

Obstetric simulation

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Valorisation

Valorisation

This chapter meets the requirements of Article 23 of the *Regulation Governing the Attainment of Doctoral Degrees* on the inclusion of a valorisation paragraph in all PhD dissertations at Maastricht University as of 1 September 2014. Knowledge valorisation is the “process of creating value from knowledge by making knowledge suitable and/or available for social (and/or economic) use and by making knowledge suitable for translation into competitive products, services, processes and new commercial activities”.

Relevance and background

The focus of this doctoral thesis, “Obstetric simulation: Designing simulation-based medical education and the role of physical fidelity”, is the design of simulation and choice of setting in simulation-based medical education (SBME).

SBME [1-3] can broadly and simply be defined as: “a person, device, or set of conditions which attempts to present education and evaluation problems authentically. The student or trainee is required to respond to the problems as he or she would under natural circumstances” [1].

SBME has traditionally been conducted off site in settings or contexts such as simulation centres, but some hospitals also provide in-house training in rooms specifically allocated to training [4-6]. In this thesis off site simulation (OSS) is defined as SBME where the setting is either a simulation centre or in-house training facilities consisting of hospital rooms set up for simulation training and resembling simulation centre facilities to some extent. Introduced over the past decade, in situ simulation (ISS) is defined by Riley et al. as “a team-based simulation strategy that occurs on patient care units involving actual healthcare team members within their own working environment” [7]. Rosen et al. describe in a review ISS as a blend of simulation and real working environments providing training where people actually work [8]. ISS can be conducted as either announced or unannounced, the latter of which is also called a drill [8,9]. The search for literature on ISS and related terms resulted in approximately 120 hits for original research papers, but to the best of our knowledge, no randomised trials and only few comparison studies have been conducted comparing the ISS versus the OSS setting.

In the thesis we use the following four terms for simulation settings: 1) OSS in simulation centres; 2) OSS in-house in training rooms in hospitals; 3) announced ISS; and 4) unannounced ISS.

This doctoral thesis is based on original studies conducted in obstetric and anaesthesia departments focusing on obstetric emergencies, e.g. clinical management of obstetric emergency situations such as shoulder dystocia, postpartum bleeding, preeclampsia, neonatal resuscitation and emergency caesarean sections [6,10-15], but also a review (twelve tips article) with a general summation. This is relevant as labour wards are challenging workplaces where patient safety and medical litigation are high on the

agenda [16-22]. In emergency situations, managing labouring women may require the involvement of several healthcare professional groups, including midwives, auxiliary nurses, obstetric nurses, obstetricians, anaesthesiologists, nurse anaesthetists, operating room nurses and neonatologists, and when the parturient woman is severely ill, involvement of medical and surgical specialists may be required. Hence ordinary situations like pregnancy and labour can become potentially life threatening, calling for multi-professional and multi-disciplinary clinical management. Obstetric emergencies are rare and require complex skills. However their rarity means training and learning in real-life clinical practice is difficult. Therefore there is a need for SBME in obstetric emergencies.

ISS is believed to increase fidelity (or authenticity in more layman's terms), the assumption being that ISS, compared to OSS, is more realistic and more effective because it is conducted in a real context and thus considered to have a positive impact on learning [7,8,23-26]. Consequently, ISS is argued to be more effective for learning, and this assumption is investigated and discussed in this doctoral thesis.

Conclusions and implications

The innovative value of the conclusions drawn in this doctoral thesis can be boiled down to this short, pragmatic conclusion when looking at outcome on individual and team learning: "You can simulate anywhere".

The results differ for organisational outcome and our results show that for organisational learning outcome, OSS conducted in-house provides important local organisational practical learning, but announced ISS provides more and unannounced ISS provides even more organisational learning [6,10-15]. For a schematic overview of how different simulation settings are potentially affected by various aspects of SBME, see Table 8.1.

Health management, hospitals and departments planning SBME

Based on this thesis and the current literature, our recommendation for hospitals, departments and other institutions planning SBME is that they can conduct simulation in all kinds of simulation settings and that they can decide their choice of simulation setting based on the available facilities and level of feasibility in their organisation. However, to achieve organisational learning, hospitals and department are recommended to occasionally conduct announced or unannounced ISS to identify weaknesses and to obtain more information on changes needed in the organisation. Our studies show that only a few ISS are needed to achieve learning on the organisational level and to reveal areas that OSS in-house does not expose. But we also found that unannounced ISS or drills provoked more anxiety and stress among the healthcare professionals, especially midwives, than simulation conducted as announced ISS or OSS in-house simulation does. This must therefore be taken into consideration in institutions, hospitals and departments when planning simulation.

An implementation advantage of announced ISS is also that it was found to be more popular among staff members, especially doctors. The popularity of ISS indicates that it can therefore be used as a means to help recruit staff to participate in inter-professional simulation [14,15,27].

Another important implementation point is that all planning of SBME requires very detailed planning [1-3,28-30], but based on conclusions from this thesis [6,11,14,15], unannounced ISS in particular requires multifaceted planning and the need for excellent management support [11]. Even when planning is well conducted, simulation instructors must be prepared to cancel or postpone scheduled unannounced ISS in the event of heavy patient loads, shortage of staff or the unavailability of patient care rooms for conducting ISS, such as emergency rooms, delivery suites or operation theatres [11].

An additional aspect of facilitating the implementation of SBME is the importance of establishing cooperation between local educational planners and the departmental management. An additional recommendation is thus to actively involve representatives from all healthcare professional groups in planning postgraduate inter-professional simulation [6,11-15]. This can help clarify inter-professional differences, identify hidden conflicts between healthcare professionals and promote agreement concerning the aims and content of simulation events [30,31].

For hospitals and departments to meet some of the major challenges they face in guaranteeing that all staff have up-to-date skills and knowledge, and to ensure continuous implementation of simulation-based training, we recommend, based on our research, running courses locally due to advantages such as reduced costs and easy accessibility for staff [6,11,14,15]. Moreover ISS and OSS in-house simulation approaches also provide important local organisational learning [6,11,14,15]. Hospital departments must also be aware, however, of the potential disadvantages of local courses as they can involve organisational problems and low quality content due to badly organised simulations and a lack of qualified simulation instructors. Local hospital departments need to address these issues by having local simulation instructors and by participating in training in locally organised courses or in national or international courses, which was the case in our current studies [6,11,14,15]. If relevant, simulation centres can also provide assistance with training simulation instructors.

In the complex process of planning and implementing multi-professional SMBEs, hospital departments should apply a broad approach that includes a wide range of experts and stakeholders in the planning to ensure that the simulation programme is feasible and successful [6,11,14,15,30,31]. One more important implementation aspect is to focus on integrating teamwork training with simulation-based clinical skills training to continually incorporate a clinical approach [6,11,14,15]. Other studies also argue that practicing teamwork integrated with simulation-based skills training that encompasses

a clinical approach is preferable and has been shown to be associated with significant improvements, whereas focusing solely on teamwork is not recommended [21,22,32,33].

The medical education research domain

In the domain of medical education research this doctoral thesis is important due to its contribution to the discussion of setting, context and fidelity [34,35]. The conclusions from this thesis challenge the much-discussed topic of learning in context, as we conclude that the ISS setting did not increase fidelity and thereby learning [36-41]. We conclude that the fidelity of the physical simulation setting appears to be of minor importance. This thesis adds to the current discussion on fidelity by qualifying and exploring the somewhat weak relationship between physical fidelity and the transfer of learning. The new findings from the studies in this thesis contribute to research discussions as our conclusions indicate that OSS in-house can be used as equally as well as ISS if other authenticity elements are taken into consideration and respected. Hence, based on the present studies, we concluded that the psychological and sociological fidelity aspects of the simulation were important and that the physical fidelity of the simulation was the least important. The semantic and commitment context were also of importance compared to the physical context, which was of less importance.

Implications for future research

The overall strengths of the studies [6,10-15] presented in this doctoral thesis were the variety of research methodologies used and that the findings in the studies were all comparable and complementary, thus supporting the conclusions of this thesis as a whole. A specific strength of the studies was the involvement of authentic multidisciplinary teams mirroring real-life teams. A limitation of the studies was that they were all carried out in a single hospital, thus raising issues concerning whether the studies would be applicable in other organisations. Another limitation was that outcome measurements only involved clinical outcomes to a limited extent. As with other research, conclusions from this thesis need to be confirmed by more research from other medical specialities and among other types of healthcare professionals using various types of simulation and settings.

A major focus in SBME is evaluating whether simulation interventions can document translational outcomes in terms of improved patient care practices [42,43]. This is difficult in obstetrics as a high number of deliveries are required to measure patient-relevant outcomes [44]. In future research collaboration between departments and hospitals is recommended as a means for achieving a critical mass of participants. Data from medical birth registries and other relevant databases are a possible source for obtaining information on which skills need to be trained and, if possible, to gauge the effect of training.

Another avenue for future research is to examine the importance of authenticity of teams versus cross training, which involves team members are trained in the duties of his or her teammates. Simulation literature supports cross training [3,45-48] , but this needs to be researched further with the involvement of larger medical teams in post-graduate and more complex simulations.

Though simulation interventions are costly, SBME is expected to expand substantially in the coming years. For postgraduate and multi-professional training we recommend locally based simulation courses due to their various advantages. A relevant focus for future research is implementation strategies [49] and the interplay between local organisers and organisers such as simulation centres.

Another relevant area for future research is to compare various kinds of educational interventions, also less costly ones. The literature is scant regarding comparison of different kinds of educational interventions in the postgraduate setting. More knowledge is warranted on whether other types of educational interventions among postgraduate multi-professional staff demonstrate the same effectiveness as SBME, for example a comparison of the learning effect of SBME with case-based learning [50].

In the future an area that deserves more research attention with regard to simulation is the patient perspective and the active involvement of patients and relatives. Actively including the perspective of patients and relatives in, for example, the staff's management, communication and cooperation on simulation are highly relevant.

Conclusion

To sum up, continuously integrating simulation into the clinical work of a department is recommended in order to guarantee implementation in the clinical setting and to ensure that the need for change in the organisation becomes visible. Results from this thesis may also be useful in the planning and decision-making process for building new hospitals and for renovating old ones in order to provide facilities for SBME in close proximity to relevant clinical departments.

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