the physical, psychological, social, functional and environmental aspects of that care - adds a level of authenticity that is difficult to replicate. Real patients commonly participate in simulations directed at training or assessment, but much less frequently in translational simulation. We demonstrate that this is feasible and desirable. Third, the integration of VRE provides an established methodological framework that supports participants to engage more deeply with the complexity of practice and to collaboratively identify and address issues (18).

Further research is required to examine the feasibility, implementation, and outcomes of these approaches, including extended simulation duration, patient inclusion, and the integration of VRE, particularly in other complex environments outside of biocontainment units. We acknowledge this is a simulation conducted at a single site, in one country, with the involvement of only one patient. Whilst the learnings from our simulation may have limited generalisability, we suggest that our methodological approach, in alignment with our conceptual frameworks, may be transferable.

Conclusion

This paper makes an original methodological contribution by describing a time extended, patient-inclusive translational simulation approach informed by VRE and person-centred care. Through explicit consideration of purpose, process and conceptual foundations, it details the application of translational simulation to examine system performance, lived experience, and the relational dimensions of care

within a biocontainment context. It demonstrates the important role patients can and should play in translational simulation by contributing directly to the understanding, evaluation and improvement of healthcare systems. These findings highlight the potential for adapting translational simulation for settings where real-world clinical experience has been limited.

Abbreviations

HCID	High-Consequence Infectious Disease
HCW	Healthcare Worker
ISS	In Situ Simulation
NETEC	National Emerging Special Pathogens Training and Education Center
PPE	Personal Protective Equipment
SPORSA	Special Pathogen Operational Readiness Self-Assessment
VRE	Video-Reflexive Ethnography

Declarations

Ethics approval and consent to participate

Western Sydney Local Health District Human Research Ethics Committee (2020/ETH00553). Informed consent for study participation was obtained from all participants. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

Written informed consent for participation and publication was obtained from the patient participant and all healthcare worker participants. The manuscript does not contain any identifiable personal information or images of participants.

Availability of data and materials

The video and transcripts generated during the study are not publicly available as individual privacy could be compromised. Some data may be available from the corresponding author on reasonable request.

Competing interests

The authors have no competing interests as defined by BMC, or other interests that might be perceived to influence the results and/or discussion reported in this paper.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. Staff backfill required to support participation in the simulation was funded through the operational education budget of the biocontainment centre.

Authors' contributions

All authors contributed to the conception and design of the study. MW drafted the initial manuscript and developed the foundational arguments, with substantial intellectual input from JH and S-YH. All authors contributed to the interpretation of the work, critically revised the manuscript for important intellectual content, approved the final version, and agree to be accountable for all aspects of the work.

Acknowledgements

The authors would like to sincerely thank the patient participant for their willingness to take part in this study and for their valuable contribution to the simulation and subsequent video-reflexive activities. We are also grateful to the healthcare workers who participated in the simulation and video-reflexive sessions, and whose engagement, expertise, and reflections made this work possible.

We thank Anie Barnsdall-Krikorian for assistance with manuscript preparation and submission.

The first author (MW) gratefully acknowledges the Brocher Foundation, Hermance, Geneva, Switzerland (www.brocher.ch), for hosting her as a Visiting Researcher in April 2026 during the early stages of preparation of this manuscript.

References

1. Brazil V, Eller S, Bajaj K. Reimagining simulation for quality and safety in healthcare: connecting paradigms, methods, and communities. *Advances in Simulation*. 2025;10(1):63. <https://doi.org/10.1186/s41077-025-00397-5>
2. Brazil V. Translational simulation: not 'where?' but 'why?' A functional view of in situ simulation. *Advances in Simulation*. 2017;2(1):20. <https://doi.org/10.1186/s41077-017-0052-3>
3. Brazil V, Reedy G. Translational simulation revisited: an evolving conceptual model for the contribution of simulation to healthcare quality and safety. *Advances in Simulation*. 2024;9(1):16. <https://doi.org/10.1186/s41077-024-00291-6>
4. Baxendale B, Evans K, Cowley A, Bramley L, Miles G, Ross A, et al. GENESS 1-Generating Standards for In-Situ Simulation project: a scoping review and conceptual model. *BMC Med Educ*. 2022;22(1):479. <https://doi.org/10.1186/s12909-022-03490-9>
5. Colman N, Stone K, Arnold J, Doughty C, Reid J, Younker S, Hebbar KB. Prevent Safety Threats in New Construction through Integration of Simulation and FMEA. *Pediatr Qual Saf*. 2019;4(4):e189. <https://doi.org/10.1097/pq9.0000000000000189>

6. Dube M, Laberge J, Sigalet E, Shultz J, Vis C, Ball CG, et al. Evaluations for New Healthcare Environment Commissioning and Operational Decision Making Using Simulation and Human Factors: A Case Study of an Interventional Trauma Operating Room. *HERD*. 2021;14(4):442-56. <https://doi.org/10.1177/1937586721999668>
7. Krammer T, Kessler L, Aspalter G, Kuster L, Fussenegger B, Aichner H, Simma B. Video-Recorded In Situ Simulation Before Moving to the New Combined Neonatal/Pediatric Intensive Care Facility: An Observational Study. *Pediatr Crit Care Med*. 2023;24(1):e1-e8. <https://doi.org/10.1097/PCC.0000000000003080>
8. Lamé G, Dixon-Woods M. Using clinical simulation to study how to improve quality and safety in healthcare. *BMJ Simul Technol Enhanc Learn*. 2020;6(2):87-94. <https://doi.org/10.1136/bmjstel-2018-000370>
9. Sowole L, Kainth R, Tuudah C, Delmonte Sen A, Price N, O'Hara G. High-consequence infectious diseases: the conception and development of a multi-disciplinary, interprofessional simulation training programme. *J Hosp Infect*. 2024;147:87-97. <https://doi.org/10.1016/j.jhin.2024.02.003>
10. Stern KL, Sauer LM, Arguinchona C, Dunning J, ElRayes W, Lim PL, et al. Global High-Consequence Infectious Disease Readiness and Response: An Inventory of High-Level Isolation Units. *Health Secur*. 2024;22(6):422-8. <https://doi.org/10.1089/hs.2023.0168>
11. Chan J, Levine CB, Herstein JJ, Cloutier N, Sauer L, Mehta AK, Evans J. Preparedness and Response Considerations for High-Consequence Infectious Disease. *Emerg Infect Dis*. 2025;31(8):1507-15. <https://doi.org/10.3201/eid3108.250313>
12. Pfäfflin F, Stegemann MS, Heim KM, Achterberg S, Pfitzner U, Götze L, et al. Preparing for patients with high-consequence infectious diseases: Example of a high-level isolation unit. *PLOS ONE*. 2022;17(3):e0264644. <https://doi.org/10.1371/journal.pone.0264644>
13. Shea SY, Donovan SK, Beam EL, Herstein JJ, Kratochvil CJ, Lowe JJ, Lowe AE. Developing Training in Response to High-Consequence Infectious Diseases and Preparedness Measures for the Future. *Health Secur*. 2024;22(5):347-52. <https://doi.org/10.1089/hs.2023.0158>
14. National Emerging Special Pathogens Training and Education Center [NETEC]. Tranquil Passport: Testing the Nation's Special Pathogen Readiness Ahead of the FIFA World Cup United States of America: NETEC; 2025 [Available from: <https://netec.org/2025/07/02/tranquil-passport-testing-the-nations-special-pathogen-readiness-ahead-of-the-fifa-world-cup/>].
15. Patterson T. United States: Administration for Strategic Preparedness & Response. 2026. [cited 2026]. Available from: <https://www.aspr.gov/news-updates/blog/2026-02/tranquil-passport-full-scale-exercise>.
16. Wyer M, Hor SY, Barratt R, Garrahy P, Moore C, Williams Veazey L, et al. Exploring the safety and quality of mobile X-ray imaging in a new infectious disease biocontainment unit: an in situ simulation and video-reflexive study. *BMJ Open*. 2024;14(2):e080152. <https://doi.org/10.1136/bmjopen-2023-080152>

17. Wyer M, Hor SY, Ferguson PE, Morath A, Barratt R, Priestley CM, et al. Using Video-Reflexive Methods to Develop a Provider Down Protocol for the New South Wales Biocontainment Center. *Health Secur.* 2024;22(S1):S34-s44. <https://doi.org/10.1089/hs.2023.0165>
18. Iedema R, Carroll, K., Hor, S., Collier, A., Mesman, J., & Wyer, M. Video reflexive ethnography in health research and healthcare improvement: theory and application. Boca Raton, FL: CRC Press, Taylor & Francis Group; 2019.
19. Nickson CP, Petrosoniak A, Barwick S, Brazil V. Translational simulation: from description to action. *Adv Simul (Lond).* 2021;6(1):6. <https://doi.org/10.1186/s41077-021-00160-6>
20. Bokken L, Rethans JJ, Jöbsis Q, Duvivier R, Scherpbier A, van der Vleuten C. Instructiveness of real patients and simulated patients in undergraduate medical education: a randomized experiment. *Acad Med.* 2010;85(1):148-54. <https://doi.org/10.1097/ACM.0b013e3181c48130>
21. Kodikara K, Senaviratne T, Premaratna R. Medical Student's Experiences of Training on Simulated and Real Patients in Education: A Qualitative Exploration. *Education in Medicine Journal.* 2023. <https://doi.org/https://doi.org/10.21315/eimj2023.15.3.3>
22. Bokken L, Rethans JJ, van Heurn L, Duvivier R, Scherpbier A, van der Vleuten C. Students' views on the use of real patients and simulated patients in undergraduate medical education. *Acad Med.* 2009;84(7):958-63. <https://doi.org/10.1097/ACM.0b013e3181a814a3>
23. Pedersen KZ, Mesman J. A transactional approach to patient safety: understanding safe care as a collaborative accomplishment. *J Interprof Care.* 2021;35(4):503-13. <https://doi.org/10.1080/13561820.2021.1874317>
24. Mesman J. Resources of Strength: An Exnovation of Hidden Competences to Preserve Patient Safety. In: Rowley E, Waring J, editors. *Socio-Cultural Perspective on Patient Safety*. Boca Raton: CRC press; 2011. p. 71-92.
25. Hollnagel E, Wears RL, Braithwaite J. From Safety-I to Safety-II: a white paper. The resilient health care net: published simultaneously by the University of Southern Denmark, University of Florida, USA, and Macquarie University, Australia. 2015;10.
26. Plsek PE, Greenhalgh T. The challenge of complexity in health care. *Bmj.* 2001;323(7313):625-8.
27. Wyer M, Iedema R, Hor S-Y. Editorial: Patients: passive subjects or active participants in reducing the spread of infection? *Journal of Clinical Nursing.* 2014;23(17-18):2385-6. <https://doi.org/https://doi.org/10.1111/jocn.12464>
28. Adams C, Walpola R, Iqbal MP, Schembri A, Harrison R. The three pillars of patient experience: identifying key drivers of patient experience to improve quality in healthcare. *Journal of Public Health.* 2024;33(10):2105-13. <https://doi.org/10.1007/s10389-023-02158-y>
29. McCormack B. Person-centred care and measurement: The more one sees, the better one knows where to look. *J Health Serv Res Policy.* 2022;27(2):85-7. <https://doi.org/10.1177/13558196211071041>
30. Plsek PE, Wilson T. Complexity, leadership, and management in healthcare organisations. *BMJ.* 2001;323(7315):746-9. <https://doi.org/10.1136/bmj.323.7315.746>

31. National Emerging Special Pathogens Training and Education Center [NETEC]. Special Pathogen Operational Readiness Self-Assessment (SPORSA) Aurora (CO)[Internet] [Available from: <https://netec.org/readiness-assessments/>]
32. Australasian Health Infrastructure Alliance (AHIA). Isolation Rooms – Engineering and Design Requirements. In: AHIA, editor. St Leonards, Australia2026.
33. Bannister B, Puro V, Fusco FM, Heptonstall J, Ippolito G, Group EW. Framework for the design and operation of high-level isolation units: consensus of the European Network of Infectious Diseases. *Lancet Infect Dis*. 2009;9(1):45-56. [https://doi.org/10.1016/S1473-3099\(08\)70304-9](https://doi.org/10.1016/S1473-3099(08)70304-9)
34. Wyer M, Iedema R, Hor S-Y, Jorm C, Hooker C, Gilbert GL. Patient Involvement Can Affect Clinicians' Perspectives and Practices of Infection Prevention and Control:A "Post-Qualitative" Study Using Video-Reflexive Ethnography. *International Journal of Qualitative Methods*. 2017;16(1):1609406917690171. <https://doi.org/10.1177/1609406917690171>
35. Carroll K, Mesman J, McLeod H, Boughey J, Keeney G, Habermann E. Seeing what works: identifying and enhancing successful interprofessional collaboration between pathology and surgery. *J Interprof Care*. 2021;35(4):490-502. <https://doi.org/10.1080/13561820.2018.1536041>
36. Dickson J, Mesman J, Guthrie B, Grant S. Using Video-Reflexive Ethnography on an Acute Medical Unit: Methodological Challenges, Solutions and Opportunities within a Complex and Busy Clinical Setting. *International Journal of Qualitative Methods*. 2024;23:16094069231222143. <https://doi.org/10.1177/16094069231222143>
37. Wyer M, Jackson D, Iedema R, Hor SY, Gilbert GL, Jorm C, et al. Involving patients in understanding hospital infection control using visual methods. *J Clin Nurs*. 2015;24(11-12):1718-29. <https://doi.org/10.1111/jocn.12779>
38. Collier A, Phillips JL, Iedema R. The meaning of home at the end of life: A video-reflexive ethnography study. *Palliat Med*. 2015;29(8):695-702. <https://doi.org/10.1177/0269216315575677>
39. Hung L, Phinney A, Chaudhury H, Rodney P. Using Video-Reflexive Ethnography to Engage Hospital Staff to Improve Dementia Care. *Glob Qual Nurs Res*. 2018;5:2333393618785095. <https://doi.org/10.1177/2333393618785095>
40. Hor SY, Dadich A, Gionfriddo MR, Noble C, Wyer M, Mesman J. Research as care: practice-based knowledge translation as transformative learning through video-reflexive ethnography. *Health Sociol Rev*. 2023;32(1):60-74. <https://doi.org/10.1080/14461242.2022.2161406>
41. Collier A, Wyer M. Researching Reflexively With Patients and Families: Two Studies Using Video-Reflexive Ethnography to Collaborate With Patients and Families in Patient Safety Research. *Qual Health Res*. 2016;26(7):979-93. <https://doi.org/10.1177/1049732315618937>
42. Davies E, Montagu A, Brazil V. Recommendations for embedding simulation in health services. *Adv Simul (Lond)*. 2023;8(1):23. <https://doi.org/10.1186/s41077-023-00262-3>
43. Collier A, Hodgins M, Crawford G, Every A, Womsley K, Jeffs C, et al. What does it take to deliver brilliant home-based palliative care? Using positive organisational scholarship and video reflexive

- ethnography to explore the complexities of palliative care at home. *Palliat Med.* 2019;33(1):91-101. <https://doi.org/10.1177/0269216318807835>
44. Iedema R. Creating safety by strengthening clinicians' capacity for reflexivity. *BMJ Qual Saf.* 2011;20 Suppl 1(Suppl_1):i83-6. <https://doi.org/10.1136/bmjqs.2010.046714>
45. Wyer M, Hor S-Y, Barratt R, Gilbert GL. Testing the efficacy and acceptability of video-reflexive methods in personal protective equipment training for medical interns: a mixed methods study. *BMJ Open.* 2021;11(10):e052985. <https://doi.org/10.1136/bmjopen-2021-052985>

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [WyerSupplementarymaterials1.docx](#)