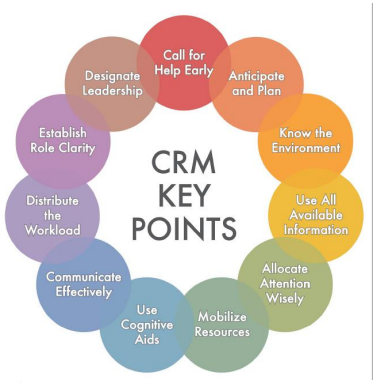

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Cognitive Aids

Debriefing & Emergency Management Tool

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Introduction to teamwork skills

Why, when and how to use emergency manuals

Crisis Resource Management (CRM) skills &

appropriate use of cognitive aids

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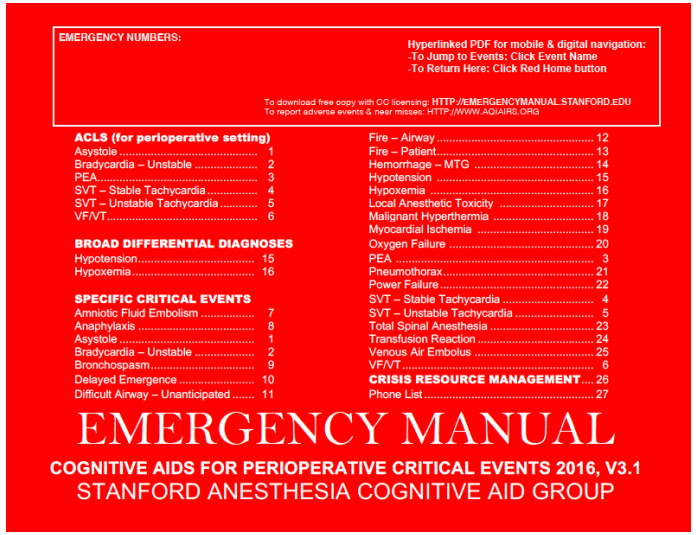
If using emergency manual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Need to know

WHAT

WHEN

WHY

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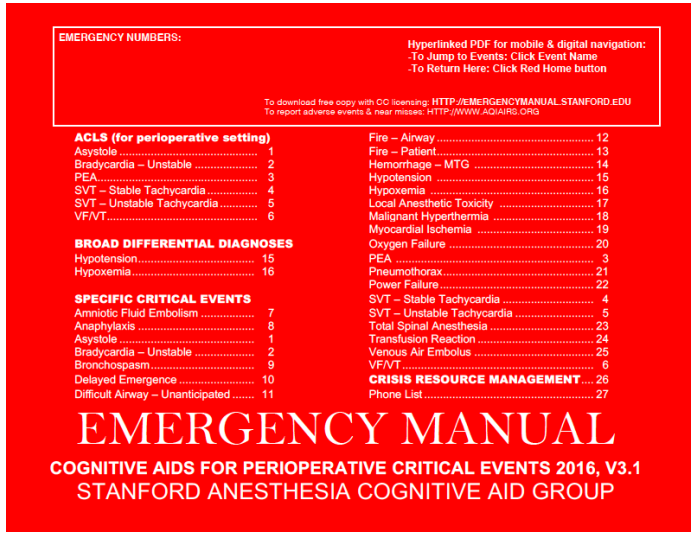
What is the purpose?

Simulation

Training

Better patient care

Debrief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ACLS (for perioperative setting)
Asystole 1
Bradycardia – Unstable 2
PEA 3
SVT – Stable Tachycardia 4
SVT – Unstable Tachycardia 5
VF/VT 6

BROAD DIFFERENTIAL DIAGNOSES
Hypotension 15
Hypoxemia 16

SPECIFIC CRITICAL EVENTS
Amniotic Fluid Embolism 7
Anaphylaxis 8
Asystole 1
Bradycardia – Unstable 2
Bronchospasm 9
Delayed Emergence 10
Difficult Airway – Unanticipated 11
Fire – Airway 12
Fire – Patient 13
Hemorrhage – MTG 14
Hypotension 15
Hypoxemia 16
Local Anesthetic Toxicity 17
Malignant Hyperthermia 18
Myocardial Ischemia 19
Oxygen Failure 20
PEA 3
Pneumothorax 21
Power Failure 22
SVT – Stable Tachycardia 4
SVT – Unstable Tachycardia 5
Total Spinal Anesthesia 23
Transfusion Reaction 24
Venous Air Embolus 25
VF/VT 6
CRISIS RESOURCE MANAGEMENT 26
Phone List 27

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WHAT

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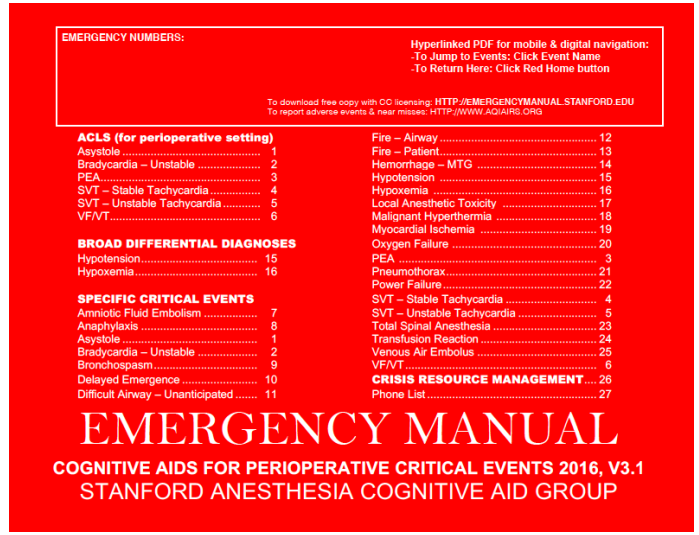
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- ✓ Prompt for task completion – reminder
- ○ Fixation error – wrong page?

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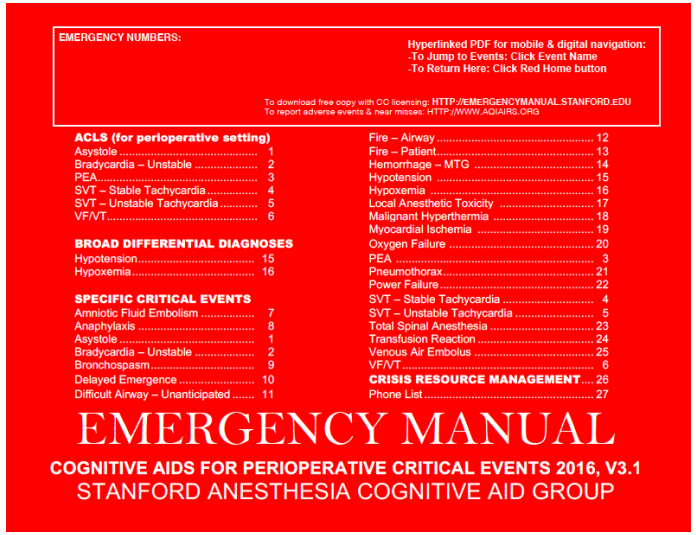
When is it used?

Emergency situation

Simulation

Debriefing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WHEN

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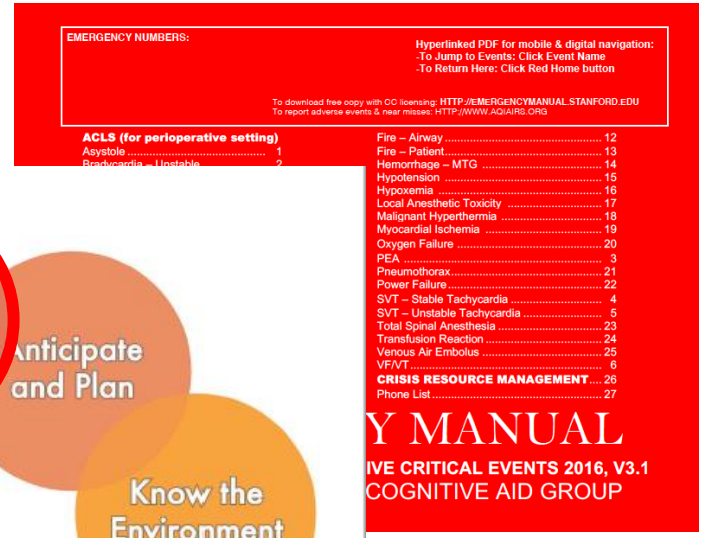
Alternative strategy



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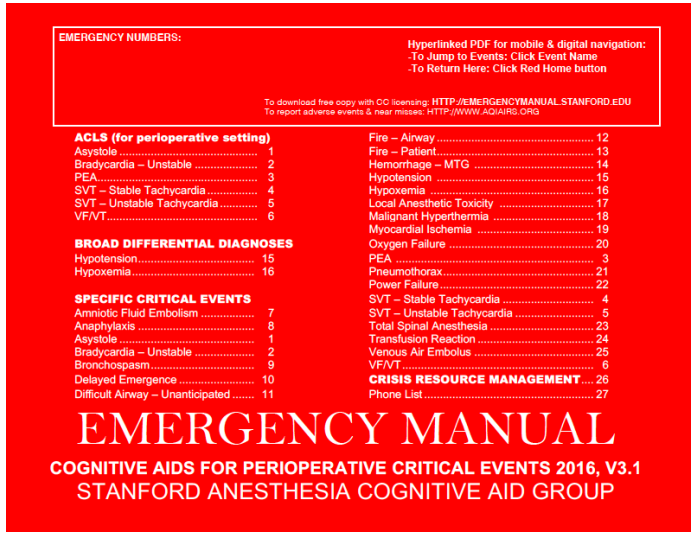
Why should it be used?



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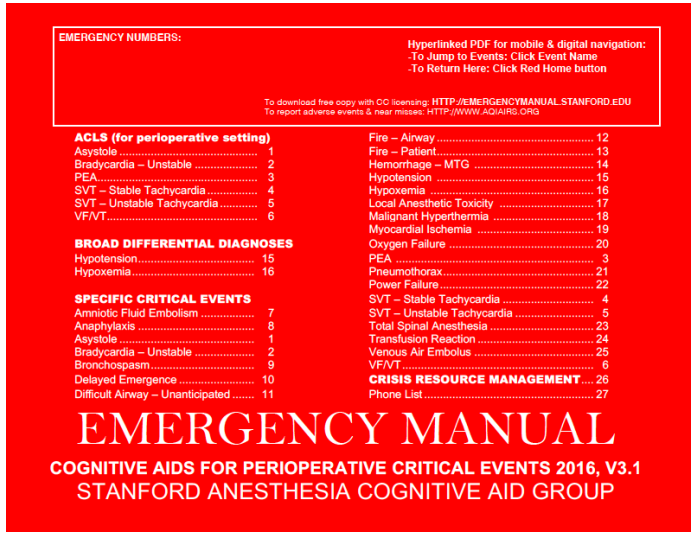

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WHY

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Simulation-based studies have shown that operating room teams deliver best clinical care during critical events more effectively and efficiently when consulting accessible information on the management of specific critical events

Emergency manuals (EMs) are context-relevant sets of cognitive aids, such as crisis checklists

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Simulation Scenario Case

PEA Cardiac Arrest

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ACLS (for perioperative setting)

Asystole	1
Bradycardia – Unstable	2
PEA	3
SVT – Stable Tachycardia	4
SVT – Unstable Tachycardia	5
VF/VT	6

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PULSELESS ELECTRICAL ACTIVITY

By Stanford Anesthesia Cognitive Aid Group

SIGNS

\+

⊘ **PULSE**

CPR:
1. **100–120** compressions/minute; ≥ 2" deep. Allow complete chest recoil.
2. **Minimize breaks** in CPR.
3. Rotate Compressors q2 Min.

Assess CPR quality, improve IF:
- $ETCO_2$ < 10 mmHg
- Arterial line Diastolic < 20 mmHg

1. CALL FOR HELP.
2. CALL FOR CODE CART.
3. INFORM TEAM.

IMMEDIATE

1. Turn **OFF** vasodilating volatile & IV drips; Increase to 100% O_2, high flow.
2. Ventilate **10 breaths/minute**; do not over ventilate.
3. Ensure **IV access** (or consider intraosseous).
4. **Epinephrine** – 1 mg IV push q 3-5 minutes.
5. If **rhythm changes** to **VF/VT** (shockable rhythm) → Immediate Defibrillation. **Go To VF/VT, event #6.**
6. Consider **ECMO** if available and reversible cause.
7. Consider TTE or TEE **Echocardiography** to evaluate cause.

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By Stanford Anesthesia Cognitive Aid Group

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2. **Minimize breaks** in CPR.
3. Rotate Compressors q2 Min.

Assess CPR quality, improve IF:
- $ETCO_2$ < 10 mmHg
- Arterial line Diastolic < 20 mmHg

SECONDARY

Consider common perioperative Ddx:

1. Hemorrhage
2. Anesthetic overdose
3. Septic or other shock states
4. Auto PEEP
5. Anaphylaxis
6. Medication error
7. High spinal
8. Pneumothorax
9. Local anesthetic toxicity
10. Vagal stimulus
11. Pulmonary Embolus

Find and Treat Causes – H's and T's: Expanded on next page.

10. Vagal stimulus
11. Pulmonary Embolus
Find and Treat Causes – H's and T's: Expanded on next page.

Go To Next Page ➔

H and Ts

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ASYSTOLE *continued*

DETAILS

1. **Hypovolemia:** Give rapid bolus of IV fluid. Check hemoglobin/hematocrit. If anemia or massive hemorrhage, give blood. Consider relative hypovolemia: Auto-PEEP (disconnect circuit); High Spinal; or Shock States (e.g. anaphylaxis). **Go To relevant event.**
2. **Hypoxemia:** Increase O_2, to 100% high flow. Confirm connections. Check for bilateral breath sounds. Suction ET tube and reconfirm placement. Consider chest X-ray. **Go To Hypoxemia, event #16.**
3. **Tension pneumothorax:** Unilateral breath sounds, possible distended neck veins and deviated trachea (late signs). Perform emergent needle decompression (2nd intercostal space at mid-clavicular line) then chest tube placement. Call for chest x-ray, but do NOT delay treatment. **Go To Pneumothorax, event #21.**
4. **Thrombosis – Coronary:** Consider transesophageal (TEE) or transthoracic (TTE) echocardiography to evaluate ventricle wall motion abnormalities of the ventricles. Consider emergent coronary revascularization. **Go To Myocardial Ischemia, event #19.**
5. **Thrombosis – Pulmonary:** Consider TEE or TTE to evaluate right ventricle. Consider fibrinolytic agents or pulmonary thrombectomy.
6. **Toxins (e.g. infusions):** Consider medication error. Confirm no infusions running and volatile anesthetic off. If local anesthetic toxicity **Go To Local Anesthetic Toxicity, event #17.**
7. **Tamponade – Cardiac:** Consider placing TEE or TTE to rule out tamponade. Treat with pericardiocentesis.
8. **Hypothermia ↓:** Active warming by forced air blanket, warm IV fluid, raise room temperature. Consider cardiopulmonary bypass.
9. **Hyperthermia ↑:** If Malignant Hyperthermia, call for MH Cart. Give Dantrolene immediately: start at 2.5 mg/kg. MH Hotline: (800) 644-9737. **Go To Malignant Hyperthermia, event #18.**
10. **Obtain ABG to rule out:**
    - **Hyperkalemia ↑:** Give Calcium Chloride 1 g IV; D50 1 Amp IV (25 g Dextrose) + Regular Insulin 10 units IV. Monitor glucose. Sodium Bicarbonate 1 Amp IV (50 mEq).
    - **Hypokalemia ↓:** Controlled infusion of potassium & magnesium.
    - **Hypoglycemia:** If ABG delay, check Fingerstick. Give D50 1 Amp IV (25 g Dextrose). Monitor glucose.
    - **H+ Acidosis:** If profound, consider Sodium Bicarbonate 1 Amp IV (50 mEq). May consider increasing ventilation rate (but can decrease CPR effectiveness so monitor).
    - **Hypocalcemia:** Give Calcium Chloride 1 g IV.

END

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09:56

ow and When to Use Emergency Manuals

versation with Sara Goldhaber-Fiebert, M.D.

1 ASYSTOLE

Continued from Prior Page

FIND AND TREAT CAUSE: H&T's

FOR ASYSTOLE AND PULSELESS ELECTRICAL ACTIVITY

DETAILS

1. **Hypovolemia:** Administer rapid bolus of IV fluid and check hemoglobin/hematocrit. Give blood for anemia or massive hemorrhage. Consider relative hypovolemia e.g. auto PEEP – disconnect circuit; high spinal; or shock states (e.g. anaphylaxis) – **Go to** relevant specific events.
2. **Hypoxemia:** Increase to 100% O_2; high flow. Confirm connections. Check for bilateral breath sounds. Suction ET tube and reconfirm placement. Consider chest X-ray. **Go to** Hypoxemia event.
3. **Tension pneumothorax:** Unilateral breath sounds, possibly distended neck veins and deviated trachea (late signs). Perform emergent needle decompression (2nd intercostal space at mid-clavicular line) followed by chest tube placement. Call for chest x-ray, but do not delay treatment. **Go to** Pneumothorax event.
4. **Thrombosis Coronary:** Consider using transesophageal (TEE) or transthoracic (TTE) echocardiography to evaluate wall motion abnormality of ventricle. Consider emergent coronary revascularization. **Go to** Myocardial Ischemia event.
5. **Thrombosis Pulmonary:** Consider TEE or TTE to evaluate right ventricle. Consider fibrinolytic agents or pulmonary thrombectomy.
6. **Toxins (e.g. infusions):** Consider medication error. Confirm no infusions running and volatile anesthetic off. Consider local anesthetic toxicity event.
7. **Tamponade – Cardiac:** Consider placing TEE or TTE to rule out. Treat with pericardiocentesis.
8. **Hypothermia:** Active warming by forced air blanket, warm IV fluid. Consider cardiopulmonary bypass. **Hyperthermia:** Consider Malignant Hyperthermia. Call for MH Cart. Treat with Dantrolene immediately (start at 2.5 mg/kg. **Go to** Malignant Hyperthermia event). MH Hotline: 800-644-9737 (800-MH-HYPER).
9. **Obtain ABG to rule-out:**
   - **Hyperkalemia:** Give Calcium Chloride 1 g IV; D50 1 Amp IV (25 g Dextrose) + Regular Insulin 10 units IV. Monitor glucose. Sodium Bicarbonate 1 Amp IV (50 mEq).
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   - **H+ Acidosis:** If profound, consider Sod... Bicarbonate 1 Amp IV (50 ... 1 g IV.

EMERGENCY M... 3 APRIL 2014

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Where is the cognitive aid?

Need to know the Emergency Manual is being implemented

Need to be familiar with it

If hung in a corner no one will use it

Even if hung in an obvious place – people wont use it

Need to incorporate into the workflow in an obvious place

Practice in scenarios

Can use first in debriefing and simulation

06:57

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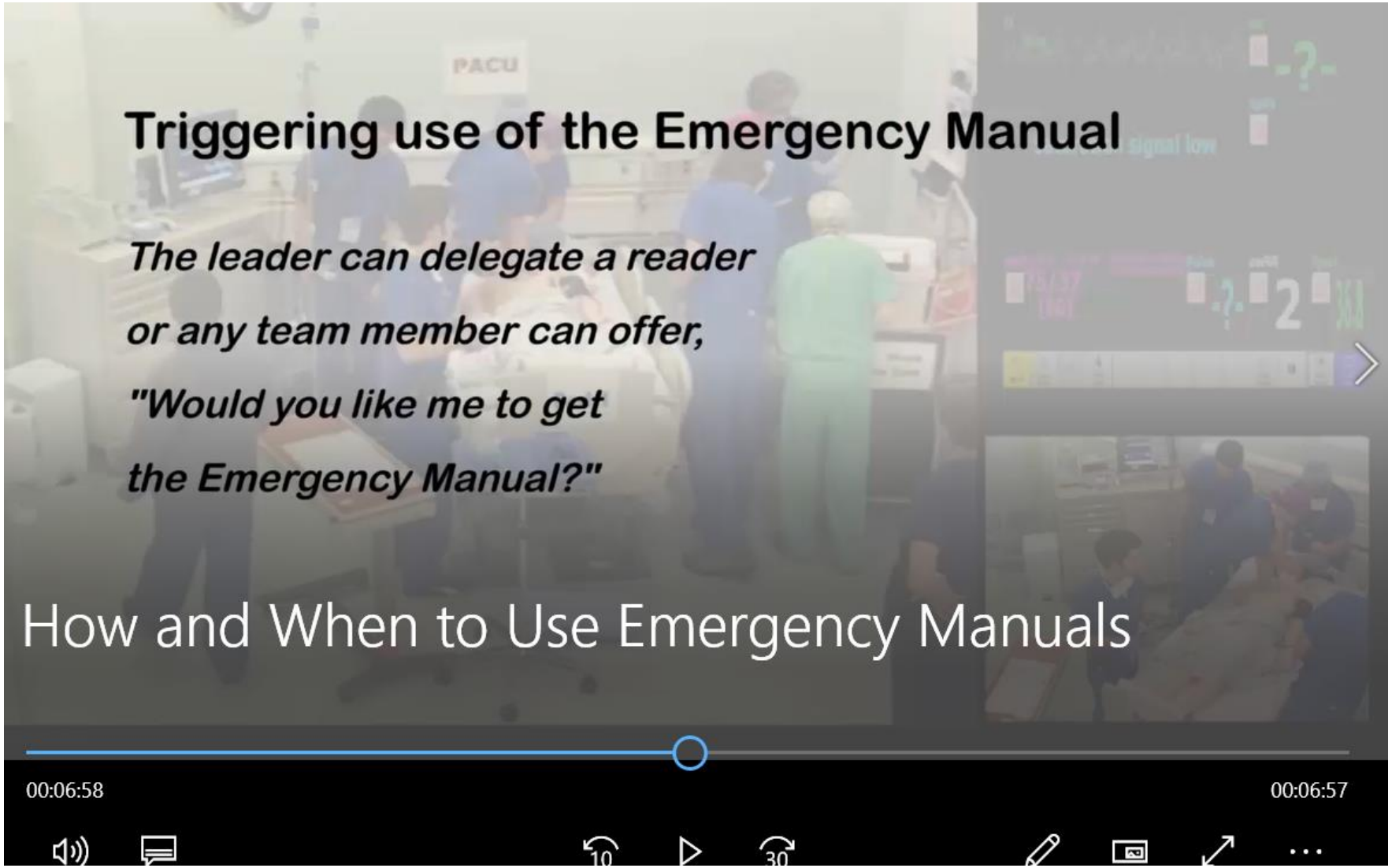

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Debrief Tool

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What went well?

What would you change?

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Categories

Clinical reasoning	Technical Skills	CRM Principles
		Teamwork Utilize available resources Checklist

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Monkey business illusion

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How to use EM in debrief or critical emergency

Respectful assertiveness

"Observation - Assessment – Inquiry"
I notice you are doing CPR at a rate of 80 per minute, would you like me to count for you so you can do 120 per minute?

Empowerment, and role of specific language
Eg Nurse to doctor, resident to attending

Practice triggering team use "Would you like me to get you the emergency manual?" or "Would you like me to read aloud from the Emergency Manual?"

Requires major cultural change

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Buy-in

Logistics

Training

Table 1. A Terminology of Standardized Practices[4]

Term	Function	Format	Comment
Procedure (Standard Operating Procedure)	Sets out the expected standard for performing an operation or task	Lengthy and detailed document	May have legal implications if not followed
Protocol	Summarizes a complex set of procedures	Less detailed document than procedure	Potential legal implications if referring to a specific enforceable procedure
Guideline	Describes ideal actions to perform a task, usually based on evidence from research	Often lengthy documents (e.g., cardiac resuscitation guidelines)	Usually not mandatory or legally enforced
Cognitive aid	A "memory aid" specifically designed for use at the time of completion of the task	Variable, e.g., poster, computer program, mnemonic	Takes into account specific "rules of thumb" and requirements during task completion
Algorithm	A form of protocol or cognitive aid presented as a flowchart	Usually a single page poster or document	Common format for a cognitive aid
Checklist	A type of cognitive aid listing a suggested sequence of actions	May be paper- or screen-based or presented as an auditory prompt	Extensively used in other industries (e.g., aviation)
Types of checklist			
Static parallel	One operator reads and performs tasks	Nonurgent, nonsequential checklist	Example: Preanesthesia machine checkout
Static sequential with verification	A second person reads items and an operator confirms	Sequence of actions is important	Example: "Flight deck" pilot and copilot checklist.
Static sequential with verification and confirmation	Multiple team members respond to a series of items and cross-check	Ideal for team settings with multiple different roles	Example: World Health Organization Preincision "Time Out" checklist
Dynamic	One or more team members develop a plan using a branching decision tree	Complex branching algorithm. May be too complex to use in emergencies	Example: ASA difficult airway algorithm

ASA = American Society of Anesthesiologists

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REVIEW ARTICLE

The Use of Cognitive Aids During Emergencies in Anesthesia: A Review of the Literature

Stuart Marshall, MB, ChB, MHumanFact

(Anesth Analg 2013;117:1162–71)

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A Cognitive Aid for Cardiac Arrest:

You Can't Use It if You Don't Know About It

Peter D. Mills, Ph.D., M.S.
Joseph M. DeRosier, P.E., C.S.P.
Julia Neily, R.N., M.S., M.P.H.
Scott D. McKnight, Ph.D.
William B. Weeks, M.D., M.B.A., C.H.E.
James P. Bagian, M.D., P.E.

September 2004 Volume 30 Number 9

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Use of an Emergency Manual during an intraoperative cardiac arrest by an inter-professional team

Bereknyei Merrell S. Jt Comm J Qual Patient Saf 2018;44:477-484

Debrief after real event

All clinician participants stated that EM use enabled effective team functioning via reducing stress of individual clinicians, fostering a calm work environment, and improving teamwork and communication. These impacts in turn improved the delivery of patient care during a clinical crisis and influenced participants' intended EM use during future appropriate crises.

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Situations where staff recognize need for Emergency Manual

3 R's

Rare event: e.g. Malignant Hyperthermia

Refractory condition eg Hypotension or Hypoxemia (i.e. unclear diagnosis)

Reader assisting the leader in a complex event: e.g. Pulseless Electrical Activity (PEA)

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Use of Emergency Manuals

i. "Smart people use cognitive aids" in high stakes industries
ii. Designed to be readily accessible, clinically helpful information

a. Orientation to Emergency Manual
   i. Importance of familiarization
      a) Perceptual blindness
         a. Example of not seeing what you're looking for – bear in the movie.
         b. During simulation, residents removing cognitive aid taped to defibrillator due to lack of familiarity
      b) Point out location of manuals in OR
   ii. Organization of Emergency Manual
      a) Table of contents, alphabetically listed on cover
      b) ACLS in front section
      c) Critical Events Non-ACLS alphabetically listed
      d) CRM principles on back cover
   iii. Example: Use of Emergency Manual in PEA scenario

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Clinical uses of Emergency Manuals