Pediatric Cholinergic Toxidrome

Created: June 1, 2009
Modified: February 29, 2012
<table>
<thead>
<tr>
<th></th>
<th>Curriculum Outline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Author Contact Information</td>
</tr>
<tr>
<td>2</td>
<td>Description of Curriculum</td>
</tr>
<tr>
<td>3</td>
<td>Target Trainees</td>
</tr>
<tr>
<td>4</td>
<td>Prerequisite Knowledge and Skills</td>
</tr>
<tr>
<td>5</td>
<td>Goals and Objectives</td>
</tr>
<tr>
<td>6</td>
<td>Instructor Notes</td>
</tr>
<tr>
<td>7</td>
<td>Common Errors &amp; Prevention Strategies</td>
</tr>
<tr>
<td>8</td>
<td>Cognitive Training</td>
</tr>
<tr>
<td>9</td>
<td>Skill Training</td>
</tr>
<tr>
<td>10</td>
<td>Equipment Setup</td>
</tr>
<tr>
<td>11</td>
<td>Assessment Methods</td>
</tr>
<tr>
<td>12</td>
<td>Appendices</td>
</tr>
</tbody>
</table>
1. Instructor Contact Information

**Suzan Mazor, MD**  
Associate Professor  
Department of Pediatrics, Division of Emergency Medicine  
Seattle Children’s Hospital  
Mail-stop B-5520  
4800 Sand Point Way NE  
Seattle WA 98105  
Email: suzan.mazor@seattlechildrens.org  
Phone: 206-987-2599

**Jennifer R. Reid, MD**  
Assistant Professor  
Department of Pediatrics, Division of Emergency Medicine  
Seattle Children’s Hospital  
Mail-stop B-5520  
4800 Sand Point Way NE  
Seattle WA 98105  
Email: jennifer.reid@seattlechildrens.org  
Phone: 206-987-2599

**Sara Kim, PhD**  
Director & Associate Professor  
Instructional Design and Technology, David Geffen School of Medicine  
University of California Los Angeles  
Box 957381  
700 Westwood Plaza, Room 1220  
Los Angeles, CA 90095-7381  
Email: sarakim@mednet.ucla.edu  
Tel: 310-206-0572
2. Description of Curriculum

Course Overview
This course teaches learners to recognize and manage pediatric cholinergic toxicity and its complications, particularly respiratory failure.

The course is simulation based with an integrated team communication focus.

The learners will participate in a simulation scenario and be asked to identify the signs and symptoms of a cholinergic toxidrome and its management including antidote therapy (Appendix A).

At the end of training, the learners should be able to recognize the seriousness of the situation and recruit a full resuscitation team. The primary complication for the team to recognize and manage is respiratory failure.

Educational Rationale on How the Course Generalizes to Real-Life Circumstances
Organophosphates and carbamates are cholinesterase inhibiting chemicals used predominately as pesticides. They are also used as chemical warfare agents. Their toxic effects are similar to those of cholinesterase inhibitors used medically to treat glaucoma and myasthenia gravis.

Exposure to cholinesterase inhibitors follow both deliberate and inadvertent ingestion or overdose, occupational exposure, and international warfare. Medical providers must be able to quickly recognize and manage this potentially deadly scenario.

The goal of this course is to provide the learner with an opportunity to manage a life threatening pediatric cholinergic overdose, where the correct steps need to be taken in a limited period of time.

Key elements include the primary survey (including exam of the pupils), eliciting critical history (potential ingestion/exposures), recognizing the need to call for team assistance early in an event, recognizing and treating respiratory failure, recognizing cholinergic toxidrome (DUMBBELS: defecation, urination, miosis, bronchorrhea, bronchospasm, emesis, lacrimation, salivation) treating cholinergic toxicity (atropine, pralidoxime), and decontamination.

Duration of Training Session: 1 hour
Frequency of Course: 2 times per year
Number of Trainees per Session: 3 to 7
# 3. Target Trainees

<table>
<thead>
<tr>
<th>Primary</th>
<th>Pediatric and emergency medicine residents, fellows, faculty and nurses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary</td>
<td>N/A</td>
</tr>
</tbody>
</table>
4. Prerequisite Knowledge and Skills

**Required background knowledge:**
- Anatomy related to the pediatric airway
- Application and use of airway adjuncts (oral, nasal airway)
- How to provide ventilatory support: Bag Mask Ventilation, Endotracheal Intubation
- Drugs used for rapid sequence intubation (RSI)
- Toxidrome of cholinergic toxicity
- Antidote to cholinergic toxicity: atropine, pralidoxime
- TeamSTEPPS communication terminology (Appendix B)

**Required background skills expected in trainees prior to receiving training in the target course:**
- Airway assessment
- Airway positioning techniques
- Correct use of oral & nasal airway
- Proper bag mask ventilation technique
- Rapid sequence intubation procedures, medications and dosages
- Proper endotracheal intubation technique and confirmation
5. Goals and Objectives

Goal 1: Recognition and Management of Respiratory Failure
The learner will improve skills in recognizing and managing respiratory failure in a safe and professional manner. (ACGME Competencies: Medical Knowledge\(^1\), Patient Care\(^2\), Interpersonal and Communication Skills\(^3\), Professionalism\(^4\), System-based Practice\(^5\), Technical skills\(^6\))

**Objective 1a - Initial patient assessment** \([1,2,3,4]\)
The learner will be expected to discuss what s/he would look for in an initial history and physical examination (primary survey) of a patient.

**Objective 1b - Identification of respiratory failure** \([1,2,3]\)
The learner should identify signs of respiratory failure: airway obstruction, bradypnea, hypoxia, tachycardia, or secondary bradycardia.

**Objective 1c - Appropriate monitoring** \([1,2,3]\)
The learner should apply basic monitoring standards for a patient in respiratory failure (cardiorespiratory monitors, pulse oximetry, blood pressure, and temperature). S/he should obtain a patient weight or an accurate estimate (i.e. Broselow-Luten Tape).

**Objective 1d - Equipment setup** \([1,2,3,6]\)
The learner should be able to set up the equipment required to treat a patient in respiratory failure: airway adjuncts (nasal airways), supplemental oxygen, bag-mask ventilation, suction, endotracheal tube with stylet, and laryngoscope. S/he should select an appropriate size nasal airway, face mask, bag, endotracheal tube and laryngoscope for the patient.

**Objective 1e - Demonstrate understanding of the relevant anatomy** \([1]\)
The learner should be able to identify pediatric anatomy that could impede ventilation. The neck should not be flexed or hyper extended. The airway should be evaluated for patency.

**Objective 1f - Technical skills** \([6]\)
The learner should position the patient for maximal ventilation: shoulder roll and/or jaw thrust. S/he should be able to bag-mask ventilate the patient effectively, using the “E” and “C” technique, using either one person or two person technique. If s/he intubates, s/he should use rapid sequence intubation techniques, including pre-oxygenation, pre-medications (atropine), a sedative (optional, due to the cholinergic toxicity) and a paralytic. The learner should place the endotracheal tube in the trachea. Intubation should be confirmed with at least 2 techniques (physical exam for chest rise, auscultation, capnography, colorimeter, and x-ray). S/he should identify a reference resource and verify medication doses.
5. Goals and Objectives

Goal 2: Recognition and Management of Cholinergic Toxicity
The learner will recognize and treat cholinergic toxicity in a safe and professional manner. (ACGME Competencies: Medical Knowledge\(^1\), Patient Care\(^2\), Interpersonal and Communication Skills\(^3\), Professionalism\(^4\), System-based Practice\(^5\), Technical skills\(^6\))

**Objective 2a - Recognition of cholinergic toxidrome\(^{[1,2]}\)**
The learner should identify physical exam findings consistent with cholinergic toxicity DUMBBELS: defecation, urination, miosis, bronchorrhea, bronchospasm, emesis, lacrimation, salivation.

**Objective 2b - Management of cholinergic toxidrome with atropine, pralidoxime\(^{[1,2]}\)**
The learner should identify atropine and/or pralidoxime as the antidotes to cholinergic toxicity. Dosing should either be stated or obtained from resource material; Atropine dose: 0.05 mg/kg IV, pralidoxime dose: 20-40 mg/kg IV.

**Objective 2c – Appropriate monitoring\(^{[1,2,3]}\)**
The learner should recognize the need for ongoing monitoring (cardiorespiratory monitors, pulse oximetry, blood pressure, and temperature) due to the potential of recurrent respiratory failure.

**Objective 2d – Appropriate external decontamination\(^{[1,2,3,6]}\)**
The learner should identify that cholinergic toxidrome could indicate a contaminated patient, potentially putting providers at risk. Safe decontamination methods should be utilized.

Goal 3: Teamwork and communication Skills
The learner will become more skilled in the management and leadership of emergency personnel including physicians, nurses, and ancillary personnel. (Competencies: Interpersonal and Communication Skills\(^3\), Professionalism\(^4\), System-based Practice\(^5\), Technical skills\(^6\))

**Objective 3a – Team structure and leadership\(^{[3,4,5,6]}\)**
The learner will be exposed to a full-scale high-fidelity simulation using a human patient simulator in which the learners are faced with a life threatening emergency due to respiratory failure. The team will be expected to brief at the beginning of the scenario, huddle during the scenario and debrief after the scenario.

**Objective 3b – Communication skills\(^{[3,4,5,6]}\)**
The learner will be required to direct available resources to manage respiratory failure and cholinergic toxicity. S/he will coordinate, direct and communicate with a resuscitation team using directed call-out and check-back.
6. Instructor Notes

1. Environmental Set Up (See Section 10)
   - Try to re-create the location, look, and feel of the participant’s “home” work environment.
   - Place SimBaby in a gown, diaper, etc, to maximize realism.

2. Pre-Simulation Introduction
   - Share a “basic assumption” with participants. (e.g., We believe each of you is intelligent, well-trained, want to do their best and improve (adapted from the Center for Medical Simulation, Cambridge, MA)).
   - Share the “goals”. (e.g. this is an opportunity for us to practice patient care and team dynamics in a safe, supportive environment.)
   - Review the simulator capabilities: where monitors can be applied, where to auscultate for breath sounds or heart sounds, where to look/feel for clinical findings (breathing, pulses, pupils, etc) where procedures can be performed (IV, IO, bag valve mask, endotracheal intubation).
   - Review supplies: location of resuscitation equipment, monitors, defibrillator, discuss that if additional equipment or resources are desired, request should be made to facilitator.
   - Review safe use of defibrillator.
   - Review: If equipment malfunctions or is missing, please continue with the simulation as you would in a real patient case.
   - Review: We recognize that this is a “simulated” environment; please do your best to act as you would in a real patient environment.
   - Review: Discuss principles of teamwork and communication – TeamSTEPPS (Appendix B). Review expectations of team leaders and members: take time to plan before a patient arrives (brief) and “get the team on the same page” (huddle).
   - Review: Discuss that additional history, physical exam findings, lab/imaging results, consults may be requested, as they would in a real clinical situation. Not all results/requests may be available immediately.
   - Review: After the scenario concludes, we will discuss the medical management and the team dynamics of the scenario together.

3. Scenario Notes
   - A “trigger” is a critical time or event that signifies the start or end of an act in the scenario. These are the critical steps that help the scenario progress. Please review these prior to conducting your session.

4. Debriefing (See Appendix C)
   - Remember: Try to have participants step away from the simulator, into a different space (e.g. chairs in a circle or separate room). This physical que helps participants shift from “doing” /a clinical focus to “reflecting” /a learning focus.
   - Remind participants this is a “confidential” opportunity for discussion and questions. Try to refrain from discussing individual performances outside of the simulator environment.
   - Remind participants that the debriefing time is intended to focus on the group’s performance.
7. Common Errors and Prevention Strategies

Common Errors and Prevention Strategies:

a. Failure to recognize respiratory failure.

b. Fixation error: focus on endotracheal intubation leading to failure to use stepwise treatment of respiratory failure.
   \textit{Strategy:} Review basic airway management: assessment, positioning, airway adjuncts (oral/nasal airways), bag mask ventilation (BMV) as progressive steps in airway management.

c. Failure to use RSI for intubation for patient with assumed full stomach.
   \textit{Strategy:} Review components of RSI: preoxygenation, premedication with atropine in children < 5 yrs, sedative (not needed in this case due to cholinergic toxicity), paralytic and timely cricoid pressure.

d. Failure to recognize cholinergic toxidrome.
   \textit{Strategy:} Review signs of cholinergic toxicity. DUMBBELS: defecation, urination, miosis, bronchorrhea, bronchospasm, emesis, lacrimation, salivation.

e. Failure to treat cholinergic toxidrome.
   \textit{Strategy:} Review antidote to cholinergic toxicity: atropine and pralidoxime

f. Failure to safely externally decontaminate the patient
   \textit{Strategy:} Review need & process to safely decontaminate a patient.

g. Inefficient teamwork
   \textit{Strategy:} Review need to \textit{brief} (discuss team roles) prior to a critical situation and \textit{huddle} (ad-hoc planning to re-establish situation awareness) during a crisis.

h. Inefficient communication: lack of call-out
   \textit{Strategy:} Review importance of directed communication:
   “Survey MD- What’s the airway status?”

i. Inefficient communication: lack of check-back
   \textit{Strategy:} Review use of closed-loop communication:
   Team Leader: “Give Atropine 1mg IV push”.
   Medication Preparation Nurse: “Atropine 1 mg IV push”.
   Team Leader: “Correct”.

General strategies to solve the problems

- Increase knowledge base: assigned reading, lectures, TeamSTEPPS training
- Debriefing focused to re-evaluate critical thinking and structure planning of actions
- Teaching points based on errors
- Regular simulation training to avoid previous mistakes
Key methods for delivering cognitive training include the following:

- Respiratory Failure and Cholinergic Toxicity Learner Handout (Appendix D).
Participants:
Doctor #1: Team Leader
Doctor #2: Airway Physician
Doctor #3: Survey Physician
Nurse #1: Medication Administration Nurse
Nurse #2: Medication Preparation Nurse
Nurse #3: Documenting or Circulating Nurse
Instructor #1: Attending PEM or EM physician (Facilitator)
Instructor #2: If a 2nd instructor is available, cast them as “grandma”, available to answer questions. If a 2nd instructor isn’t available, the facilitator can play the role of grandma as well.

Background:
- This scenario works best if learners function in their normal roles (e.g., physicians as physicians, nurses as nurses). If your learners consist of only one discipline, please ask 1-2 of them to function as the needed discipline during the scenario. To maximize the realism of the scenario, ask them to do everything he/she would normally do.
- If your learners have not been introduced to the concept of specific team roles (e.g., team leader), we recommend discussing your institutional standards prior to the start of the scenario. If your learners are already familiar with this concept, we recommend reminding them of your institution’s team roles and responsibilities prior to the start of the scenario.
- Based on your learners needs/experience, the instructor can assign roles or allow self determination during the brief. You may choose to have the learners remain in the same roles throughout the scenario or rotate. Please state your expectation to the group, (e.g., “Now that we have reviewed team roles and responsibilities, I will assign the team leader to be Dr. Stone. Dr. Stone, you will have the opportunity to assign all other roles and organize your team after I introduce you to the scenario”).
- Remind them that an instructor/facilitator/actor will be available (identify WHO) to answer questions (e.g., history, labs) and assist them (if they are having difficulty examining the simulator or finding equipment). Not all results or requests may be available at the time the request is made.
- All learners will be read the Prelude outside the simulation area.
- Following the Prelude, give the team 2minutes to brief. This is their opportunity to organize their team prior to receiving the triage history.
- The team will then be read the Triage history outside the simulation area, then be permitted to enter the “patient’s room”.
- Remind them that “grandma” (identify WHO) is also available to answer questions.

Prelude: 0-3 minutes

Introduction:
The communication (triage) nurse just received a phone call from a grandma. Her 2 year old grandson is having trouble breathing. They’ll be here in 2 minutes. You have 2 minutes to organize your team.

(Give the team 2 minutes to brief).
**9. Skill Training**

**Triage history:**
The triage nurse met the grandma and Robert, a 2 year old boy, at triage. She brought him directly back to a room because he “looked bad”.

Grandma is available to answer questions. (NAME) will be playing the role of grandma. (If possible, consider having grandma tuck a pair of gardening gloves in her pocket or have a shovel sticking out of her bag).

(The team can now enter the simulation room to meet the patient).

**Act 1: 3-5 minutes**

**Triggers:** 3 minutes

**Additional History and Medical Information if asked:**

Robert: 2 year old boy.

**Chief Complaint:** Respiratory distress

**History:** He was in good health this morning. He spent the day at his grandparent’s house. Grandma became concerned when he began drooling and seemed to have difficulty breathing. Robert had been playing in the backyard and garage for an hour prior to presentation. Grandma drove Robert to the ED. He has not been sick (no cold, cough, or fever).

**PMH:**
- Healthy, no medical problems
- Immunizations up to date

**Medications:**
- Robert is on no medications
- If asked, Grandma is a gardener currently doing lots of work on her yard/bushes/trees including pruning and pesticide application.

**Social:**
Lives with mom; cared for by grandparents.

**No allergies.**

**Initial Examination (becomes available with appropriate monitors, evaluation):**

- **Rhythm** sinus
- **HR** 110 bpm
- **BP** 90/55
- **Sat** 88%
9. Skill Training

**Act 1 Cont’d**

**Appearance:** Listless, responds only to pain.

**Respiratory:** Tachypneic, with intermittent upper airway obstruction. Coarse breath sounds and wheezing bilaterally. Copious secretions, salivating.

**Circulation:** Facial pallor, mottled hands and feet. Cap refill 4 seconds. 1+ pulses. Diaphoretic.

**Neuro:** Pinpoint pupils bilaterally, unresponsive to light. Responds to painful stimuli.

**Additional:** No signs of trauma, but eyes tearing constantly.

**Act 2: 5-13 minutes**

**Triggers:**
- Start - 5 minutes
- End - 30 seconds after Atropine or pralidoxime given, or intubation, or 7 minutes in this act

**Physical Examination:**

- **Rhythm** sinuss bradycardia
- **HR** 64 bpm
- **BP** 120/68
- **Sat** ramps down to 84% on room air over 1 min
- **RR** ramps down to 6/min over 1 min
- **Temp** 37.0

**If requested:**

- **Appearance:** Listless, limp, unresponsive to pain.
- **Respiratory:** Slowed shallow breathing, with upper airway obstruction. Coarse breath sounds bilaterally. Copious secretions, salivating.
- **Circulation:** Facial pallor, mottled hands and feet. Capillary refill 4 seconds. 1+ pulses. Diaphoretic.
- **Neuro:** Pinpoint pupils bilaterally, unresponsive to light. Does not respond to painful stimuli.
- **Additional:** No signs of trauma but eyes constantly tearing.

**Potential Interventions, if requested:**

- If requested: Doctor #2, #3, and Nurse #2, #3 are available to participate.
- If requested: Oral airway is available, but makes patient vomit if attempted.
9. Skill Training

If requested: Nasal airway is available, overcoming upper airway obstruction. Addition of BMV allows easy ventilation of patient, oxygen saturations increase to 96%.

**Act 2 Cont’d**

If requested: BMV is available, allowing ventilation if airway properly positioned.
If requested: IV access obtained on first attempt.
If requested: Atropine, pralidoxime are available.

Atropine, 0.05mg/kg IV/IO/IM/SQ
Pralidoxime, 20-40mg/kg IV/IO/IM/SQ

If requested: Intubation equipment available: endotracheal tubes, laryngoscopes, suction, colorimeter.
If requested: Rapid sequence intubation medications available: atropine, midazolam, etomidate, rocuronium, and succinylcholine.
If requested: glucose 85
If requested: fluid available for IV/IO administration (e.g. Normal saline 20 mL/kg)

***If team gives atropine or pralidoxime or intubates AND externally decontaminates patient, proceed to Act 4.

*** If team reaches end of this act (total of 7 min in this act) without administering atropine, pralidoxime or intubating patient, proceed to Act 3.

**Act 3: 13-17 minutes**

**Triggers:**
- Start - Patient not externally decontaminated OR
  Patient not given atropine or pralidoxime or intubated
- End - 4 min in this Act

**Physical Examination: Patient remains in same condition as in Act 2**

- Rhythm: sinus bradycardia
- HR: 64 bpm
- BP: 120/68
- Sat: 84% on room air
- RR: 6/min
- Temp: 37.0

A confederate (this is an actor, identified by the facilitator and prepared prior to the simulation) develops symptoms from exposure to the cholinergic substance. S/he develops watery eyes, excessive saliva and difficulty breathing. S/he can tell the team his/her symptoms and that s/he feels unwell.

**Act 4: 17-19 minutes**

**Triggers:**
- Start- 30 seconds after atropine, pralidoxime given AND externally decontaminated or
  17 minutes into scenario.
- End- 2 min in this Act
**Act 4 Cont’d**

**Physical Examination:**

- **Rhythm** sinus
- **HR** 115 bpm
- **BP** 105/56
- **Sat** ramps up to 96% over 1 min
- **RR** ramps up to 26/min over 1 min***
- **Temp** 37.0

*If requested:*

- **Appearance:** Some movement of arms/legs.***
- **Respiratory:** No upper airway obstruction. Clear breath sounds bilaterally.
- **Circulation:** Warm well perfused. Cap refill 3 seconds. 2+ pulses.
- **Neuro:** 3mm pupils bilaterally, responsive to light. ***
- **Additional:** No signs of trauma.

**Potential Interventions, if requested:**

- If requested: X-ray en route for evaluation.
- If requested: Additional atropine, pralidoxime available for administration.
- If requested: Toxicology/Critical care en route for consultation.
- If requested: glucose 85
- If requested: fluid available for IV/IO administration (e.g. Normal saline 20 mL/kg)

**When ending scenario consider asking:**

- Any additional evaluations/interventions team would like
- Anticipated disposition of patient

***Note: If the team has intubated the patient and not given atropine, pralidoxime: respiratory rate should reflect the rate at which they are bagging. If paralytics were given, no movement or pupil responsiveness should occur.***
## 10. Equipment Set-up

### Simulation Environment preparation

Before each simulation, ensure the anticipated resuscitation equipment is available for the team’s use. Preferably, within 6 feet of simulator.

### Resources

- PALS reference cards, material
- Patient Weight Estimator
- Pediatric Resuscitation Medication references (e.g.: Broselow tape, reference cards)
- Documentation forms (Code Blue forms)

### Universal Precautions

- Staff gowns
- Gloves
- Mask and face shields
- Teaching crash cart & Backboard
- Teaching Defibrillator

### Medications

- Adenosine
- Amiodarone
- Atropine
- Etomidate
- Fentanyl
- Ketamine
- Lidocaine
- Midazolam
- Pralidoxime
- Normal Saline/Lactated Ringers
- Rocuronium
- Succinylcholine
- Epinephrine 1:10,000

### Equipment

- Simulator in hospital gown, on bed
- Monitor – NIBP, HR, RR, Oxygen saturation, temp
- BP cuff, HR monitor leads, O2 sat probe, defibillator cables
- Oxygen hook-up on wall or cylinder
- Bag-mask system, multiple size masks
- O₂ Mask, simple or non-rebreather
- Suction
- Thermometer
- Temperature probe
- Nasal, oral airways, multiple sizes
- Shoulder roll
- Endotracheal tubes- 3.0, 3.5, 4.0, 4.5, 5.0, styles
10. Equipment Set-up

**Equipment Cont’d**

- Laryngoscope, Miller and Mac blades, multiple sizes
- Co2 colorimeter
- Nasogastric tube(s)
- Stethoscopes
- IV/Angiocaths, various sizes
- IO needles, 2 sizes
- Gauze, Tape
- IV tubing
- IV pumps, pressure bags
- Syringes, multiple sizes
- Bedside blood sample processors: glucose, lytes, gases
## 11. Assessment Methods

**Type(s) of Assessment Methods Used in This Course:**

- [ ] Pre-test Only
- [x] Pre-test & Post-test
- [x] Post-test Only

- [x] Medical Management Evaluation/Debriefing Form *(Appendix E)*
- [x] Teamwork and Communication Evaluation/Debriefing Form *(Appendix F)*
- [x] Simulation Session Evaluation *(Appendix G)*
<table>
<thead>
<tr>
<th>Appendix</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>Pediatric Cholinergic Toxidrome Scenario Algorithm</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Team STEPPS References</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Debriefing Overview</td>
</tr>
<tr>
<td>Appendix D</td>
<td>Learner Handouts</td>
</tr>
<tr>
<td>Appendix E</td>
<td>Pediatric Cholinergic Toxidrome Medical Management Evaluation/Debriefing Form</td>
</tr>
<tr>
<td>Appendix F</td>
<td>Pediatric Cholinergic Toxidrome Teamwork and Communication Evaluation/Debriefing Form</td>
</tr>
<tr>
<td>Appendix G</td>
<td>Pediatric Cholinergic Toxidrome Simulation Session Evaluation Form</td>
</tr>
<tr>
<td>Appendix H</td>
<td>References</td>
</tr>
</tbody>
</table>
Appendix A: Scenario Algorithm

**SCENARIO TIMELINE**

**Act 1: Cholinergic Toxicity**
3-5 min.
Triggers: Start 3 min into scenario
End: 5 min into scenario

**Act 2: Respiratory Failure**
5-13 min.
Triggers: Start 5 min into scenario
End: 30 sec after atropine or pralidoxime is given, or intubation, or 13 min into scenario

**Act 3: Contamination**
13-17 min.
Triggers: Start 13 min into scenario
Patient not externally decontaminated OR patient not given atropine, pralidoxime, or intubated
End: Patient externally decontaminated AND treated with atropine/pralidoxime/ intubation. Or 17 min into scenario

**Act 4: Resolution**
17-19 min.
Triggers: Start patient externally decontaminated and given atropine/pralidoxime or intubated.
End: 19 min into scenario

**VITAL SIGNS**

- **Rhythm**: sinus
- **HR**: 110 bpm
- **BP**: 90/55
- **SAT**: 88%
- **RR**: 60/min
- **Temp**: 37.0 C

**FACILITATOR INFORMATION**

- Allow team to brief outside the simulation room
- If requested, additional history/exam available
- If requested, additional history/exam available.
- If requested, atropine, pralidoxime are available
- EMV improves SAT to 96%
- Confederate develops symptoms: lacrimation, salivation, respiratory distress
- If requested, atropine or pralidoxime is available
- If requested, glucose 85
- If requested, additional consultants en route
- Patient symptoms resolving
- If requested, additional medications available, consultants en route
### Appendix B: TeamSTEPPS References

#### TeamSTEPPS Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adapta</strong>bility</td>
<td>The ability to adjust strategies and altering a course of action in response to changing conditions (internal and external).</td>
</tr>
<tr>
<td><strong>Brief</strong></td>
<td>Discussion prior to start that assigns essential roles, establishes expectation, anticipated outcomes, and likely contingencies.</td>
</tr>
<tr>
<td><strong>Call-Out</strong></td>
<td>A tactic used to communicate critical information during an emergent event. Helps the team prepare for vital next steps in patient care. (Example: “Airway status?” – “Airway clear”; “Breath sounds?” – “Breath sounds decreased on right”)</td>
</tr>
<tr>
<td><strong>Check-Back</strong></td>
<td>A communication strategy that requires a verification of information. The sender initiates the message, the receiver accepts it and restates the message. In return, the sender verifies that the re-statement of the original message is correct or amends if not. (Example: “Give 25 mg Benadryl IV push” – “25 mg Benadryl IV push” – “That’s correct”)</td>
</tr>
<tr>
<td><strong>CUS</strong></td>
<td>Signal phrases that denote “I am Concerned, I am Uncomfortable, This is a Safety Issue.” When spoken, all team members will understand clearly not only the issue but the magnitude of the issue.</td>
</tr>
<tr>
<td><strong>Debrief</strong></td>
<td>Brief, informal information exchange session designed to improve team performance and effectiveness.</td>
</tr>
<tr>
<td><strong>DESC Script</strong></td>
<td>A technique for managing and resolving conflict. Describe the specific situation or behavior; provide concrete data. Express how the situation makes you feel/what your concerns are. Suggest other alternatives and seek agreement. Consequences should be stated in terms of impact on established team goals; strive for consensus.</td>
</tr>
<tr>
<td><strong>Huddle</strong></td>
<td>Ad hoc planning to re-establish Situation Awareness; designed to reinforce plans already in place, and assess the need to adjust the plan.</td>
</tr>
<tr>
<td><strong>I’M SAFE</strong></td>
<td>A checklist to determine both your coworkers’ and your ability to perform safely: I = Illness; M = Medication; S = Stress; A = Alcohol and Drugs; F = Fatigue; E = Eating and Elimination.</td>
</tr>
<tr>
<td><strong>SBAR</strong></td>
<td>A framework for team members to structure information when communicating to one another. S = Situation (What is going on with the patient?) B = Background (What is the clinical background or context?) A = Assessment (What do I think the problem is?) R = Recommendation (What would I do to correct it?)</td>
</tr>
<tr>
<td><strong>Shared Mental Model</strong></td>
<td>An organizing knowledge structure of relevant facts and relationships about a task or situation that are commonly held by team members</td>
</tr>
<tr>
<td><strong>Situation Awareness</strong></td>
<td>The ability to identify, process, and comprehend the critical elements of information about what is happening to the team with regards to the mission. It’s knowing “What is going around you” and “What is likely to happen next”.</td>
</tr>
<tr>
<td><strong>Situation Monitoring</strong></td>
<td>The process of actively scanning and assessing elements of the situation to gain information or maintain an accurate awareness or understanding of the situation in which the team functions.</td>
</tr>
<tr>
<td><strong>Two-Challenge Rule</strong></td>
<td>Assertively voicing concern at least two times to ensure it has been heard.</td>
</tr>
</tbody>
</table>
“Simulation creates the opportunity to debrief.”

We believe that the focus of each simulation should be the DEBRIEF. The simulation creates the opportunity for us to examine our medical management, technical skills and teamwork and communication skills. It allows us to talk about the challenges we faced in a safe environment and improve the way we care for patients as a team.

Framework for debriefing:

Each debrief should consist of 3 components:
- Introduction
- Discussion of medical management and technical skills
- Discussion of teamwork and communication skills

1) Introduction

This “sets the stage” for debriefing and creates expectations.
What you might say:
- This is an opportunity to reflect and learn, improve our medical care, team work, and communication.
- Everyone should be able to ask questions and share their feelings.
- Once you leave this session, we encourage open discussions of the concepts you learn, but ask you to keep specifics about the scenario and performances to yourself.

2) Medical management and technical skills

This portion of the discussion focuses on the medical aspects of the case. It’s usually more comfortable to begin with these “facts”.

What you might say:
- Let’s begin by discussing medical management.
- What did you think was wrong with the patient? Can someone summarize what happened in this scenario for us?
- What signs led you to think this?
- What information/resources could have helped guide your decision making?

3) Teamwork and communication (a. k. a. crew resource management, non-technical skills)

This portion of the discussion focuses on how the team worked together. It can be emotionally charged and difficult to discuss without feeling “personal”. The challenge is to try to generalize specifics into themes.

What you might say:
- Let’s talk about how you functioned as a team.
- What did your team do well?
- What could your team do differently next time?
- That is something I see often. Has anyone else experienced that? What have you seen done?
4) Summarizing
   - *This is your opportunity to ensure the key learning points are highlighted*
   - *Try to choose approximately 3 take-home medical/technical points and teamwork/communication points.*
     - Medical management/technical skills examples:
       (a) This was a case of pediatric cholinergic toxicity leading to respiratory failure.
       (b) Signs of cholinergic toxicity: defecation, urination, miosis, bronchorrhea, bronchospasm, emesis, lacrimation, salivation.
       (c) Signs of respiratory failure: bradypnea, inadequate ventilatory effort (upper airway obstruction), apnea, hypoxia.
       (d) Externally decontaminate the patient: reduce ongoing exposure to patient and medical team.

     - Teamwork/communication examples:
       (e) Recognize need for a full resuscitation team when a patient develops respiratory failure.
       (f) Delegate and maintain specific team member roles to ensure coordinated team functioning.

General Facilitator Goals:
   - Try to facilitate the TEAM’s discussion (avoid dominating the conversation)
   - Ask open ended questions (avoid yes/no questions)
   - Discuss the team performance (not the individual)
Appendix D: Learner Handouts

Respiratory Failure Teaching Points

1. Respiratory assessment includes:
   - Airway: chest or abdomen movement, listen & feel air movement
   - Breathing: Respiratory rate, effort (nasal flaring, retractions, head bobbing), lung sounds

2. Signs of respiratory failure: airway obstruction, bradypnea, hypoxia, secondary bradycardia

3. Critical monitoring:
   - Cardiorespiratory, pulse oximetry, blood pressure, temperature, patient weight

4. Prepare equipment:
   - Nasal airways, supplemental oxygen, bag-mask ventilation, suction, nasogastric tube, endotracheal tube with stylet and laryngoscope,

5. Identify pediatric anatomy that could impede ventilation.
   - Kids have big skulls that angle their heads into flexion. More pliable airways can result in airway compression if necks are hyperextended.

6. Management of respiratory failure:
   - Positioning: use a shoulder roll and/or jaw thrust-careful not to flex or hyper extend neck.
   - Supplemental oxygen.
   - Ventilatory support: bag-mask ventilate using the “E” and “C” technique, either one person or two person technique.
   - If intubating, utilize rapid sequence intubation techniques:
     - Pre-oxygenation, pre-medication (atropine), a sedative (optional, due to the cholinergic toxicity) and a paralytic.
     - Intubation should be confirmed with at least 2 techniques (chest rise, auscultation, capnography, colorimeter, or x-ray)
     - Avoid succinylcholine if organophosphate or carbamate poisoning suspected as effect will be exaggerated

Cholinergic Teaching Points

Cholinergic agents include:
- Organophosphate and carbamate pesticides
- Nerve gases like sarin and soman

Cholinergic toxidrome:
- Defecation, Urination, Miosis, Bronchorrhea, Bronchospasm, Emesis, Lacrimation, Salivation

Treatment options:

Cholinergic toxidrome:
- Atropine: titrate until bronchospasm/bronchorrhea has decrease, heart rate has increased
- Pralidoxime: Specific antidote for organophosphate poisoning. If carbamate poisoning suspected or possible, give pralidoxime.

Decontamination:
- Remove contaminated clothing; wash exposed areas with soap and water. Irrigate exposed eyes with warm saline solution.
Appendix E: Medical Management Evaluation/Debriefing Form

Pediatric Cholinergic Toxidrome
Medical Management/Technical Skills

This checklist identifies core medical management/technical skills. It’s hard to discuss more than 3 of these during one debriefing session. We recommend selecting 2-4 of these issues to focus on.

Assessment of ABCDE’s

□ Done Well  □ Needs Work

Specific comments: _____________________________________________
________________________________________________________________________________
________________________________________________________________________________

What did you think of the assessment of the ABCDE’s? What could you do differently?

Obtaining significant history

□ Done Well  □ Needs Work

Specific comments: _____________________________________________
________________________________________________________________________________
________________________________________________________________________________

What’s in a SAMPLE history? Signs and symptoms, Allergies, Medications, Past Medical History, Last meal, Events. What made you think/not about potential exposures/ingestions?

Recognition of respiratory failure

□ Done Well  □ Needs Work

Specific comments: _____________________________________________
________________________________________________________________________________
________________________________________________________________________________

Discussion Points: What signs of respiratory failure did you see?-airway obstruction, bradypnea, hypoxia. What would have helped you identify them sooner?

Management of respiratory failure

□ Done Well  □ Needs Work

Specific comments: _____________________________________________
________________________________________________________________________________
________________________________________________________________________________

Discuss Points: What did you think about in managing respiratory failure? (airway positioning, bag-valve mask technique). What could you have done differently?
## Recognizing cholinergic toxicity

<table>
<thead>
<tr>
<th>Work</th>
<th>□ Done Well</th>
<th>□ Needs</th>
</tr>
</thead>
</table>

Specific comments: __________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________

*Discuss Points: What are the signs of cholinergic toxicity? Defecation, urination, miosis, bronchorrhea, bronchospasm, emesis, lacrimation, salivation*

## Managing cholinergic toxicity

<table>
<thead>
<tr>
<th>Work</th>
<th>□ Done Well</th>
<th>□ Needs</th>
</tr>
</thead>
</table>

Specific comments: __________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________

*Discuss Points: What’s the antidote for cholinergic toxicity? Atropine, pralidoxime 0.1 mg/kg, max dose 2 mg, repeat for recurrent symptoms*

## Managing cholinergic exposure

<table>
<thead>
<tr>
<th>Work</th>
<th>□ Done Well</th>
<th>□ Needs</th>
</tr>
</thead>
</table>

Specific comments: __________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________

*Discuss Points: Decontamination: importance of decontamination (removal of clothes, washing skin) for safety of patient and medical team.*

### Specific medical management issues:
(list any particular elements of history or interventions you want to discuss)
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
Appendix F: Teamwork and Communication Evaluation/Debriefing Form

Pediatric Cholinergic Toxidrome
Teamwork and Communication Evaluation

This checklist identifies core teamwork and communication skills. It’s hard to discuss more than 3 of these during one debriefing session. We recommend selecting 2-4 of these issues to focus on.

**Recognize Emergent Situation and Call for Help**  □ Done Well □ Needs Work

Specific comments: _________________________________________________________

___________________________________________________________

Discussion Points: What helped you recognize this was an emergent situation and call for more help? What hindered you?

**Leader Identified**  □ Done Well □ Needs Work

Specific comments: _________________________________________________________

___________________________________________________________

Discussion Points: What helped the leader be effective? What hindered having clear leadership?

**Roles Delegated/Maintained**  □ Done Well □ Needs Work

Specific comments: _________________________________________________________

___________________________________________________________

What helped/ hindered delegation/maintaining roles?

**Directed Messages**  □ Done Well □ Needs Work

Specific comments: _________________________________________________________

___________________________________________________________

Discussion Points: How were orders given- “Into the air” or directed at specific individuals? What did that impact you? How could they be delivered more effectively?
## Appendix F: Teamwork and Communication Evaluation/Debriefing Form

### Closed Loop Communication

<table>
<thead>
<tr>
<th></th>
<th>□ Done Well</th>
<th>□ Needs Work</th>
</tr>
</thead>
</table>

Specific comments: ____________________________________________
________________________________________________________________
________________________________________________________________

*Discussion Points: describe closed loop communication*

### Sharing Knowledge

<table>
<thead>
<tr>
<th></th>
<th>□ Done Well</th>
<th>□ Needs Work</th>
</tr>
</thead>
</table>

Specific comments: ____________________________________________
________________________________________________________________
________________________________________________________________

*Discussion Points: How did team members share information? What thoughts guided your actions?*

### Recognize Limitations

<table>
<thead>
<tr>
<th></th>
<th>□ Done Well</th>
<th>□ Needs Work</th>
</tr>
</thead>
</table>

Specific comments: ____________________________________________
________________________________________________________________
________________________________________________________________

*Discussion Points: What did you think about your ability to “complete all your tasks”? What could have been done?*

### Reevaluation/Summarizing

<table>
<thead>
<tr>
<th></th>
<th>□ Done Well</th>
<th>□ Needs Work</th>
</tr>
</thead>
</table>

Specific comments: ____________________________________________
________________________________________________________________
________________________________________________________________

*Discussion Points: At what points is it valuable for the team leader to reevaluate/summarize? How can a summary be provided? What can you do as a team member when you want one?*
### Simulation Session Evaluation Form

| **Facilitator:** __________________________ | **Date:** ____________ |
| **Case Presented:** __________________________ |

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This simulation case provided is relevant to my work.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. The simulation case was realistic.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. This simulation case was effective in teaching basic resuscitation skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. This simulation case was effective in teaching case-specific management skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. The debriefing after the case was useful.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Can you list/describe 1 or more ways this simulation session will change how you do your job?

Comments:
Appendix H: References


