

Simulation and Crisis Resource Management in Pediatric Learning

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Why simulation?

Traditional way of pouring information through lectures focus on improving the knowledge. This may not be the best way to improve outcome and safety of the patient in ICU environment. In the ICU there is much emphasis on technical skills and not on communication, teamwork and leadership, resulting in clinicians being unprepared to meet the demands of the complex ICU environment.

Intensive care frequently results in unintentional harm to patients. The ICU environment is unforgiving for mistakes due to the multidisciplinary, time-critical nature of care and vulnerability of the patients. Human factors account for the majority of adverse events and a sound safety climate is therefore essential.

Simulation training is a powerful educational tool to help facilitate learning and change the practice to improve patient outcomes. Simulation allows the health professionals to practice and gain experience in a safe and structured environment without risk to patients. Simulation training with CRM focuses on teamwork, error management and blame free discussion of human mistakes.

Health care simulation prepares the physicians and nurses to face real patients. It offers a controlled, safe and reproducible environment to practice clinical skills. Simulation creates a zero-risk environment that allows medical teams to practice high-risk; low frequency events without endangering patients. Manikins used for simulation can come back alive despite errors, but not real patients!

Types of Simulation training:

- 1) Simulation laboratory- environment with high fidelity computer controlled manikins
- 2) "In situ"-training, which is conducted on actual patient care units involving actual health care team members and actual organization processes
- 3) Role play

How do adults learn?

Adult learning is different from that of children. Past experience allows adults to form mental models, which guide their practice. In health care, mental models form the basis for clinical decision-making.

Unlike lecture-based learning, simulation requires learners to apply their current mental models. Simulation provides a great opportunity for individuals refine their mental models.

Educators can design simulations that stress existing mental models, helping the individual to identify areas where they need to learn and refine the mental models.

Experiences, either real or simulated, are simply catalysts for learning. The actual learning does not occur during the experience itself, but rather during the debriefing that follows. Experiences provide an opportunity for the reflection during debriefing. Learner can evaluate, refine and enhance the mental models. The learner must then “test,” or experiment with revised mental models created by this reflection, leading to permanent change. The process of having an experience (concrete experience), reflecting on that experience (reflective observation), developing mental models (abstract conceptualization) and then testing that mental model (active experimentation) is based on Kolb’s experiential learning cycle. (Figure 1)

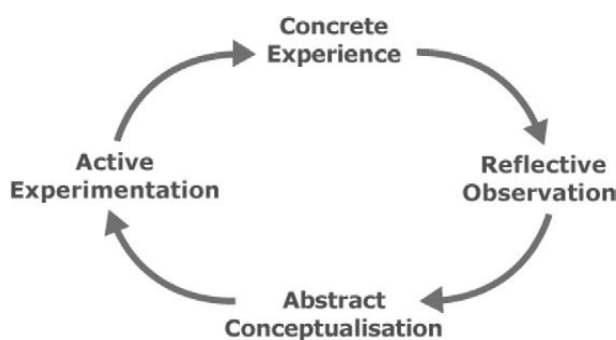


Figure 1: Kolb’s Experiential Learning Cycle

The Circle of adult learning:

Adult learning is a continuing process of attaining, maintaining, and enhancing clinical competence. Simulation adheres to the most important aspects of experiential adult learning by allowing hands-on experience in a safe environment, and subsequently providing guided reflection.

Adult learners develop new skills through repeated experience with simulation, allowing repeated exposure to both common and rare clinical scenarios. If conducted well and accompanied by constructive feedback simulation has been shown to improve trainee performance when faced with a similar situation again

Unlike learning through lectures, confidentiality is a unique requirement for simulation based learning because all levels of individual performance are observed by the whole group.



Figure 2: Task Oriented Simulation (courtesy: PediSTARS India)

Crisis Resource Management (CRM)

What is crisis?

A crisis can be defined as follows:

“A time of difficulty or danger which involves non-routine circumstances, leading to an increase in workload, speed and complexity”.

It is the turning point of a disease when important changes take place, indicating either recovery or death.

What Happens in Crisis?

As a result of a crisis, such as a cardiac arrest, tasks get neglected and there could be a loss of situational awareness. Situational awareness allows one to predict what might happen next or to see the “big picture”. The increased speed and complexity seen in a crisis may lead to confusion and lack of coordination and errors. These are often errors of fixation and omission. For example, a blood pressure cuff not able to record BP might actually represent hypotension, not malfunction.

What is Resource Management?

Management of the medical crisis often requires effective performance of multiple simultaneous tasks. It requires pooling of cognitive resources of multiple people, from several disciplines than an individual. The optimal team possesses a shared awareness of the situation and a shared decision-making process to prevent errors related to the time-critical environment.

Traditional medical education has focussed on individual learning and has not focussed on importance of team work and development of safe systems. Most medical errors occur due to system failure than individual error. Behaviours and actions result in under performance.

The evidences show that ICUs with a “team-oriented culture” have shorter lengths of stay, lower nursing turnover and higher quality of care and can better meet family members needs”

Lessons Learn from Aviation Industry

The concept of CRM-based culture change by the use of team training exercises from scenario is derived from aviation simulation expertise. Up to 1977 aviation industry could be classified as a professional-centered, hierarchic working environment. This all changed with the Tenerifedisaster. A KLM Boeing 747 crash-later revealed that human factors contributed to the deadliest mishap in aviation history that claimed 583 lives. As part of the solution to prevent this from happening ever again, a compulsory Human Factor training for all aircrew personnel was developed in 1979 in a workshop (CRM) sponsored by NASA.

In aviation, non-technical skills, a blame-free environment and Team Situational Awareness (SA) are considered CRM core competencies. Team SA is defined as the ability to identify, process, and comprehend the critical elements of information about what is happening to the team with regards to the mission

What are non-technical skills (NTS)?

NTS or human factors are the cognitive, social and personal resource skills that complement technical skills and contribute to safe and efficient task performance. NTS tell us how it should be done than what should be done!

Human factors (rather than equipment failure) were found to be the most common cause of serious accidents in aviation industries. Suboptimal performance among highly trained pilots was not always the result of lack of knowledge or deficiency in technical ability, but often due to short comings in communication, leadership, situational awareness, decision making and teamwork

These so called “non-technical skills” became a key component of pilot training and everyday operations with the introduction of “Cockpit resource management” (CRM). Training in NTS was subsequently introduced into numerous other industries, and the word “cockpit” in CRM was replaced with “crisis” (crisis resource management)

The importance of NTS in health care was recognised by anaesthetists, who developed the first formal medical NTS training course piloted in 1990. The NTS model has subsequently been adapted to emergency situations in other branches of health care.

Categories	Elements
Task Management	Planning and preparing Prioritising Providing and maintaining standards Identifying and utilising resources
Team working	Coordinating activities with team members Exchanging information Using authority and assertiveness Assessing capabilities Supporting others
Situation awareness	Gathering information Recognising and understanding Anticipating
Decision making	Identifying options Balancing risk and selecting options Re-evaluating

Table 1: Taxonomy for non-technical skills used in crisis resource management

Stages of medical simulation

First level of medical simulation training mainly focuses on technical skills, and level 2 of simulation training focuses on CRM. CRM helps the participants develop greater awareness of importance of effective communication, team work, situation awareness and management of resources during crisis. It is found to be both beneficial and enjoyable by participants and allows the opportunity for team building

To be able to provide the best care to patients, there must be effective interdisciplinary team work between nurses, doctors and other healthcare providers. This teamwork must be maximized during a crisis situation, for the patient to receive the best care.

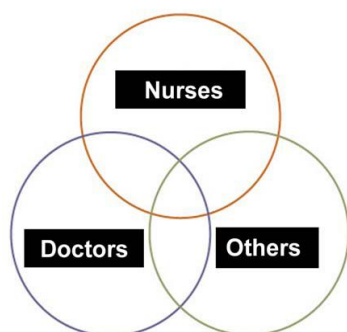


Figure 3: CRM training (Courtesy: PediSTARS India)

To successfully manage a crisis, several things need to happen simultaneously. We need to make a timely diagnosis, declare a crisis, mobilize resources and initiate appropriate medical management

Factors associated with crisis:

Factors that cannot be changed include

- Patient issues
- Disease process
- Circumstances of the crisis situation.

Factors that can be changed with effective communication and interdisciplinary training are

- Leadership and role clarity for everyone in the team
- Communication and crosscheck techniques
- Situational awareness and recognition of adverse situation
- Effective use of resources(personnel, equipment)
- Ongoing global assessment and feed back

These are the 5 major principles in CRM



Figure 4: Global assessment during CRM-“20,000 meters view”

CRM training focuses on risk management and decision-making, the effective use of checklists, identifying team roles, effective communication and performance feedback. Team members are taught how to communicate without creating conflict or in the face of apparent conflict.

Leadership:

It is vital for the team leader to be

- Be clear
- Organise team
- Control communication
- Verbalise clear goals
- Transmit plans with frequent updates

- Maintain 20,000 meters view to avoid tasks and fixation

Why communication is important?

Communication is the glue that holds crisis management together. During a crisis, members of the team may have information and different ideas. This information may be critical to the patient's survival. It is important to create a respectful environment where information is shared. This creates situational awareness and equal distribution of work load.

3 Cs of communication-1) Clarity 2) Cite name 3) Close the loop

Debriefing

The actual learning does not occur during the simulation experience itself, but rather during the debriefing that follows. A debriefing is a discussion that occurs immediately following the simulation. Educators and learners reflect together to analyze individual and group performance.

Debriefing provides an opportunity for learners to reflect on the simulation and their own performance. This reflective process allows the learner to identify gaps in mental models and to prepare for learning. Experience and reflection allow the learner to make sense of what happened, facilitates bridging to future experiences.

After reflection, the learner is ready to adapt their mental model. Active experimentation promotes “cementing” of new knowledge and long-term changes in practice.



Figure 5: Debriefing with video recording (Courtesy: PediSTARS India)

Focus of debrief:

- Individual performance (Competency Management)
- Team performance (CRM)

The participants are guided through the events in a sequential order, accompanied by questions. The facilitators encourage a dialogue and an exchange of opinions regarding management, teamwork and communication skills. Video clips can be used to illustrate crucial points

Barriers associated with the delivery of simulation training in India.

- Costs of training: especially for high-end immersive simulation, which requires medical equipment, manikins, personnel, simulation programming and facilities
- Lack of trainers

The only solution to overcome this barrier lies within us; by motivating ourselves to achieve the best. Sharing the simulation equipment, encouragement of more in-situ simulation in the hospital setting and training the trainers (TOT) are the way forward to see much wider use of simulation learning in our country.

Summary:

Simulation has been shown to improve quality of patient care and increase patient safety, by developing new training methods for health care professionals.

Effective education must be delivered along a continuum, from simulation to the bedside, where each experience is seen as a problem to be solved or an opportunity to learn. Simulations should not only provide an opportunity for experience, but also one for reflection and refinement of mental models.

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