Case study

In Situ Simulation in Intensive Care

University Hospital Erlangen

Erlangen, Germany

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This case study describes various aspects of in situ simulation in Pediatric Intensive Care. The document was developed in collaboration with and approved by University Hospital Erlangen.

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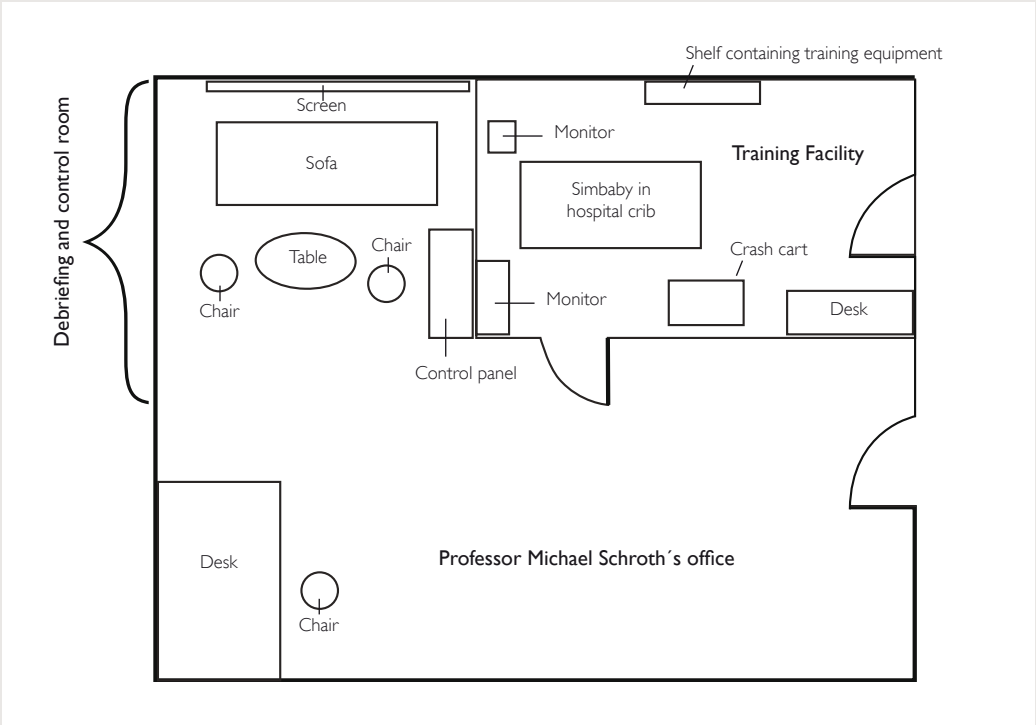
UNIVERSITY HOSPITAL ERLANGEN

The 24 clinics, 16 departments and six institutes of University Hospital Erlangen comprehend every field of modern medicine. Most of the hospital buildings are situated alongside the palace garden close to the city and provide altogether 1400 beds. and provide about 1400 beds. Teaching, research and medical care are of the highest standard and research results from Erlangen are setting standards for prevention, diagnostics and therapy.

6000 employees are working to achieve their common purpose: to promote health and to cure disease. Skills training was implemented at the turn of the century and in 2008, as the first hospital in Germany, Erlangen integrated fully immersive in situ simulation training in the pediatric and neonatal intensive care units.

Floor plan



Website: http://www.english.uk-erlangen.de/e1585/index_ger.html

PREFACE

University Hospital Erlangen advanced from skills training to fully immersive in situ simulation training in 2008. This case study describes the motivation for implementing in situ training, how it was integrated and how the training impacts the participants today.

WHY IN SITU SIMULATION

Bringing the required ventilation bag along when transporting patients from the operating theater to the recovery room is not of much help if the doctor in charge is not capable of using the device. The example demonstrates an inability, especially seen in new doctors, to provide safe and effective patient care when it is needed the most. Witnessing poorly managed emergencies over time had Chief Pediatrician Michael Schroth convinced that better medical training methods would be crucial in getting new colleagues more quickly 'up to speed'.

In situ simulation was thought to be the remedy as this form of training allows people who work together to train together at their own workplace and to use equipment they ordinarily use. In situ training also enables instructors to 'act on the spot' by taking colleagues aside and quickly address incidents that occurred only moments earlier. By tailoring scenarios to emergency situations that play out in real life, the simulations may reflect learning objectives that have become apparent along the way. Hence, the participants perceive these simulations as being extremely relevant to their daily practice.

HOW THE PROCESS EVOLVED

The university hospital implemented skills training at the turn of the century and many found this training useful. Learning about the advanced simulators designed for pediatric training a decade later spurred Dr Schroth to establish fully immersive in situ simulation training at his own hospital's pediatric and neonatal intensive care units. All he needed was a few square meters to set up the training equipment, but even this limited amount of space seemed a challenge to free up. As a solution, Dr Schroth came up with the idea of integrating the new training facility with his own office. In 2008 the Clinical Director and Head of the Pediatric Hospital procured the hospital's first human patient simulator (a SimBaby) and Dr Schroth immediately began remodeling his office.

FINANCIAL MODEL

The German federal states allocate additional funding to help designated hospitals carry out their teaching responsibilities. The amounts allocated vary and depend on the actual numbers of medical students attending lectures and other learning activities conducted at each university. University Hospital Erlangen utilizes part of the allocated funding for training equipment. To increase their own budgets, Dr Schroth and his team conduct lectures and organize simulation training also for external clientele, such as anesthesiologists and general practitioners. Maintenance costs for training equipment derive from this source of income.

Student attendance has always been compulsory, but this is about to change in Germany. When attendance has become voluntary, students are likely to carefully select lectures and other learning activities they actually learn from. High attendance and good grade point averages will continue to be instrumental in achieving sustainable budgets, why the universities will need to focus even more on high quality teaching in the years to come. Students at Erlangen already consider simulation a high quality learning activity, effective both in itself and as an adjunct, as simulations are also known to reinforce theoretical instruction. Hence, colleagues at Erlangen feel confident that the medical students will continue to attend the simulation sessions after attendance becomes voluntary. As scenario training also tends to make corresponding lectures more meaningful, colleagues are hopeful that students will continue to attend most of the lectures as well.

ORGANIZATIONAL MODEL

The major part of the simulation training is conducted by medical doctors and senior residents with teaching responsibilities at Erlangen. A group of tutors assist as operators when the in situ training takes place outside the neonatal and pediatric intensive care units. The tutors are also responsible for transporting the training equipment when in situ training takes place at other locations around the hospital.

Staff competency levels

All instructors are medical doctors and hold 4-day formal simulation instructor courses.*

* TuPASS (Germany), Barts (London), and DIMS (Denmark) simulation centers collaborate on developing and conducting Train-The-Trainer courses. For additional information: http://www.EUsim.org/

Staffing

Instructors:	2 Medical Doctors
	2 Senior Residents
Tutors:	4 Medical Students

Facility

The training facility is a 20 sq meter room comprising one human patient simulator, a crash cart, a shelf containing therapy equipment, and an office desk. The control functions are operated from the Chief Pediatrician's office where also the debriefing takes place.

Figure 1. Training facility showing SimBaby, monitors and crash cart.

METHODOLOGY

Simulation Training

Activity: All doctors employed at the pediatric, neonatal and adult intensive care units are required to perform at least one facilitated simulation training every three months and the instructors encourage their colleagues to do additional training on their own. The daily training in the designated training facility takes place whenever there is time. In situ training conducted in the Emergency Department and elsewhere in the Pediatric Hospital is normally scheduled ahead.

Who: Doctors and nurses train together on occasion, but the majority of participants are doctors and medical students (on week days) in addition to external clientele (on weekends).

How: A 30-minute brief allows new participants to familiarize themselves with the facility and the training equipment. Groups of 6 -10 persons are later divided into smaller groups of 2-3, who take turns performing one scenario each. While one group is challenged with medical emergencies, the other participants observe their performance via a screen in the next room (in Dr Schroth's office), which also acts as the control room. The audio-visual equipment enables the instructor to communicate directly with the participants, hence supervise, encourage, and provide appropriate advice. The simulations are conducted 'on the fly' based on the participants' behavior.

Duration: Normally 15 minutes for hospital employed personnel and 50 minutes for medical students and external clientele.

Debriefing

Debriefing takes place immediately after a simulation scenario is either resolved or stopped. Everyone participates in analyzing one's own and colleagues' performance. Debrief sessions are always facilitated by the instructor whose ultimate goal is to augment the learning outcomes generated from the simulation training. Young colleagues have no problem being assessed and critiqued, whereas participants from outside the hospital find this more difficult.

Duration: 5-10 minutes for hospital employed doctors. 10-15 minutes for medical students and for external clientele.

Audio-visual recordings: The facilitator show relevant clips recorded during the simulation training to illustrate behavior and actions that took place.

Figure 2. The AV system allows others to observe the ongoing simulation indentation training in a separate room.

Curriculum
University Hospital Erlangen has developed a set of scenarios that reflect the clinical conditions and emergency situations most frequently seen in the pediatric and neonatal wards. Simulations are also made 'on the fly' in order to mirror situations that took place recently.

The following scenarios are the most frequently used

- Basic Life Support
- Basic Neonatal Life Support
- Bradycardia in Neonates
- Bronchiolitis and respiratory disorders
- Cardiac arrest
- Comotio cerebri
- Exsiccosis and gastroenteritis
- Meningitis
- Metabolic disorders
- Neonatal infections (SIRS)
- Seizures
- Tachycardia (SVT) in Neonates

The following skills are the most focused

- Interaction, team training
- Standard protocol training

EXPERIENCE SO FAR

Staff reflections

- Colleagues were skeptical at first, worried there wouldn't be enough time to train.
- It's easier for younger doctors to accept the need to train when they see the experienced doing it. It becomes less embarrassing.
- Doctors want to train, nurses seem more fearful of criticism.
- Participants are very quickly made aware of their personal limitations.
- They learn to open their eyes. Now they look at the child (SimBaby) and not the monitors, like in the beginning.
- They've been there! It's the same crash cart. They know it.
- Emergency situations are identified sooner.
- Students remember most of the scenarios they go through.

  After completing 80% of the scenarios, they have experienced what they need to know.
- Young doctors see that they now can bridge a situation until the senior resident appears. It is an enormous gain of confidence.

Identified Benefits

- Localized training means a familiar atmosphere
- The training takes place close to the patients
- Taking colleagues aside and train them on the spot
- Knowing one's colleagues makes it easier to tailor the training to individual needs
- Scheduling training time is rarely necessary
- The simulations are perceived as quite realistic
- The training builds confidence
- Acknowledgement is attained from head of the department
- Time tabling not necessary

Identified Challenges

- Time constraints, as just a few instructors with overly busy schedules are involved
- Not sufficient resources to provide additional and more frequent training for external clientele
- Nurses dislike the exposure associated with simulation training
- Staff cut backs in intensive care makes it more difficult for nurses to prioritize training

Identified Success Factors

- Devoted personnel
- Formal instructor training
- Training facility
- Making simulation training 'a normal thing to do'

TRAINING SOLUTION

The training equipment currently includes:

1 SimBaby
1 Self developed AV system
Skills trainers

WHAT MAKES GOOD SIMULATION PROGRAMS

Issenberg et al[2] reviewed and synthesized existing evidence in educational science that addressed the following question: What are the features and uses of high-fidelity medical simulations that lead to most effective learning?

Issenberg argued, that the weight of the best available evidence suggests that high-fidelity medical simulations facilitate learning, when training is conducted under the 'right conditions.'

The right conditions include:

- Feedback is provided during the learning experience
- Learners engage in repetitive practice
- Simulation is integrated with the normal training schedule
- Learners practice with increasing levels of difficulty
- Simulation training is adapted to multiple learning strategies
- A wide variety of clinical conditions are provided
- Learning on the simulator occurs in a controlled environment
- Individualized learning with reproducible, standardized educational experiences is provided
- Learning outcomes are clearly defined
- Ensuring the simulator is a valid learning tool

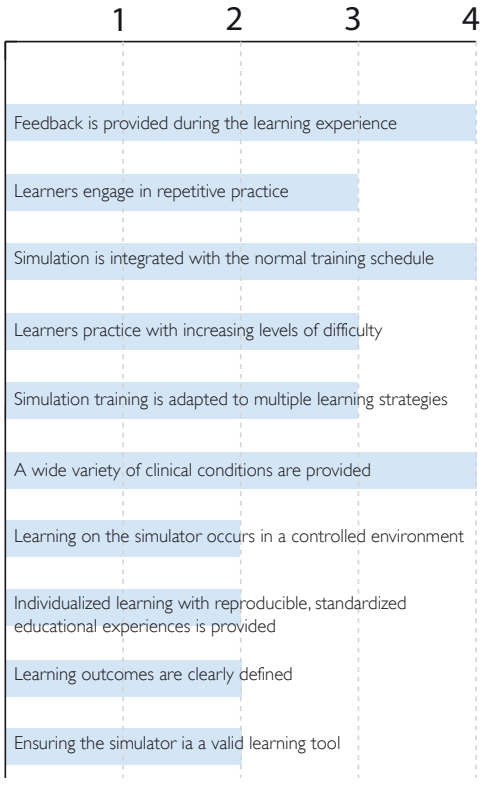


Figure 3. The bars indicate to which degree University Hospital Erlangen delivers on each of the 'right conditions' as assessed by the hospital on a 4 - point Likert scale.

Colleagues at Erlangen find that what matters in simulation based training is more about the combination of factors than it is about one feature being more important than the others. 'Providing a wide variety of clinical conditions' and 'having simulation integrated with the normal training schedule' are however emphasized features, whereas 'Ensuring the simulator is a valid tool' is rated less important.

FIVE YEARS FROM NOW

- More time is allocated to simulation training
- The group of instructors includes nurses
- Simulation is integrated with the normal training schedule for nurses
- Simulations are performed across multiple disciplines
- Doctors and nurses perform more team training
- The training capacity is extended
- A second SimBaby is procured
- Simulation is integrated with the normal training at the university
- Simulation is an integral part of the medical examination
- Simulation is repeated during the first years of training
- More defined tasks receive funding

REFERENCES

1. University Hospital Erlangen: http://www.zms-publishing.com/summary_/medizin/univ_hosp_erlangen/index_eng.html
2. Barry Issenberg et al. (2005) Features and uses of high fidelity medical simulations that lead to effective learning: a BEME systematic review, Medical Teacher, Vol. 27, NO.1, pp. 10-28.

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Case Study

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