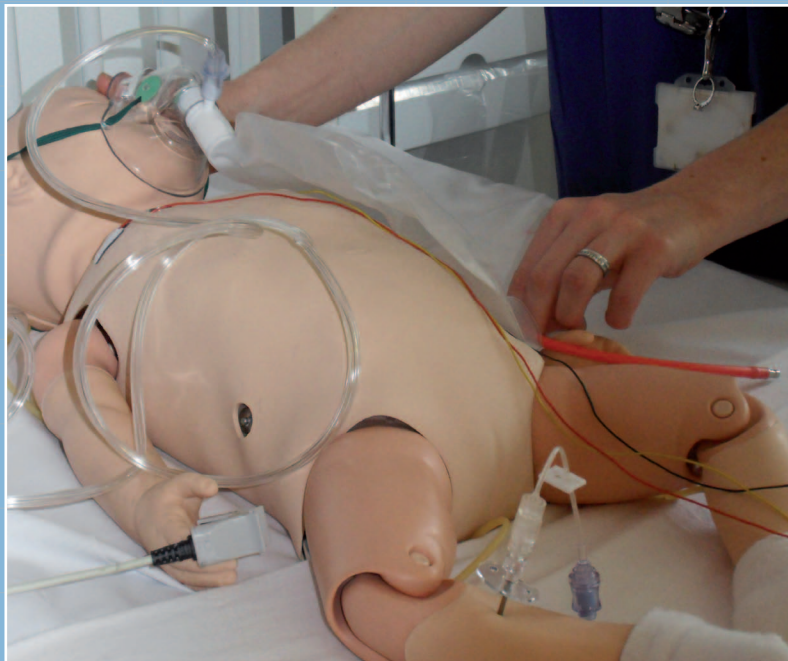


# Case study

## In Situ Simulation in Pediatric Wards



Imperial College Healthcare

London, UK

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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 St Mary's Hospital, part of Imperial College.*

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## ST MARY'S HOSPITAL

St Mary's Hospital is a general acute teaching hospital that diagnoses and treats a range of adult and pediatric conditions. The pediatric service includes a dedicated children's emergency department and pediatric intensive care unit, and a number of specialty services (infectious diseases, allergy, clinical hematology and bone marrow transplants, neurology and nephrology).

The hospital has pioneered the use of robotic surgery, including the UK's first da Vinci robot for keyhole surgery. Simulation training has taken place in designated training facilities for a number of years and was extended to include in situ training for pediatric healthcare personnel in 2005.



## PREFACE

This case study provides insights into why St Mary's Hospital in London wanted to expand the hospital's simulation training program and include in situ simulation, how in situ training was implemented, and some of their experiences so far.

## WHY IN SITU SIMULATION

Recognizing that clinical emergency situations in infants are frequently perceived as extremely challenging and threatening by core medical personnel, consultant pediatric intensivist Dr Claudine De Munter at St Mary's Hospital wanted to start infant simulation training at the hospital. St Mary's Hospital already had a simulation center for anesthetic and surgical training in use. Convinced however that in situ training had major advantages over training facilitated at the established simulation center; Dr De Munter and her colleague consultant pediatric intensivist Dr Mehrengise Cooper developed a training program for general pediatricians in the management of critical illnesses of the infant.

**Augmented reality:** Training conducted on the premises, ie within the hospital's general pediatric wards, would allow healthcare professionals to train together in their own environment, using the tools and equipment they normally use. The possibility of replicating incidents that occur in pediatric intensive care units would further increase the relevance of the training. Having the simulators stored on the ward would make it quick and easy to set up the simulations; hence training could be facilitated more often. All in all, it was agreed that in situ training would have a positive impact on critical care delivered to infants at St Mary's Hospital.

## HOW THE PROCESS EVOLVED

St Mary's Hospital is the first hospital in the UK to start a full in situ training program, which has been in operation since 2005. A grant from a UK neonatal charity organization (Save the Baby) secured the purchase of their first human patient simulator (SimBaby). The London Deanery<sup>2</sup> (responsible for postgraduate medical and dental training in London and actively promoting simulation) funded the second in 2008. Dr De Munter developed her own trolley set-up for these two simulators and started conducting in situ training right away.

## FINANCIAL MODEL

The human patient simulators were procured from sources outside the hospital and essential consumables were obtained directly from the wards. However, continuing funding - for maintenance and possibly future extension of current training solutions and for general support of the facilitated training - is not in place at St Mary's Hospital at the time of writing.

## ORGANIZATIONAL MODEL

Dr De Munter conducts the majority of the simulations herself, acting as both instructor and operator. Dr Cooper helps out when possible and organizes the junior doctors' training. Pediatric intensive care senior staff nurse Anne Dawson organizes training for the pediatric nurses and participates in the multidisciplinary simulated sessions.

### Staff competency levels

The instructors have a medical background. Formal instructor courses are not required as the accumulated experience gathered from years of simulations has been considered sufficient.

### Staffing

2 consultant pediatric intensivists  
1 intensive care nurse

### Facilities

The pediatric department comprises 3 general pediatric wards, 1 accident/emergency ward and 1 outpatient ward. The simulations take place on the general pediatric wards or in the A&E ward.

## METHODOLOGY

### Simulation Training

**Activity:** The simulations are facilitated on a weekly basis, and the training sessions take place in the midst of the daily routines, often in the presence of the hospitalized children's parents. Family members enjoy watching the simulations, as they feel more assured when realizing that the medical staff takes training seriously. All junior doctors and nurses are encouraged by their educational supervisors to participate in the training.

**How:** Normally 1 nurse and 1 doctor train together. The instructor provides a short introduction to the scenario and then uses the simulator 'on the fly'. This way the instructor can more easily adapt the scenario to the participants' current skills and performance level, which naturally varies from one team to the next. Scenarios are often repeated to refine the performance.

**Duration:** Normally 45-60 minutes.

### Debriefing

Each simulation is followed by a debrief session lasting around 15-20 minutes. The facilitator emails comments to the individual participants later on. Time does not allow for personalized, lengthy debriefing sessions.

**Audio visual recordings:** Simulations are videotaped and, due to time constraints, used for documentation rather than debriefing purposes. When there is disagreement regarding what took place during a simulated session, the recordings are shown to the participants to clear up the misunderstandings.

### Curriculum

Dr De Munter has developed a separate collection of scenarios comprising the clinical conditions most frequently occurring in PICU. The following scenarios are the most frequently used:

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- Anaphylactic shock
- Arrhythmia
- Asthma
- Bronchiolitis
- Burns
- Convulsions
- Head trauma
- Meningitis
- Pneumothorax
- Rashes
- Respiratory failure
- Septic shock
- A mixture of the above

### Developments in London

Starting in 2008, a collaboration between pediatric intensivists, pediatric tutors from 12-13 London hospitals, and the School of Pediatrics at the London Deanery, has led to the development of official training courses for both in situ training and training across the hospitals' simulation centers. These programs concern all pediatric trainees within London. Other, similar infant crisis resource management scenarios that include communication scenarios and part task training are also employed.

### Compulsory Training

Starting 2010, the 2-300 London junior doctors will have 16 hours (2 full days) of compulsory simulation training per year. Other deaneries in the UK are now looking to the London Deanery and it is assumed that many will follow their example in the years to come.

## EXPERIENCE SO FAR

### Staff reflections

- The best thing is that they have to get the equipment, meds, and monitors that they would need. Practicing in their own environment makes the training more transferable to the real world
- Participants may seem apprehensive at first, but after the debrief they see the purpose, and they really like it
- Communication with the doctors is definitely transferable

### Identified Benefits

- More multidisciplinary staff can train as there is no need to leave the workplace
- Flexibility: The trolley system is easily moved between the 3 separate units
- Time efficient: 10 minutes to set up simulation trolley, 10 minutes to tidy up
- Increased familiarity with the equipment normally used
- All pediatric nurses and junior doctors are able to train at least twice a year

### Identified Challenges

- The main issue concerns the fact that the faculty team is small. Training is dependant on the availabilities of either one of the two pediatric intensivists.
- This challenge is however being addressed since, thanks to the London Deanery's back up, trainers are being trained and faculty will grow.

### Identified Success Factors

- Formal instructor training (such as the Train-The-Trainer course) \*
- Sufficient space for equipment (for both training and storage)
- An efficient setup and packing system for the training equipment (which saves time)

\* 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/>

## TRAINING SOLUTION

The training equipment currently includes:

- 2 SimBaby
- 1 Smots portable AVS
- Skills trainers



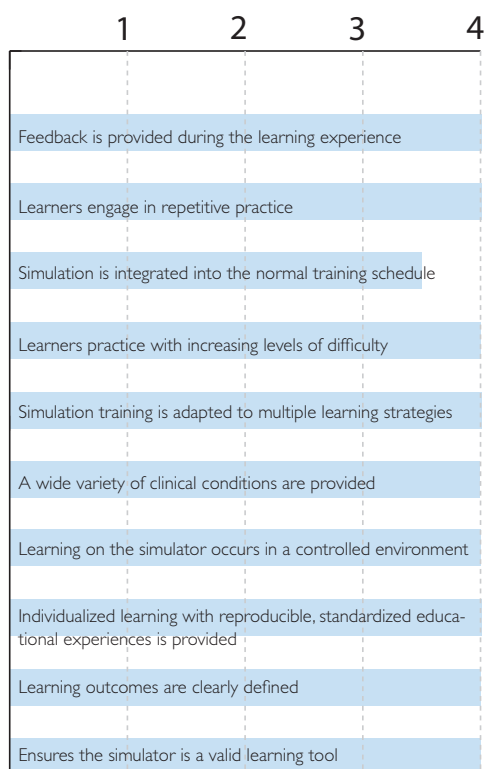
**Figure 1.** SimBaby with all belongings neatly stored in a lockable trolley. The two trolleys are each placed in a corner of the PICU when not in use.

## WHAT MAKES GOOD SIMULATION PROGRAMS

Issenberg et al<sup>3</sup> reviewed and synthesized existing evidence in educational science that addressed the question: 'What are the features and uses of high-fidelity medical simulations that lead to most effective learning?' Issenberg argues, 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 2.** The bars indicate to which degree St Mary's Hospital delivers on each of the 'right conditions' as assessed by the hospital on a 4 - point Likert scale.

Colleagues at St Mary's Hospital find that what matters in simulation based training is more about the combination of the above factors than it is about one feature being more important than the others. However, 'Repetitive practice' is emphasized, provided all the other factors are present.

## FIVE YEARS FROM NOW

- The funding is in place
- Simulations are performed across multiple disciplines
- More scenarios focus on training communication skills
- Training for the 'unexpected' has been added to the curriculum
- Part task training is available also for technical staff
- Actors/standardized patients are employed in the simulations

## RESEARCH ACTIVITY

'Efficiency of in situ multi-disciplinary simulation-based crisis training in Pediatrics' is an ongoing study looking into:

- The efficiency of simulation as a training tool for junior pediatricians in training
- How simulation training impacts nurses' confidence level

## REFERENCES

1. St Mary's Hospital: <http://www.imperial.nhs.uk/stmarys>
2. London Deanery: <http://www.londondeanery.ac.uk/>
3. 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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