The use of simulation in teaching office based medical emergencies to dental students
Jeffrey Bennett, DMD  
Professor and Chair  
Department of Oral Surgery / Hospital Dentistry  
Indiana University School of Dentistry

David Wald, DO  
Professor of Emergency Medicine  
Temple University School of Medicine

Joseph Piecuch, DMD, MD  
Clinical Professor  
Oral and Maxillofacial Surgery  
University of Connecticut
There is a high likelihood that a practicing dentist will experience a medical emergency in the dental office. While most are mild, approximately 10% will be considered serious. A significant percentage of the patients who experience a medical emergency in the dental office were known to have some underlying disease.
Society has the right to expect that all practitioners possess the basic knowledge and skills to manage common medical emergencies.

All medical school graduate should be capable of handling medical emergencies, as they are generally the first on scene.

All dental school graduate should be capable of handling medical emergencies, as they are generally the first and possibly the only highly trained individual available to provide care within their office.
CODA accreditation standards

- 5-6 All students, faculty and support staff involved in the direct provision of patient care must be continuously certified in basic life support (B.L.S.), including cardiopulmonary resuscitation, and be able to manage common medical emergencies.

- 2-27 Graduates must be competent in providing appropriate life support measures for medical emergencies that may be encountered in dental practice.
Baum BJ. Inadequate training in the biological sciences and medicine for dental students: an impending crisis for dentistry. JADA 2007

“unless this attitude [dentistry’s “collective reluctance to deal with medical complex issues”] changes soon, dentistry will have taken a step toward self marginalization”

Jeffcoat MK. If we don’t do it, who will? Dentistry can’t shirk medical complexities. JADA 2004

Approximately 17% of graduates felt that inadequate educational time was devoted to emergency medical training

What is simulation?

- Educational tool that provides the student the opportunity to practice procedures
- Safety of environment
- Demonstrate multiple patient problems
- Reproducibility of content
- Ease of simulating critical events
Deliberate practice is an educational technique used to produce expert performance

- Intense repetition of a skill
- Rigorous assessment of that performance
- Specific informative feedback
- Improved performance in a controlled setting

- Ericsson KA. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. Acad Med 2004; 79(S70-81)
Types of simulators / simulation

- Standardized patient
- Role playing
- Screen based computer
- Task simulator
- High fidelity patient simulator
Medical emergency education in U.S. dental schools

- 95.3%: required course
- Hours in curriculum:
  - 3 – 60 hours (mean 19 hours)
  - >10 hours – 70% of institutions
- Role playing and simulation: 62.8%

Clark JDE 2006
Surveyed medical emergency instruction in U.S. Dental Schools

- 62.5% (n=40) of dental schools responding
  - 51 – 100 students: 53%
  - > 100 students: 40%

- Medical emergency instruction other than CPR – 95%
  - BLS – 1st & 3rd years
  - ACLS: not offered – 70%, 26% - elective, 4% - mandatory

- Instruction (lecture, seminar, small group) – median 12 hours
  - Lecture – 98%, Seminar – 43%, Small group – 60%
  - 2nd & 3rd year
  - OMFS faculty provided 98% of instruction
## Surveyed medical emergency instruction in U.S. Dental Schools

### Table 2: Types of Simulation and Their Utilization

<table>
<thead>
<tr>
<th>Role Playing</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student or Faculty Role Playing</td>
<td>16 (43%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standardized Patients</td>
<td>6 (16%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Based Simulation</td>
<td>5 (14%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Fidelity Patient Simulation</td>
<td>12 (32%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access to HFPS</th>
<th>Yes 70%</th>
<th>No 23%</th>
<th>Unsure 8%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost to Use HFPS</td>
<td>15 (47%)</td>
<td>9 (25%)</td>
<td>8 (25%)</td>
</tr>
<tr>
<td>Support use of HFPS</td>
<td>33 (83%)</td>
<td>1 (3%)</td>
<td>6 (15%)</td>
</tr>
</tbody>
</table>
Surveyed medical emergency instruction in U.S. Dental Schools

- High fidelity patient simulation
  - No institution using > 5 years
  - 6 using between 3 & 5 years
  - 3 using between 1 & 3 years
  - Cost was associated with non-use
  - Class size was not significantly associated with use
  - Schools with enrollment > 100 students used for shorter duration

- Role playing
  - 4 using > 5 years
  - 3 using between 3 & 5 years
  - 3 using between 1 & 3 years
Surveyed medical emergency instruction in U.S. Dental Schools

- Debriefing – 53%
- Video used for debriefing – 14%
Surveyed medical emergency instruction in U.S. Dental Schools

- Simulation used for:
  - Instruction – 56%
  - Assessment – 33%
To what extent does simulation support learning and teaching patient management and procedural skills

- Stimulation usually results in improved knowledge and skills
- Trainees and instructors express high levels of satisfaction with stimulation as an education method
- Most studies focus on short term gains in knowledge and skills and outcomes are usually tested in the stimulation setting
Training and re-training

- Pediatric residents resuscitation skills deteriorate over the 12 months following their initial course (PALS) early in their residency. (Pediatr Crit Care Med 2007)

- Levels of knowledge and skills deteriorate even more significantly during their 2nd year of training when no refresher course in PALS is provided. Pediatrics 2001
• ACLS guidelines established in 1974
• Certification became a requirement
• Recertification every 2 years
• Knowledge decay occurs after 1 year

What is the optimal interval to maintain baseline knowledge?

- Two groups of pediatric residents provided ACLS training with HFPS
  - Group reassessed at 4 months
  - Group B reassessed at 8 months
  - Those reassessed at 4 month interval performed better
- Educational sessions to maintain a baseline skill set should be performed on a more frequent basis

- 96% of studied residents
  - Training should be repeated at a frequency of every 6 months
- 83% of studied residents
  - HFPS should be an integral part of training and offered to them every 3 months

Pediatr Crit Care Med 2011
• Survey among dental students believed that emergency medical training should be increased and periodically reassessed during dental curricula

Henzi et al. North America Dental Students’ perspectives about their clinical education. JDE 2006
Hunt et al. Survey of pediatric resident experiences with resuscitation training and attendance at actual cardiopulmonary arrests. Pediatr Crit Care Med 2009

- Knowledge gained from ACLS/PALS courses decay significantly within weeks or months

- PC-based simulator maintained competence
  - Fills a gap, regardless of the type of prior resuscitation training they received
How easy is it to ventilate a patient?

- Difficult ventilation has been reported to be up to 15% (El-Orbany. Anesth Analg 2009)

- Resusci Anne manikins require < 5 cm H2O to result in adequate ventilation

- Pastis et al. Simulation in Healthcare 2013
  - Airway model with airflow restrictors
  - Require 28 cm H2O pressure
Healthcare is a TEAM-BASED discipline

- Institute of Medicine (1999)
  - Identified the promotion of effective team functioning as 1 of its 5 principles to create safe hospital systems.
  - Kohn et al. To err is human: building a safer health care system. National Academy Press

- JCAHO 2006
  - Lack of communication
  - Root cause of nearly 70% sentinel events
Healthcare is a TEAM-BASED discipline

- Most care delivered today is done by teams of people yet training often remains focused on individual responsibilities leaving practitioners inadequately prepared to enter complex situations.
- Simulation is a training tool that teaches
  - Knowledge, responsibilities, communication skills
Instead of measuring the quality of the participants' performance, we concentrated on the students' attitude and self-assessment towards emergency medical care. We expect that the training influences the students in a way that they realize the necessity of such skills and gain confidence in managing emergency situations.

Evaluate the impact of simulation on translational patient outcomes

- Measurement of educational outcomes in controlled laboratory setting
- Better patient care delivery practices
- Improved patient and public health outcomes directly linked to educational intervention
  - Where studies evaluated the impact of transfer of simulation learning to clinical practice, the evidence is positive but limited
Central line placement: Simulation based training (SBT) vs traditional training (bedside)

- (1) SBT produced more skillful residents when assessed in laboratory
- (2) SBT residents inserted central lines with significantly fewer needle passes
- (3) SBT residents had lower incidence of catheter related bloodstream infections

Barsuk et al: Arch Intern Med 2009
Only treating dentists, exercising their clinical judgment, can provide true “clearance” for the treatment they provide.

“Medical clearance” is being used as a crutch, or a justification dentists feel comfortable using when they believe they do not have the necessary knowledge and judgment to provide safe and appropriate care. However, “medical clearance” is a fallacy that relies on a blind trust in the knowledge of the consulting physician to whom dentists erroneously abdicate accountability for their treatment decisions. It threatens the autonomy of dental professionals as primary health care providers—and it can put patients at risk.
Competence is:

- the ability of an individual to do a job properly.

- the possession of a required skill, knowledge, qualification, or capacity.

- the acquisition of knowledge skills and abilities at a level of expertise sufficient to be able to perform in an appropriate work setting (within or outside academia).
Does the sequence of instruction matter during simulation?

- Learners who participated in simulation before lecture demonstrated increased knowledge compared with learners who participated in simulation after a lecture.

- Preferred to have lecture prior to simulation.

- The timing of when to engage learners in simulated activities is dependent on the amount of previous knowledge they have before engaging in a simulated activity.

- Simulation in Healthcare 9(1) 2014
“no industry in which human lives depend on skilled performance has waited for unequivocal proof of the benefits of simulation before embracing it”

Gaba Qual Saf Health Care 2004
Thank you