Workshop on Simulation for Pediatric Anesthesia
Course Syllabus

Contents:

1. Objectives:

At the completion of this workshop, the participants will have experienced live scenarios of intraoperative pediatric crises using a simulator in an actual operating room environment. As the scenarios unfold, participants will have the opportunity to be part of the management team and get feedback on their performance in the simulated crisis or may choose to focus on learning about the evaluative process and educational benefits by participating as part of the debriefing teams. In addition participants will have gained knowledge on the value of simulation for the education of health care providers, ACRM, and systems analysis.

2. Overview of Course:

Introduction to the Simulation Environment; Kyle Harrison, MD

A condensed review of ACRM principles and techniques will help students understand the dynamics of the high-fidelity simulations in which they will participate. The rules of "engagement" with the simulator environment will be covered briefly and re-emphasized in the OR's later in the course.

Video of Simulation at Packard OR's; Michael Chen, MD

The current use of our "in-situ" simulation system will be reviewed and a video clip from one of our educational sessions will demonstrate the set up and flexibility of this system. We will discuss what is needed to create a simulation program, how we have implemented our program, pros/cons, and barriers.

Use of Simulation: Educational Models; Alice Edler, MD

This presentation will include a review of common simulation tools used in pediatric anesthesia education, an introduction to the learning theories that underlie their use, and discussion of the benefits and barriers to use of simulation in pediatric anesthesia training.

Introduction to OR environment and simulation mannequins: simulation teams

A hands on introduction to the environment in which the scenarios will take place will occur, with focus on the simulator mannequin, control computer, monitor, and ancillary equipment.

Scenarios: simulation teams

Two scenarios will be run within the OR, using participants in some roles and facilitating team members in others. After each crisis, a debriefing session will occur within the OR to review management of the event and analyze factors that contributed to outcome.

Question and Answer Session: Moderators – Al Hackel, Anita Honkanen

An opportunity to 1. review the sessions and 2. discuss how our simulation program is set up, will occur at the end of the workshop.

3. Review of ACRM Principles: by Kyle Harrison, MD

ACRM (Anesthesia Crisis Resource Management)

The primary goal of crisis management is to detect and correct an evolving problem to prevent an adverse outcome. Crisis management requires dynamic decision making. Management of dynamic situations depends on the ability of the anesthetist to respond to many sources of rapidly changing information.

Key Points of ACRM

Call for Help early enough to make a difference.
Take an appropriate leadership role.
Communicate effectively.
Distribute the workload.
Anticipate and plan
Know the work environment.
Utilize all available resources.

Take command as team leader

Make sure the team understands who is in charge.
The team leader decides what needs to be done, prioritizes the necessary tasks, and assigns them to specific individuals.
"Authority with participation, Assertiveness with respect."

Communicate effectively

Communications between team members is crucial in a crisis.
Do not raise your voice unless absolutely necessary.
State your commands or requests clearly.
Avoid making statements into thin air.
Close the communication loop.
Foster an atmosphere of open exchange among all personnel.
Concentrate on what is right for the patient rather than who is right.

Distribute the workload
Assign specific tasks to individuals according to their skill level.
The team leader should only become involved in manual tasks if specific expertise is necessary to ensure correct and timely completion.
Look for overloads to and failures of team members.

Allocation of attention
Maintain vigilance by assigning tasks to others if possible.
Assign someone to monitor the patient while you perform a needed task
Periodically stop a task and check on the patient's status.

Use all available resources
Self
OR/ICU personnel
Equipment
Cognitive aids
External resources
Plans

Ref. a

4. Educational Uses of Simulation: by Alice Edler, MD

Learning Objectives
At the completion of this presentation the learner will
1. Be familiar with common simulation tools used in pediatric anesthesia education
2. Be introduced to the learning theories that underlie simulation use, and
3. Participate in a discussion of the benefits and barriers to use of simulation in pediatric anesthesia training.

The use of patient simulation, including high fidelity patient simulation (HFPS), partial task trainers, standardized patients and virtual worlds, has revolutionized professional medical education over the past 2 decades and holds promise for even more widespread use in the coming years. The most frequently used simulation modality in pediatric anesthesiology education is HPFS for team skills training or Anesthesia Crisis Resources Management (ACRM), education for critical thinking skills, and the introduction and maintenance of clinical skills for the management of rare disease states. Simulation education is based in the performance learning. The student becomes an actual participant in the learning situation, rather than a passive recipient of information and knowledge from the teacher. All forms of simulation education include three basic elements: a scenario, which is the presentation of a clinical problem recreated in a realistic clinical setting, the simulation, a response to this problem, debriefing. Or the reflective analysis

of the response. Key to simulation learning is the debriefing where the student and the teacher reflectively analyze the performance for the sake of learning. Debriefing typically includes not only a review of the subject matter knowledge, but also the technical skills and professional behaviors necessary for professional completion of the clinical scenario.

Simulation offers advantages in both medical teaching and learning. Simulator education offers the advantage that teaching time is defined and preordained. Time for teaching does not detract from the pressing demands of patient care. In simulation education, the teacher can allow for and teach from the learner's life-threatening mistakes and virtual fatal results without actual patient harm. Simulation allows for extended and uninterrupted "time on task", a luxury seldom afforded in clinical practice.

Despite the theoretical reasonableness of simulation learning there still remain barriers to the widespread adoption of simulation as an educational instrument. From a theoretical viewpoint there is not a unifying theory of simulation pedagogy. Principles of simulator teaching are based in two non-medical domains, business management and aviation safety and must be adapted for use in medical education.
The business model has provided the theoretical framework of experiential learning. Experiential learning involves real-time, interactive engagement with the phenomenon/ experience rather than abstract thinking about the topic. Experiential learning as described by Kolb is a 4 stage process: meeting the experience, reflecting on its significance, drawing theoretical abstractions from the experience and the reflection, and then proceeding to future active experimentation of the formed concepts. Essentially the learner is rethinking his/her previous flawed assumptions and refining them to better fit the experience. Critical thinking by students results in clear, precise, accurate interpretation of the experience. Critical thinking is the completion of the experiential learning cycle. However, the role of a facilitator/teacher is conspicuously absent in classic experiential learning theory.

A more appropriate model comes from Dewey, who adds two essential distinctions to the role of experience in learning. Dewey theorizes that not all experiences are equally educative. It is the role of the teacher to select, arrange, and use his/her own knowledge to assist the learner in understanding the experiences. The teacher plays an essential role in experiential learning by guiding the student through a critical thinking process to understand the difference between reliable and unreliable facts gathered from the experience, to look for patterns within these bits of information and then make critical judgments linking the facts, their patterns and the students own past knowledge in order to construct new knowledge from the experience.

A logistic barrier to the widespread use of simulation is the cost of equipment, personal maintenance and training. It is estimated that the initial cost of a simulation center approximates $200,000 but varies with the choice of model or operator driven simulators. A more important barrier to widespread use is the lack of valid and reliable assessment tools for simulation learning. Currently there are initial but limited attempts to introduce simulation education into assessment of clinical competence. Unlike traditional pen and

paper assessments of medical knowledge, simulation is essentially performance assessment and involves not only assessment of knowledge but also clinical decision-making and professional behaviors. The Murray's work on simulation assessment tools though the most complete in our discipline, still only provides estimates of reliability for ultra short skills assessment scenarios. We have yet to develop satisfactory tools for the assessment of professional behaviors such as communication skills or professionalism. Truly simulation in all its forms allow us to teach more complex, more detailed skills and behaviors for the effective practice of anesthesia and opportunities are becoming more available to include simulation into our routine teaching and practice.

The use of patient simulation, including high fidelity patient simulation (HFPS) , partial task trainers, standardized patients and virtual worlds, have revolutionized professional medical education over the past 2 decades and holds promise for even more widespread use in the coming years. Simulation education is based in the performance learning. The student becomes an actual participant in the learning situation, rather than a passive recipient of information and knowledge from the teacher. All forms of simulation include the presentation of a clinical problem recreated in a realistic clinical setting, the scenario, a response to this problem, the simulation, and reflective analysis of the response, known as debriefing. Key to simulation learning is the debriefing where the student and the teacher reflectively analyze the performance for the sake of learning. Debriefing typically includes not only a review of the subject mater knowledge key to the task, but also the technical skills and professional behaviors necessary for professional completion of the clinical scenario.

The most frequently used modalities of HFPS education in pediatric anesthesiology training include team skills training or Anesthesia Crisis Resources Management (ACRM), education for critical thinking skills such as differential diagnosis , and the introduction and maintenance of clinical skills for the management of rare disease states. Currently there are initial but limited attempts to introduce simulation education into assessment of clinical competence.

5. Debriefing: Utility and Techniques: by Anita Honkanen, MD

Debriefing is a session created to bring participants in a crisis or an event together and review what occurred. The goals of a debriefing session may vary, but in ACRM, the technique is used to allow members of the team a chance to review their performance, to understand the drivers in the crisis, to understand how they were able to manage the crisis as a team, and to learn some general principles in crisis management that they may then use more effectively during future critical events.

Facilitated debriefing is the key to learning from a simulation scenario. During a critical event, attention is intensely focused on managing the crisis and completing necessary

tasks. It is only in the later analysis, that an understanding of all the factors impacting on the outcome can be evaluated. This then leads to learning from the event, its management, and any failures that occurred. A facilitator is important in guiding the debriefing and framing the learning points.

Ideally, the facilitator will lead the participants in the crisis through the event and elicit their own reactions to occurrences, assisting them in developing their own analyses. Material covered in a group discussion is much more likely to be retained than that passively obtained in a lecture type presentation. In addition, when participants provide their own insights and observations, they feel their input has been heard and then have more of a stake in the discussion and a sense that their ideas become part of the conclusion. These conclusions then become more acceptable and believable to the participants.

Facilitating a debriefing well takes time and practice: here are some of the major points to consider when working in this role:

Things to do:

- -Set expectations for crew participation
- -Engage the team to facilitate achieving those expectations
- -Cover all critical topics
- -Balance the discussion: draw in quiet participants
- -Cover teaching points to be made – integrate into discussion at appropriate times
- -Discuss positive actions and how they impacted outcome

Things to avoid:

- -Don't Lecture
- -Don't provide your own analysis before it is "discovered" by team's analysis
- -Don't give impression that your observations are the most important
- -Limit interruptions of team discussion
- -Don't create the sense of an interrogation
- -Avoid a rigid agenda
- -Don't cut sessions short when outcomes are positive

Debriefing sessions are most effective when the team members are able to guide their own discussion based on observations of their own, using the facilitator to initiate the discussion by setting the objectives and assist in leading the discussion minimally. Teams that have not previously participated in this type of analysis or group discussion will require much more guidance on the part of the facilitator.

Starting with an introduction, that outlines the expectations for the session and the ways in which the team members will participate, is essential. Setting a format will then help the team develop an agenda for the session. The facilitator should be sure that all critical items are included in the agenda. The basic principles of ACRM should be used to frame the analysis and evaluation. Finally, the lessons learned from the session should be explicitly reviewed and generalized if possible.

Some of the techniques that encourage active team member participation and in depth analysis of events are the following:

-Ask Questions: What, Why, How
-Engage all team members in the discussion
-Re-word questions instead of answering – allow the crew to answer the questions
-Allow pauses and silence to encourage thoughtful analysis and time for answers

In summary, debriefing creates the opportunity for members of a team involved in a crisis situation to reflect on their performance, review the elements that were active during the crisis, analyze how these factors impacted the outcome, and develop some lessons to be carried away and used in future situations. In addition, basic concepts useful in approaching any crisis can be emphasized during the debriefing, allowing a review of important skills that can then enhance participants' performance in a wider set of circumstances.

Ref. b.

6. Questions:

1. What are the critical elements needed for high-fidelity patient simulation (HFPS)?

2. What are the 7 ACRM principles that guide analysis of crisis management?

3. What are the currently used modalities of simulation in medical education?

4. What are the most widely accepted theories of simulation learning?

5. What are the advantages to the use of simulation for teaching and learning pediatric anesthesia?

6. What is debriefing, and what role does it play in simulation?

7. What are some of the benefits derived from a debriefing session?

7. References.

a. David M Gaba, K J Fish, Steven K Howard: Crisis Management in Anesthesiology. Philadelphia, Churchill Livingstone, 1994

b. Lori K. McDonnell, Kimberly K. Jobe, R. Key Dismukes; Facilitating LOS Debriefings: A Training Manual; NASA Technical Memorandum 112192, Ames Research Center, Moffett Field, CA 94035-1000

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Course Overview:

Objectives:
At the completion of this workshop, the participants will have experienced live scenarios of intraoperative pediatric crises using a simulator in an actual operating room environment. As the scenarios unfold, participants will have the opportunity to be part of the management team and get feedback on their performance in the simulated crisis or may choose to focus on learning about the evaluative process and educational benefits by participating as part of the debriefing teams. In addition participants will have gained knowledge on the value of simulation for the education of health care providers, ACRM, and systems analysis.

General Notes:

Place: Phoenix Children's Hospital, operating rooms, Hosts: Jeffrey Morray, MD, Howard Williams, MD, Dean Smith, MD

Time: Bus pick up at 13:30, return at 16:30, Saturday, March 10th

Attire: Comfortable clothing and shoes suitable for layering under OR "Bunny Suit" or Scrubs

Refreshments: light snack and beverages

Outline of Course:

14:00 Welcome to the Course: Al Hackel, MD
Course and Faculty Introduction; Anita Honkanen, MD

14:10 Introduction to the Simulation Environment; Kyle Harrison, MD

14:25 Video of Simulation at Packard OR's; Michael Chen, MD

14:35 Use of Simulation: Useful Educational Models; Alice Edler, MD

14:45 Move to OR's and put on bunny suit, divide into teams – A and B, see ORs

14:55 Introduction to OR environment and simulation mannequins

15:05 Scenarios: Teams A and B: two sessions
Note: teams will move to second simulation room at the conclusion of the first debriefing to participate in the second scenario and debriefing session

16:15 Question and Answer Session:
Group: Moderators – Al Hackel and Anita Honkanen

16:30 Bus ride return to Meeting Center, Pointe Hilton Squaw Peak, Phoenix

Course Description:

Introduction:
Scenarios will be run in the operating rooms at Phoenix Children's Hospital, putting us in an authentic environment, as opposed to the usual simulation exercise that takes place within a simulation center. This will allow for increased opportunity to approximate crises and solutions in a realistic manner. This model can be used to test hospital systems and the usual OR teams of nurses, techs, surgeons, and anesthesiologists for comfort within their usual work environment. The attached syllabus reviews course content in greater depth.

Roles:
Here, course facilitators will be playing the various "parts" of different team members, and course participants will be playing one of 3 roles during the scenarios: "hot" seat, first responder, and scrub tech.

The "hot" seat role allows the participant to be the first reactor to the situation and to respond as needed. The first responder will be called in to assist if needed by the "hot" seat participant, as the scenario unfolds. Finally, the scrub tech role allows the participant to achieve a different perspective within the OR team and to see from a fresh view point the crisis as it unfolds. This person can and will be asked to assist as appropriate during the crisis, but should only attempt to use skill levels appropriate for their designated position.

These roles will be assigned during the introductory session prior to the scenarios. Volunteers are welcome. Six participants from each team will play roles, three during the first scenario and three during the second.

Learning from exercises in simulation occurs as a result of experiencing a crisis, being observed during that crisis, and working through a debriefing session following the event to focus attention on the various elements, both medical and systemic, that impact on how the crisis evolved. The other participants will be in the OR, focused on analysis of the crisis as it unfolds. It will be helpful if they take notes to contribute to the discussions after the event as they may be asked to assist with comments at an appropriate time. Participants will be asked to make focused comments and observations, looking for the various sorts of error noted in analysis of ACRM. These could be attention errors, omission errors, judgment errors, communication errors, and organizational errors.

Course Directors:
Anita Honkanen, MD
Michael Chen, MD

Course Coordinators:
Chandra Ramamoorthy, MD
Al Hackel, MD

Hosts:
Phoenix Children's Hospital:

Department of Anesthesia
Jeffrey Morray, MD
Howard Williams, MD
Dean Smith, MD

Perioperative Services
Lois Hoke, RN, MBA
Cheryl Cogswell
Joe Bolis

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Alice Edler, MD, MA (Education), MPH, Assistant Professor of Anesthesiology
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