

SPECIAL CONTRIBUTION

Current State of Global Disasters and Development of Global Nursing Professionals

Designing and delivering effective simulation-based education for global nursing emergency disaster preparedness and humanitarian practice

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Abstract

In 2024, the University of Derby in the United Kingdom hosted an international simulation challenge aimed at preparing students for the complexities of global public health emergencies. This interprofessional event involved students from nursing, allied health, social care, and public health disciplines across undergraduate and postgraduate levels. Featuring six simulated carousel scenarios, the design and delivery of the event highlighted the need for standardised frameworks to optimise simulation-based education (SBE) in nursing emergency disaster preparedness and humanitarian practice pedagogy.

A conceptual framework was developed to guide future simulations, ensuring consistency, safety, and measurable outcomes. While SBE is invaluable for skill development in this field, it also presents challenges, such as psychological stress, potentially inadequate real-world preparation, and the risk of fostering negative attitudes toward patients. To mitigate these, SBE must integrate technical skills with realism, empathy, communication, and relational care.

The proposed conceptual framework, based on UK practice, is potentially adaptable globally, promoting experiential learning, interdisciplinary collaboration, and the appropriate use of technology. Its implementation can enhance preparedness and global healthcare response capabilities, providing a practical user-friendly guide for SBE facilitators, adaptable to various contexts and to be aligned with international competence standards.

Keywords: simulation, pedagogy, disaster, humanitarian, framework

CONTEXT

The international simulation challenge event held during 2024 was intended as an interprofessional event, with participants across undergraduate and postgraduate pre-registration nursing, allied health and social care, and public health disciplines, and was open to invited students from neighbouring regional universities and overseas partner institutions.

The overarching aim of this event was to help towards

preparing the student participants for the complexities and challenges of international public health disaster emergencies. To achieve this aim, a carousel of six simulated scenarios were identified and developed around the topic areas of: disease outbreak; operational planning; emotional dysregulation; migrant/refugee exercise; major incident response; mental health trauma.

As part of the planning and facilitation of this event a large team of academic clinical faculty facilitators drew upon their extensive experience in the conduction of simulation-based education across multiple programmes of study. Despite this experience there was evidence during the stages of design and delivery that there were variations and conflicts in considerations, prioritisations, facilitator preferences, and intended deployment of

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techniques to deliver a successful simulation based educational experience and leading to positive participant outcomes.

Upon the reflection of this experience and as part of the planning for future simulation-based education (SBE) and planned aligned events for nursing emergency disaster preparedness and humanitarian practice, the authors conducted a review of the utility of SBE in this field of practice. Together subsequently designing a conceptual framework to help structure and foster a standardised approach moving forward.

It is recommended that the application of this framework approach for the design and delivery of SBE for global emergency disaster preparedness and humanitarian practice is potentially transferable beyond the United Kingdom, together with the potential for future comparative research evaluation of this framework and alternative approaches.

DEFINING SIMULATION-BASED EDUCATION

SBE is an interactive teaching and learning approach in which real-life scenarios are replicated in a natural or virtual environment to enhance the learning experience (Collett, 2024). In nursing and healthcare, SBE allows students and professionals to practice skills, develop decision-making abilities, improve communication, and consolidate clinical competence without risking harm to actual patients (Elendu et al., 2024). Pedagogical SBE approaches are underpinned by the knowledge and skills to be achieved, the skills of the educator, and the resources available. SBE is inclusive of varied focusses, modalities, resources, and intended outcomes. They can include task training, which focuses on the development of technical skills such as IV insertion and catheterisation; manikin-based simulation, in which high fidelity manikins are used to mimic human-like physiological responses such as cardiac arrest; standardised patients (SPs), where trained actors are employed to portray certain patient characteristics in specific clinical scenarios; virtual reality (VR) simulation, where the goal is to immerse the learner into a computer-generated clinical environment; and in-situ simulation in clinical environments primarily targeted for team dynamic and system process goals (Nehring & Lashley, 2009; Elendu et al., 2024; Caffery et al., 2024).

Key features of an effective simulation include its ability to offer a safe learning (mitigated risk) environment that encourages learners to explore, learn from their mistakes and gain mastery of specific competencies

(Koukourikos et al., 2021). It should provide the learners with a close-to-the real-life experience that prepares them for the complexities of the healthcare sector (Marquette University Nursing, 2019). A simulation should be able to engage the learner in critical thinking processes such as problem-solving and decision-making, which are essential for high-pressure healthcare environments (Aggarwal et al., 2010; Koukourikos et al., 2021). The Royal College of Nursing (2023) agrees with the Society for Simulation in Healthcare (2019) that a simulation must facilitate a collaborative learning environment where learners can develop or demonstrate teamwork and effective communication in a multidiscipline team (MDT).

In the United Kingdom, Health Education England (2020 and 2021) recognises the significance of effective simulation with the benefits including enhancing competencies and confidence (Alharbi et al., 2024; Review and Krumwiede, 2024), improved patient outcomes (Aggarwal et al., 2010; Royal College of Nursing, 2023), flexibility and accessibility (Society for Simulation in Healthcare, 2019; Marquette University Nursing, 2019), and enabling exposure to rare or complex clinical situations (Koukourikos et al., 2021; Aggarwal et al., 2010). Effective simulation exercises offer a pragmatic, effective, and economical approach to preparedness (Pattillo, 2006).

However, several challenges are being faced in the successful implementation of effective simulations, including Quality Assurance concerns and the need for ongoing and diverse research (Alinier & Oriot, 2022; Royal College of Nursing, 2023), its seamless integration into traditional curricula (Aggarwal et al., 2010; Royal College of Nursing, 2023) and resource constraint including finances and the required facilitator skill set according to the ASPiH 2023 standards on Guiding Simulation-Based Practice In Health And Care (Diaz-Navarro et al., 2024).

WHY IS THE USE OF SIMULATION EFFECTIVE FOR EMERGENCY DISASTER PREPAREDNESS AND HUMANITARIAN PRACTICE

Simulation based education has the potential to be highly effective towards nursing emergency disaster preparedness and humanitarian practice as it provides a safe, controlled environment for nurses to practice and hone critical skills. During disaster simulations, nurses can consolidate their practical skills, such as effective triaging and other essential soft skills, communication, and collaborative clinical decision-making (Andriyanto and

Hidayati, 2021; Hamdi and Al Thobaity, 2023; Russin and Mottel, 2024 and Pappiya et al., n.d.) In emergency disaster and humanitarian contexts, where nurses often face high-stress, high-stakes situations, simulations allow them to practice responding to complex scenarios without the risk of real-world consequences (The MSF Sweden Innovation Unit, 2024; Guerrero-Martínez et al., 2020).

The facilitation and positive outcomes of effective simulations in emergency disaster preparedness and humanitarian practice is not always necessitated by the need for access or overzealous utilisation of potentially expensive commercial technology and high-fidelity simulation equipment, inclusive of the latest manikins. Phan et al (2023) emphasise that low-cost disaster preparedness simulations for nursing students significantly enhance their understanding of interprofessional collaboration and communication during emergencies. This hands-on approach allows nursing students to engage in realistic scenarios, thereby improving their confidence and preparedness for real-world disasters. Putra et al. (2020) highlight that nurses' previous experiences with disasters and their participation in simulation training are strongly correlated with their preparedness levels. This indicates that repeated exposure to simulated emergency disaster scenarios may bolster nurses' readiness to respond effectively in real world emergency disasters and the demands of humanitarian practice.

Although simulations offer clear benefits in enhancing emergency disaster preparedness and humanitarian practice, it would be unwise to assume that every simulation experience, in its various forms, automatically guarantees effective teaching and learning outcomes. These outcomes are essential for improving self-efficacy and raising practice standards. In fact, simulations that are poorly designed or executed can result in missed opportunities and potentially harmful effects for both participants and those they may interact with in the future. One significant concern is the psychological impact of simulation training on nursing students and professionals. The timing, design, facilitation and high-stress simulation environments can lead to increased anxiety and burnout among participants. For instance, Martin et al (2023) identify that the shift to simulation-based training during the COVID-19 pandemic exacerbated stress levels among nurses, as they faced challenges in adapting to new learning modalities while managing existing workload pressures.

According to Alinier and Oriot (2022), creating a realistic, immersive simulation for learners requires aligning learning objectives to real-life scenarios, using

factors like environment, engagement, and appropriate technology, resulting in educators often employing "benevolent deception" to enhance this experience. Benevolent deception is frequently utilised to create realistic (real-world clinical challenges), engaging scenarios that foster critical thinking and adaptability within a safe experiential learning environment, and has the potential for learners to be confused, misguided, or even offended as simulations could seem artificial. For example, in disaster healthcare simulations, educators employ benevolent deception through scripted patient responses, including hiding key information or creating challenges for learners, like misleading or escalating a situation to assess their critical thinking and teamwork skills. In one such scenario during the international simulation challenge event led to students concluding that an apprehensive young man in a significant incident scene was mentally unstable due to his 'uncompromising behaviour', whereas the challenge later picked up by some students was an issue of the language barrier, a complex, yet common occurrence in contemporary disaster situations that adds a layer of difficulty to appropriate disaster response. Thus, to maximise the positive impact and prevent this from posing a potential risk of harm to patients within actual clinical settings, Alinier and Oriot (2022) suggest that educators should present the possibility of deception during the pre-briefing and discuss any learner reaction to deception during the debriefing phase.

Nurses do not work in isolation during emergencies, disasters and humanitarian practice situations. Simulation offers the opportunity to practice interprofessional collaboration, which is crucial in emergency and humanitarian settings where multiple disciplines must work together. Nurses can improve communication, coordination, and teamwork by engaging in simulations that mimic real-life multidisciplinary situations, ensuring better patient outcomes during crises. Carezzo et al. (2020) highlight that many challenges faced during disasters stem from failures in leadership and management rather than clinical inexperience. By participating in simulations, individuals from various disciplines can practice coordination and communication, essential for effective emergency disaster response.

Chávez-Valenzuela et al (2025), identified some of the implementation challenges of facilitating interprofessional simulations, inclusive of planning logistics, understanding the roles of other health disciplines and curriculum programme coordination. Dinh et al. (2023) asserted that simulated exercises have the potential for participants to understand what is required in a disaster response, whilst practicing skills. They highlight the

potential benefit of involving multiple health students and professionals, enabling students to participate and perform tasks within their scope of practice while observing the roles of other disciplines.

One common drawback of simulation in nursing programmes is the frequent overrepresentation of nurses in these exercises or the tendency to conduct simulations exclusively with groups of nurses role-playing various interprofessional roles due to limited access to other professional groups (Zhou et al., 2022). To design scenarios that tap into critical teamwork skills for multiple learners from diverse professions is especially difficult (Benishek et al., 2020). While a professional siloed logistical approach is often necessary due to the large cohort sizes of nursing students, as seen in the United Kingdom, these large cohorts can significantly impact the planning, resourcing, delivery and maintenance of professional standards in simulation-based education (Holt, 2024). The potential tendency for nurses undertaking simulations within only their own professional group has a clear limitation as it fails to replicate real-world scenarios and does not promote true interprofessional understanding, collaborative teamwork, or transferable skills for practice. As evidenced by Abdulmohdi and McVicar (2024), perceptions of the authenticity of simulations to real-world scenarios plays a key role in the transferability of acquired knowledge from simulation to practice.

Therefore, while interprofessional simulations may present greater logistical challenges in development and delivery and may not always be feasible, they should be considered a valuable goal especially for simulation-based education related to emergencies and humanitarian practice, offering broader learning opportunities in cross-disciplinary awareness, communication, and practical competencies.

Creating effective simulations requires more than just setting up scenarios for participants. The design must be intentional, guided by specific objectives, and structured to meet key learning goals. Conceptual frameworks are essential tools for designing and implementing effective SBE. They offer a structured approach that steers the simulation process, ensuring that all key elements are covered, aligned with learning goals, and executed to

optimise the learning experience (Kim, Park and Shin, 2016). Whether managing multiple simulations or a large-scale one, a framework helps quickly identify required resources, preparation tasks, the expectations of participants during the simulation, the role of facilitators, as well as debriefing and evaluation needs and approaches.

Oliveira Silva et al. (2022) conducted a study to map the components of simulation design in health and nursing and to propose a classification based on their definitions to support the planning of SBE. The development of a shared language and framework to support sense making and sequencing helps to promote execution and impact (Oliver et al., 2024). There are existing standards and guidance documents related to proposed best practice in SBE including that from the Association for Simulated Practice in Healthcare (ASPiH 2023) and internationally (INACSL 2021). Whilst fundamentals of these guiding principles are transferable, within emergency disaster and humanitarian practice there are variations in the design and delivery of SBE, together with limited high-level research on the application of simulation in this field (Geng et al., 2021). Additionally, guidance is often resource rich Western centric, with Salifu et al. (2022), highlighting the lack of a context-specific framework to guide the design, implementation, and evaluation of simulation in nursing education in low-resource settings.

A FRAMEWORK DESIGNING AND DELIVERING SIMULATION-BASED EDUCATION

The following proposed framework has the potential for broader implementation beyond the United Kingdom but should be carefully adapted to suit the professional contexts and resource availability of each country, while still aligning with international competence standards for nurses in emergency disaster and humanitarian responses (International Council for Nurses 2019, 2022).

This structured conceptual design and delivery of SBE ensures clear learning objectives, relevant scenarios, effective skill practice, and potential transferability to real word situations. By promoting consistency, safety,

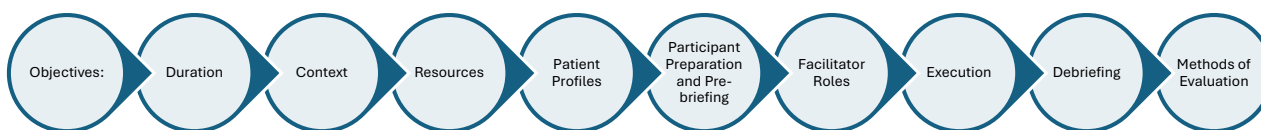


Figure 1 A framework for designing and delivering effective simulation-based education for nursing emergency disaster and humanitarian practice (Collins and Ekumah)

and measurable outcomes, helping learners build competence and confidence. Without a structured approach, simulations risk being ineffective, leading to confusion or missed learning opportunities.

Objectives: Defining Clear Learning Outcomes

In SBE setting clear and measurable objectives is essential for guiding the learning experience. These objectives should target the development of specific skills, such as clinical abilities, communication, teamwork, and decision-making.

Objectives should be customised to match the participants' prior experience levels and professional backgrounds. For novice learners, the focus may be on fundamental skills for emergencies and humanitarian practice, while more experienced participants can tackle more complex, advanced scenarios. Tailoring objectives in this way ensures that simulations are purposeful, provide a targeted learning experiences, with clear outcomes that can be effectively evaluated across a diverse range of participants.

Duration: Timing the Experience for Maximum Learning

The intended simulation duration is critical to maintaining both learning depth and participant engagement. The time allocated should be sufficient to meet objectives without leading to fatigue or disengagement. It is suggested a time window of completion is defined to participants, otherwise if a fixed duration time limit is proposed, activities and the level of engagement can wane if people become distracted by clock watching in the anticipation that a simulation is due to end, reducing the fluidity and realism of simulated events.

Context: Creating a Realistic Learning Environment

The context of the simulation refers to the setting in which the scenario occurs. It should closely mirror real-world conditions of an emergency disaster or humanitarian practice, allowing participants to apply their knowledge and skills authentically. For example, in an emergency simulation, participants might handle multiple patients under limited time pressure, while in a humanitarian disaster scenario, they may work with limited practical resources. The context also involves social and psychological dimensions, encouraging realistic team dynamics and patient interactions. The availability of technologies like high-fidelity manikins, virtual reality, or augmented reality can enhance the technical immersive realism, but even simpler physical props setups and the

use of actors as simulated patients can be equally as effective if they reflect the clinical or humanitarian environment appropriately.

Resources: Identifying and Allocating Necessary Support

Resources are crucial to the success of a simulation, encompassing the physical, technological, and human elements. Simulation equipment might include manikins, medical devices, or monitoring systems that offer real-time feedback, while role-playing scenarios typically involve actors portraying simulated patients. The physical space should be tailored to match the simulation's context, such as an emergency receiving centre or potentially an adapted outside area for a disaster event. Additionally, the appropriate allocation of human resources, including facilitators, actors, and technicians, is vital for the effective management and execution of the simulation.

Patient Profiles: Crafting Realistic Clinical Scenarios

In emergency disaster and humanitarian practice simulations, a well-developed patient profile promotes critical thinking by presenting authentic scenarios, such as a patient experiencing physical illness, trauma, or psychological distress, while also considering psychosocial factors like family dynamics. By incorporating diverse patient scenarios, participants are better equipped to navigate various clinical and cultural contexts, enhancing their ability to deliver patient-centred care in complex and challenging environments.

Participant Preparation and Pre-briefing: Setting the Stage for Success

Planning for participant preparation is essential for enhancing the learner's experience, as they guide designers to consider the needs, abilities, learning needs, required information, and goals of participants. Methodical planning helps to define specific roles and expectations of all participants and identify any necessary adjustments, such as accommodations for varying learning styles or skill levels.

Structured pre-briefing is essential to prepare participants for the simulation. It provides background on the scenario, objectives, and roles, while helping to reduce anxiety and clarify expectations. Facilitators should explain the simulation format and context, available resources, and expected participant roles, encouraging questions and discussion. Setting ground rules for a supportive, non-judgmental environment helps learners feel safe to make mistakes and learn from them.

Facilitator Roles: Guiding the Learning Process

Facilitators play a crucial role in guiding participants through simulations by setting the scene, observing participant behaviour, providing feedback, and supporting the learning process. They are responsible for introducing the objectives and scenarios, observing interactions and decision-making, and offering constructive feedback. While facilitators sometimes provide support through prompts, when necessary, they must be cautious not to over-interrupt the simulation, as this could shift the focus from a realistic practice scenario to a teaching exercise. Facilitators should allow participants the space to learn from their mistakes, creating a more authentic and engaging learning environment. To be effective, the facilitator team should include subject-matter experts, skilled in simulation pedagogy, group management, and handling emotional responses, especially in high-pressure emergency disaster and humanitarian practice situations.

Execution: Efficiency, Safety, and Time Management

Effective simulations not only allow learners to practice technical skills but also require them to apply critical thinking, problem-solving, and cognitive skills like prioritisation, analysis, and decision-making under pressure. Many simulations focus on both individual competencies and team collaboration, emphasising communication and coordination among participants. A well-documented design helps to ensure opportunities for teamwork and interaction are integral.

A simulation framework should integrate safety protocols, providing a checklist for risk assessment, equipment review, and emergency procedures. This framework also includes a plan to address any safety risks, allowing facilitators and participants to pause or discontinue the simulation if needed.

The intended duration in terms of a time window should be pre-defined, but it is suggested that this does not become a prescriptive stopwatch approach as this can lead to the tailing off of engagement levels as participants look towards facilitators to curtail the simulation once the time has been exceeded. Facilitators also need to plant activity across the simulation time window, such as new information or a change in the scenario context, these interjections need to be timed accordingly otherwise the dynamic intensity of the simulation can be lost.

Debriefing: Facilitating Reflection and Learning

Debriefing is an essential part of the learning process, offering participants the chance to reflect on their actions,

comprehend the consequences of their decisions, and pinpoint areas for improvement. It should be structured using an established debriefing model. In the hot debriefing approach, the reflection occurs immediately after the simulation, enabling participants to process the experience while it's still fresh. In contrast, cold debriefing takes place after some time has passed, allowing participants to revisit the scenario with a clearer perspective. This delayed approach can promote a more thorough analysis, as participants can discuss their experiences without the immediate emotional intensity of the simulation. Both hot and cold debriefing approaches may utilise varied models that may lend themselves more effectively to the debrief timing. Regardless of the selected model effective debriefing should help to encourage reflection, peer discussion, provide collective constructive feedback, and emphasise key takeaways to support ongoing improvement and enhance future performance.

Methods of Evaluation: Assessing Learning Outcomes

Evaluating the effectiveness of a simulation helps measure participant learning and refine future exercises. Evaluation methods may include pre- and post-simulation assessments, facilitator observations, peer feedback, and participant surveys. This feedback is used to adjust the design and ensure continuous improvement in future simulations.

CONCLUSION

Simulation-based education is a valuable and essential tool in nursing, offering significant opportunities for skill development and preparedness, and applicable to nursing emergency disaster and humanitarian practice contexts. However, it is important to recognise the potential challenges, such as psychological stress, inadequate real-world preparation, and the risk of fostering negative attitudes toward patients. To address these issues, nursing programs must take a holistic approach, emphasising not only technical skills but also empathy, communication, and relational care.

Effective simulations for nursing emergency disaster preparedness and humanitarian practice should focus on experiential learning, interdisciplinary collaboration, and the appropriate use of technology, which enhance the realism and relevance of scenarios.

Structured SBE ensures clear objectives, meaningful scenarios, and a safe environment for skill practice, promoting consistency, safety, and measurable outcomes. Without a structured framework, simulations may fail to

deliver effective learning experiences.

While the detailed conceptual framework is primarily based upon the authors practice from the United Kingdom, it has potential for wider global implementation, development and research evaluation. The suggested key to implementation is to ensure its ease of application, structured consistency across SBE facilitation teams, meanwhile permitting collective autonomy. Individual elements may be adapted to suit scenarios, each countries professional context and resource availability, whilst aligning with international competence standards for nurses in emergency disaster and humanitarian responses. The framework application is not intended as a theorised disconnect from real-world considerations and the practicalities for effective SBE, but rather as a conceptual user-friendly practical guide.

By adopting these strategies, effectively designed and delivered SBE can potentially improve professionals' preparedness, enhancing global healthcare response capabilities and outcomes.

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