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Enhancing Simulation Literacy among Healthcare Professionals

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ABSTRACT

The concept of healthcare simulation literacy is yet to be widely discussed in educational conversations within simulation communities of practice. Nevertheless, it is vital to the correct practice of simulation-based education (SBE), the core of which revolves around healthcare simulation literacy, a multifaceted domain encompassing knowledge, skills and competencies required for the effective use of simulation-based methods. This paper begins by providing an overview of the current landscape of healthcare simulation, encompassing a comprehensive definition of this crucial terminology, and describes how we attempt to strengthen simulation literacy among healthcare professionals. The challenges of such an effort are discussed, and plans are proposed.

Keywords: *Healthcare simulation literacy, Concept, Definition, Healthcare simulation courses, Faculty development programme*

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INTRODUCTION

In the last two decades, there has been an enormous growth in the global use of clinical simulation (1). This teaching-learning (T-L) methodology is currently one of the significant tools used in the training of healthcare professionals. Based on Kolb learning cycles on experiential learning, simulation-based education (SBE) has proven to be an impactful method of T-L in healthcare (2). Clinical simulation is in tune with new paradigms in Education 4.0 (3). In Malaysia, 92.1% of institutions use simulation as a T-L method (4). Simulation is capable of imparting T-L not only in the cognitive and psychomotor but also the affective domains. Therefore, it is imperative to educate academicians, especially clinician educators, on the essential principles of healthcare simulation.

A recent study showed that 80% of medical educators in major New York universities used simulation in T-L activities, but only 5% had received formal simulation training (5). This implies that the majority of healthcare professionals who teach using simulation do so without adequate knowledge regarding the tool that they use. Currently, in Malaysia, the number of healthcare professionals with qualifications in simulation is minimal. Their qualifications vary from international certification to short-term local courses. This

highlights a significant disparity between individuals with a profound understanding of healthcare simulation principles and practice and those who continue to practice SBE without a solid foundation.

Lacking a comprehensive grasp on healthcare simulation literacy (HSL), educators may encounter difficulties in effectively designing, implementing, and evaluating SBE experiences. More importantly, the absence of skill in conducting an SBE course may result in less-than-ideal educational outcomes, which could undermine the quality of healthcare professionals produced. Undoubtedly, this will lead to wastage in terms of time, effort, and cost, due to a lack of knowledge in the basic principles of simulation. The call for best standards in simulation-based practice in healthcare was clearly emphasised in the Global Consensus Statement on Simulation-based Practice in Healthcare (6). This review aims to explore the concept of HSL, and how it can be enhanced to empower healthcare educators to deliver T-L effectively through simulation.

Definition of Healthcare Simulation Literacy

Despite our best search efforts, we could not find a definition of HSL anywhere in the peer-reviewed literature, although the term was used in one published conference proceeding document (7). Computer simulationists defined computer simulation literacy as "an individual's ability to (i) understand the results of computer simulations, (ii) evaluate significance and limitations of information generated by computer simulations, and (iii) create useful information with computer simulations through the (a) independent usage and (b) critical examination of such simulations" (8). They further explained that this definition contained three goals (understand, evaluate, create), two activities (using and examination), and one application (simulation).

HSL can be defined as having the understanding, proficiency, and familiarity with healthcare simulation principles of practice, and their application in healthcare simulation. It extends beyond mere technical proficiency in operating simulation equipment. This literacy encompasses knowledge about simulation tools and their application in various medical contexts, interpretation of simulation results, and effective integration of SBE into healthcare practices in enhancing patient care and safety, and professional development.

In practical terms, HSL refers to an individual's knowledge of and ability to correctly apply the best practice of healthcare SBE, starting from analysing the requirements for SBE, formulation of teaching and learning objectives and outcomes, creating a scenario and preparing items needed for the simulation activity, conducting the simulation activity, including pre-brief, facilitation, and debriefing and/or feedback, to evaluation of the effectiveness of the simulation activity. Ismail (9) proposed four phases of SBE, divided into nine components. The components (and phases) are: (a) analysis and formation of the learning outcome (initiation phase); (b) scenario design, development and preparation (creation phase); (c) pre-briefing, simulation activity and debriefing and/or feedback (execution phase); and (d) reflection and evaluation (review phase) (Figure 1). Besides SBE, the individual who is simulation literate should be aware of other uses of healthcare simulation, namely assessment, research, and system integration.

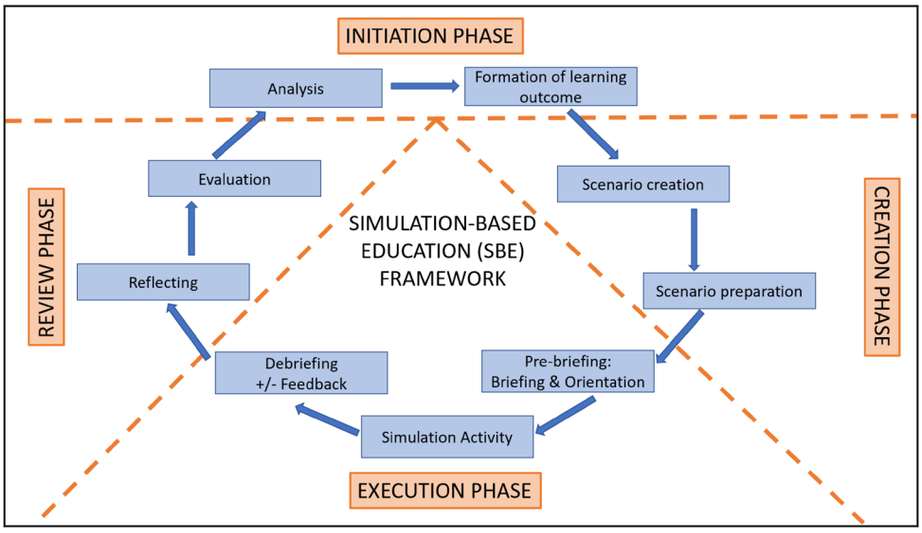

Figure 1: The four phases and nine components of SBE development (9).

Being literate in healthcare simulation includes understanding the language of simulation, the processes, and the tools involved. The individual should be able to match the appropriate technology and modalities with the simulation activity. For example, pairing simulation modalities such as simulated participants (SPs), task trainers, screen/computer-based simulation, or virtual reality simulation with specific purposes, such as decision-making, skills training, or team training. Scenario creation is a skill that the simulation practitioner should be adept at, knowing how to create realistic scenarios that mimic healthcare situations accurately. A good understanding of medical conditions, procedures, and scenarios is paramount to developing the proficiency to replicate real-world challenges. The ability to operate simulation tools and equipment is also vital, including setting up, operating, and simple troubleshooting.

An individual who is simulation literate should also be able to perform debriefing or deliver effective feedback after or during the simulation activity, which includes discussing what the learners experienced, reflecting on the actions taken, learning from the experience and how they can improve their future performance. Learner evaluation as well as programme assessment capabilities will ensure long-term quality improvement, using learning outcomes to identify areas for improvement in patient care, protocols, and individual skills.

Can Healthcare Simulation be Practiced by Chance?

"I use simulation to teach students, but I have never been through formal simulation training, hence all I know is that simulation is the imitation of a real-life scenario. I am not familiar with any of the principles of simulation but does that matter?" As can be seen from the study by Pradhan et al. (5), this seems to be the currently prevalent situation among healthcare educators.

The practice of simulation is certainly not by chance. It has its guidelines and principles that all healthcare simulation practitioners should follow. To start with, it has its code of practice, which was published as the Healthcare Simulation Code of Ethical Practice (10) to safeguard the practice of simulation (Figure 2). To improve communication, the Society for

Simulation in Healthcare (SSH) developed a healthcare simulation dictionary (11) that has been translated into various languages, including Malay (12). There are even best practice guidelines (Healthcare Guidelines for Simulation Training) that have been produced to guide healthcare simulation practice (13, 14). In fact, over the years, healthcare simulation research and practice have grown tremendously and produced so much evidence (15) (Figure 3) that makes this practice not by chance.

Figure 2: The SSH code of ethics (10).

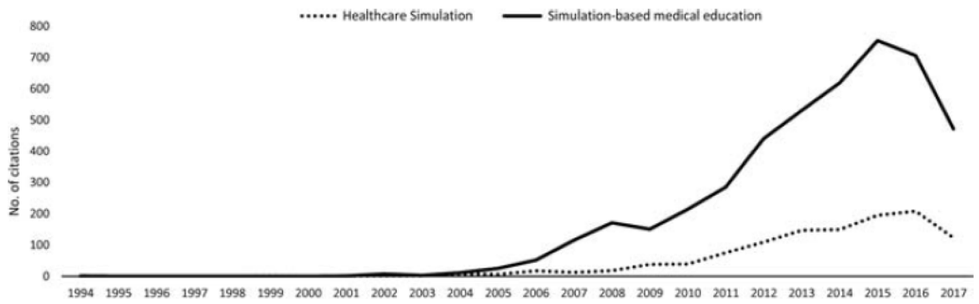

Figure 3: An overview of publication trends within Scopus under the search terms "healthcare simulation" and "simulation-based medical education" (14).

ENHANCING HEALTHCARE SIMULATION LITERACY

In Malaysia, the formal introduction of healthcare simulation as an official event began in 2007 with a course conducted by Dr. Victoria Brazil (16). In 2008, a Human Patient Simulation Network workshop took place, followed by the ASEAN Simulation User Network in 2012. Since then, simulation courses have been conducted sporadically by various organisations. With the establishment of the Malaysian Society for Simulation in Healthcare (MaSSH) in 2016, a series of national and international simulation conferences have been organised.

More recently, as members of MaSSH, we embarked on a campaign to enhance HSL among healthcare professionals in Malaysia. There are five components in our strategy: (a) local publication of a book on basic principles of healthcare simulation for the clinical educator (9); (b) conducting healthcare simulation courses for individuals (Healthcare Simulation Essentials Course), and institutions (Healthcare Simulation Faculty Development Program); (c) broadcasting Healthcare Simulation Webinars monthly covering various healthcare simulation topics that allow educators from anywhere on the globe to participate; (d) providing direct consultation to institutions, clinical teams, and individuals regarding healthcare simulation; and (e) establishing local trainer certification.

Local Healthcare Simulation Book as Theoretical Framework

The publication of a book on the basic principles of healthcare simulation (9) has been a crucial step in promoting HSL in Malaysia. The book provides a comprehensive guide to simulation and is easily accessible at an affordable price. Before the publication of this book, the only texts available to the local simulation community were journals and books published abroad, which were purchased from foreign agencies at high cost. Moreover, a book written in the regional context meets the local needs with diversity, equity, and inclusivity (17) whilst maintaining universally accepted principles and best practices of healthcare simulation. This book forms the theoretical framework for the healthcare simulation courses that we now run.

Healthcare Simulation Courses

Course for individual healthcare professionals: Healthcare Simulation Essentials Course (HSEC)

This is our locally developed one-day course, aimed at creating awareness for individual healthcare simulation training. It covers basic principles of healthcare simulation for beginners, delivered through interactive lectures and discussion. The topics covered include an overview of healthcare simulation, simulation modalities and classification, discussing the nine components of SBE, simulation-based assessment, basics of simulation-based research, simulation operations, and systems integration for patient safety. A workbook is also provided for self-evaluation of the participants' understanding of the topics presented. Details of simulation principles, such as scenario development and debriefing, were deliberately curtailed as the course aimed to provide a moderate overview of simulation to novices in the field. Graduates from this course who wish to expand their knowledge and skills further may choose to pursue a complete two-day course on scenario design or debriefing, or a full-day simulation-based assessment course at another time.

Since the launch of HSEC in July 2023, six courses have been run, through which 64 simulation practitioners have been trained, 13 of whom are new HSEC instructors, capable of disseminating HSEC throughout Malaysia and beyond. Participants come from various backgrounds – doctors, nurses, midwives, assistant medical officers, pharmacists, physiotherapists, and even non-healthcare-related professionals.

Course for institutional faculty: Healthcare Simulation Faculty Development Programme (HSFDP)

This is a series of interactions aimed at developing a team of simulation practitioners for any healthcare institution. Recognising the importance of mentorship in training and developing simulation trainers (18), the HSFDP trains a team of 20 potential trainers, who are then followed up with through intermittent coaching over nine months. It begins with a two-day intensive course that introduces these faculty members to the fundamentals of healthcare simulation, which includes SBE, simulation-based assessment (SBA), simulation-based research (SBR) and clinical simulation system integration (CSSI). Besides the core topics in HSEC, participants are guided through a more detailed scenario design session, covering the four phases and nine components (Figure 2). The reference book for essential reading is the same as for HSEC (9). At the end of the course, participants are required to create their simulation scenario related to the needs analysis of their workplace, individually or in pairs. Subsequently, these faculty members are coached through their simulation project of scenario design and development, including alpha and beta testing of the simulation scenarios created, in three further sessions over nine months (Table 1).

Thus far, two HSFDP sessions have been carried out – one for a local public university and another for a local private university. A full-scale HSFDP over a nine-month mentorship period is in progress for a large stakeholder organisation in the country.

Table 1: HSFDP table of activities

Event (month)	Activities
Intensive course (0)	Day 1 – Basics of healthcare simulation, SBE framework Day 2 – Continue SBE framework. Debriefing. Alpha testing. Beta testing. Meta debriefing. Individual project assignment.
First follow-up (3)	Presentation of project assignment (scenario creation) and alpha testing. Comments from mentors based on the checklist. Proceed with corrections, repeat alpha testing, then beta testing before the next engagement.
Second follow-up (6)	Presentation of project assignment from pre-brief to simulation activity, and debrief/feedback. Learners' reflection.
Third follow-up (9)	Presentation of project results and future plans.

Healthcare Simulation Webinars

Each webinar is moderated by members of MaSSH, aiming to impart little nuggets of knowledge on simulation principles and practice to the audience. The 90-minute webinar begins with a talk or forum, and ends with a 30-minute interactive session. Six webinars have been held so far, with a steadily increasing support in terms of the size of the audience. We aspire to invite a mix of local and international speakers for these webinars.

Healthcare Simulation Consultancy Services

Another aspect of our simulation literacy project is providing direct consultation to any institution, industry, or any interested party about healthcare simulation upon request. Many institutions have shown interest in wanting to know more about simulation, or invest in building their simulation centre and/or learn simulation centre operations and management. Free consultation is provided to any party that seeks our advice. So far, seven local institutions, four universities, two governmental institutions and one non-governmental organisation (NGO) have sought and received our consultation.

Trainer Certification

Recognition of a healthcare professional as a certified simulation trainer needs careful, systematic consideration of the evaluation of the individual trainer. Some organisations adopt the tiered certification approach (19), concerning a progressive building of skills of increasing complexity at each level. This tiered approach allows faculty members to develop a personalised development plan based on structured levels of progression. As faculty members progress in the tiered structure, they gain confidence in their abilities, which benefits both themselves and their learners.

In our approach, we believe in the apprenticeship method of training at this initial stage because we do not have many trainers who are simulation experts. The steps of our training process begin with identification, training, coaching, and supervision. Initially, we identified candidates who can be trained and certified as trainers. Potential trainers are first identified and trained when they attend the HSEC. Later, they are offered the opportunity to follow subsequent courses and become assistant facilitators. Here, they are coached under the

watchful eyes of the lead instructor, followed by individual feedback. Subsequently, the potential trainers are given the chance to become facilitators under supervision before they become full-fledged instructors, at which stage certification is awarded as an HSEC instructor. Potential trainers vary in the length of time taken to become HSEC instructors, given their full-time career commitments. Their progress was largely opportunistic. Nonetheless, within the past two years, 13 individuals have been certified as HSEC instructors.

Another ongoing trainer certification programme is the two-year simulation fellowship programme. In the pipeline is the Professional Certificate in Healthcare Simulation (ProCHeS). While the fellowship programme is restricted to doctors, this six-week programme at the Universiti Kebangsaan Malaysia, offering four credit units, is open to all healthcare professionals.

REFLECTION OF THE PRESENT SITUATION

Realisation of the need to advocate for healthcare simulation has led us to review simulation literacy among healthcare practitioners and develop programmes that run in parallel to address this significant gap. The HSEC focuses on training ad hoc interested individuals, whereas the HSFDP targets institutions. As simulation evolves, new concepts for faculty development have been introduced, such as faculty development for translational simulation (20), with a focus on healthcare quality, safety, and systems. Faculty development programmes should therefore remain fluid and open to changes from time to time according to new concepts and needs. MaSSH serves as a platform for executing these programmes, thereby harnessing multi-institutional human resources to advance the agenda.

The first challenge was to define HSL. Despite repeated usage, the term remained undefined. Nonetheless, the definition is essential to measure how deeply healthcare simulation has penetrated healthcare professional training and practice. In defining the term, we decided that for someone to be considered healthcare simulation literate, the person should know the basic elements or components of healthcare simulation, its uses, and its principles of practice. Even though simulation can be used for other purposes, such as research and system integration, the core usage is educational, hence the fundamental principle falls back on SBE. The core principles of SBE lie in the four phases and nine components of the SBE framework (9). Therefore, a healthcare simulation literate should at least be competent in all nine components of SBE. In addition, they should be aware of the uses of simulation in other areas, such as patient safety.

The other challenge we face is the lack of awareness among our healthcare professionals about the need for simulation instructor training, specifically the importance of HSL. Many simulation enthusiasts utilise simulation to train healthcare learners, but most do not seem to see the need to undergo any formal simulation training. They would usually use the simulator without creating any proper training module, and conduct training “on-the-fly”. The problem with using simulation without an appropriate module of teaching is that the simulator is treated no differently than a toy. As with any toy, once you get bored with it, the toy will be abandoned. It is not easy to convince these simulation practitioners of the need to learn the fundamental principles of the tool that they use for T-L activities. In-depth interviews of such healthcare professionals can perhaps assist in a root cause analysis of the situation. There may be a general ignorance of the systematic methodology underlying SBE, as it has not been long since simulation pioneers researching best practices for simulation

started offering courses on how to teach using simulation. The formation of professional societies that provide members a platform to discuss the best use of simulation and educator development also happened within the past decade.

Regarding curriculum formation, several publications examine the teaching of fundamental healthcare simulation principles and faculty development, ultimately promoting HSL (5, 7, 21, 22). There are similarities between some of the courses offered by these authors and ours, for example, in being "interprofessional" (7) or "multidisciplinary" (5). Both were also in "experiential" or "immersive" workshop format, respectively. Pradhan et al. (5) had a name for their workshop – Fundamentals of Simulation Education (FUSE) – which is very similar to the name of our workshop, i.e., Healthcare Simulation Essentials Course, both of which were comprehensively designed. The lack of such curricula locally prompted us to develop our own, utilising a reference book and framework, as part of our strategy to disseminate HSL. The presence of the locally written book on healthcare simulation was a key factor facilitating this HSL project.

LOOKING INTO THE FUTURE

The question of whether certification as SBE practitioners should be made mandatory before any healthcare professional is allowed to apply this tool in their T-L activities (23) cannot be raised yet, as there are still many unresolved issues. To begin with, formal simulation training courses are still developing. These courses are not yet widely available to address the existing high number of untrained simulation practitioners. Our fellowship programme and the forthcoming professional certificate, ProCHeS, aim to increase the manpower required to train simulation practitioners; however, recruitment has proven challenging. Training of potential instructors is labour-intensive as it occurs through apprenticeship.

The most appropriate first step towards rectifying the current situation is surveying the current situation objectively, evaluating the actual prevalence of healthcare simulation illiteracy and its determinants. This task was undertaken before embarking on the HSL campaign (personal communication). In-depth focus group discussions were conducted to determine the underlying problems. These data served as a valuable tool to illuminate the way forward as to how best to overcome the hurdle of educating healthcare professionals on SBE. These data serve as the foundation of our HSL project focusing on institutional leadership. At the same time, a systematic, well-structured training programme is undertaken at a nationwide level for all institutions to develop and nurture core groups of simulation-literate educators in each institution. A recent study in this region demonstrated the importance of institutional leadership support and expanding simulation communities through institutional core teams (24).

Another key aspect of the project that played a crucial role in spearheading the literacy programme was the healthcare simulation consultancy service. This service attracts many parties and some served as the beginning of a more structured programme or course. An interesting model of "healthcare simulation consultancy service" has been raised by Davies et al. (25). Whilst this may be an entity embedded within healthcare services organisations rather than academic institutions, it may also exist as an external entity that offers advice to health services organisations that are interested in sustaining a simulation centre, with focus on simulation human resource development rather than infrastructure development.

CONCLUSION

HSL can be defined as having the understanding, proficiency, and familiarity with healthcare simulation principles of practice, and their application in healthcare simulation. We proposed this definition for HSL with an educational focus. HSL is still sadly lacking within the simulation community of practice. Formal simulation training courses are indeed very much in need, but in short supply and not widely available yet. There is still much to be done to assess the situation and raise awareness of the need for formal training and correct application of simulation techniques and methodologies in healthcare education. An advocacy programme to get buy-in from the leadership of institutions may help enhance the simulation literacy in many countries. Our HSL campaign is still ongoing in full steam. We hope to produce favourable outcomes from this programme in five years. Watch this space.

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