

# Root Cause Analysis<sup>2</sup>

## Workbook for Participants

**Transforming RCA<sup>2</sup>: 2018**

*See One, Try One, Take it Home!*

December 10, 2018

The Edward P. Lawrence  
Center for Quality & Safety

 MASSACHUSETTS  
GENERAL HOSPITAL

 MASSACHUSETTS GENERAL  
PHYSICIANS ORGANIZATION

Triggering Questions (Adapted from Appendix 2 of RCA <sup>2</sup> )
<b>Communication</b>
Did existing documentation provide a clear picture of the work-up, the treatment plan, and the patient's response to treatment? (e.g., Assessments, consultations, orders, progress notes, medication administration record, x-ray, labs, etc.)
Was communication between front line team members adequate?
Were the patient and their family/significant others actively included in the assessment and treatment planning?
<b>Training</b>
Was training provided prior to the start of the work process?
Was the training adequate? If not, consider the following factors: supervisory responsibility, procedure omission, flawed training, and flawed rules/policy/procedure.
<b>Fatigue/Schedule</b>
Was the environment free of distractions?
Was there sufficient staff on-hand for the workload at the time? (i.e., Workload too high, too low, or wrong mix of staff.)
Was the level of automation appropriate? (i.e. neither too much nor not enough)
<b>Environment/Equipment</b>
Had this type of equipment worked correctly and been used appropriately in the past?
Were equipment displays and controls working properly and interpreted correctly and were equipment settings including alarms appropriate?
<b>Policy/Procedure</b>
Was required care for the patient within the scope of the facility's mission, staff expertise and availability, technical and support service resources?
Was the staff involved in the adverse event or close call properly qualified and trained to perform their function/duties?
Were there written up-to-date policies and procedures that addressed the work processes related to the adverse event or close call?
<b>Barriers</b>
<i>Barriers protect people and property from adverse events and can be physical or procedural. Negative/positive pressure rooms are an example of a physical barrier that controls the spread of bacteria/viruses. The pin indexing system used on medical gas cylinders is another example of a physical barrier that prevents gas cylinders being misconnected. The "surgical time out" is an example of a procedural barrier that protects patients from wrong site, wrong patient, wrong procedure surgeries.</i>
What barriers and controls were involved in this adverse event or close call?
Were relevant barriers and controls maintained and checked on a routine basis by designated staff?

Adapted from <http://www.npsf.org/?page=RCA2>

**Transforming RCA<sup>2</sup>**  
*See One, Try One, Take it Home!*  
Simulation Workbook

### Root Cause Analysis Case

An 86-year-old male with past medical history notable for moderate dementia, hypertension and metastatic prostate cancer on chronic opioids presented to the Emergency Department on the evening of July 4<sup>th</sup> with lower extremity pain and swelling that developed after an insect bite. He was evaluated by an Emergency Medicine Physician's Assistant (ED PA) to whom he reported that he might be allergic to morphine. Before the ED PA was able to confirm the allergy with the family, a bed on an inpatient unit became available. There was overcrowding in the waiting area so the ED PA decided to transfer the patient to the inpatient bed without confirming the allergy with the family who had briefly stepped away to get coffee on campus. During pass-off, the ED PA used a structured handoff mnemonic (I-PASS) but forgets to mention this detail.

The medicine resident who received the pass-off from the ED PA promptly interviewed the patient with the family present and diagnosed the patient with an abscess. The patient's wife confirmed that the patient was allergic to morphine (rash), but had taken oxycodone and dilaudid in the past without issue. The medicine resident was well trained and could expertly use the electronic medical record. The resident documented the allergy in an admission note but skipped the allergy entry section in the electronic medical record because he was feeling pressured for time. Overnight, several more admissions came in and the resident did not have time to rest before morning rounds.

The next morning, the patient complained of escalating pain refractory to non-opioid analgesics. In addition to the new abscess, a recent CT scan had revealed multiple lesions concerning for widespread bone metastases. The medicine resident, now tired and nearing the end of his/her shift, and forgetting about the allergy, prescribed a Morphine PCA.

A pharmacist approved the order for morphine as written after checking for coded allergies in the EMR but was soon notified that the Omnicell on the floor was out of stock of the appropriate concentration. Four different concentrations of Morphine were available on the hospital's formulary and stored in adjacent bins in the pharmacy. The lowest concentration was ordered for the patient. When the pharmacist was preparing to send the medication, he/she was interrupted by a phone call. After the interruption, the pharmacist mistakenly selected a higher concentration of Morphine than intended for the patient.

The higher concentration was delivered to the floor and immediately hung by the nurse without being scanned or checked. The patient received a bolus and basal rate of morphine 10x the intended dose and the nurse left the bedside to tend to another patient. Approximately 15 minutes later the nurse returned to find that the patient apneic, with angioedema, and a barely palpable pulse. A code blue was called, and the patient was transferred to the ICU.

\*\*Fictitious case for teaching purposes only\*\*

**Exercise #2a – RCA<sup>2</sup> Core Team**

Complete the diagram below. For each role, identify whether they could serve as a member of the RCA<sup>2</sup> Core team and/or if they should be interviewed.

Note: An individual may serve in multiple capacities	RCA <sup>2</sup> Team member?	Interview?
ED PA		
Medicine Resident		
Staff RN		
Pharmacist		
Front line staff not involved in the event		
Chief Resident not involved in the event		
Chief Pharmacist not involved in the event		
Nurse Manager not involved in the event		
Human factors engineer		
Informatics expert		
Safety Scientist/Leader well versed in RCA process		
Patient involved in the event or family member		
Patient advocate/representative		

List any additional RCA<sup>2</sup> team members you would include:

List any additional individuals you would interview:

## RCA<sup>2</sup> Simulation: Timeline

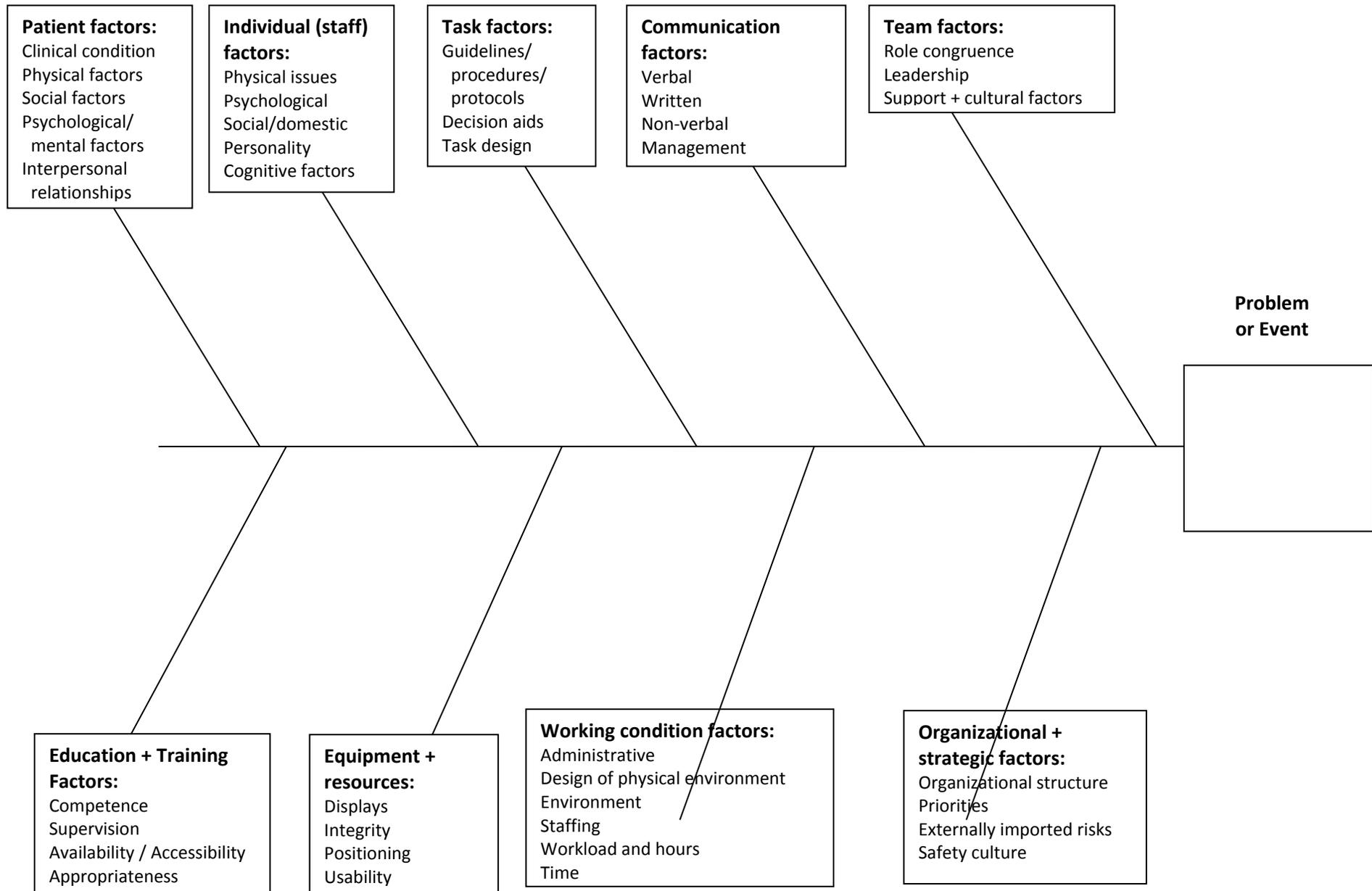
<b>Date &amp; Time</b>	<b>Source</b> (Med Record, interview, etc)	<b>Event (Description and Response)</b> (What Happened)	<b>Deviation from Expected Practice (if applicable)</b> (What normally happens? What do policies/procedures require?)
7/4/17 19:00	Med Record	Patient presents to the ED with fever and cutaneous abscess.	
19:20	Med Record	ED PA interviews the patient.	
19:20	Interview	Patient reports a possible allergy to morphine. Family not immediately available to confirm (getting coffee).	
19:50	Med Record	ED PA documents the unconfirmed allergy in a progress note.	Allergies should be confirmed and entered into the allergy section of the EMR.
20:20	Interview	Patient is admitted and passed off to the Medicine Resident using the mnemonic "I-PASS".	Allergies are not explicitly included in the "I-PASS" mnemonic, however confirmation of the possible allergy should have been performed prior to transfer or included in the pass-off.
22:30	Interview	Medicine resident reads the PA's note and notes the possible allergy to morphine.	
22:30	Interview	Medicine resident confirms the allergy to morphine with the patient's family.	
23:30	Med Record	Medicine resident types an H&P admission note into the EMR and enters orders but does not electronically enter allergies into the allergy section of the EMR.	The morphine allergy was not entered properly into the EMR. All clinicians were previously trained on how to enter allergies into the allergy section of the EMR.
7/5/17 4:30	Interview	Medicine resident is unable to rest overnight and admits several additional patients.	Residents get adequate rest when working overnight.
8:30	Interview	Patient experiences worsening pain due to metastatic cancer.	
11:30	Interview/ Med Record	Medicine resident orders morphine PCA.	Allergies could have been re-reviewed with patient but this is not a policy.
11:45	Interview/ Med Record	Pharmacist approves the order for morphine PCA.	
11:50	Interview	RN notifies pharmacist that morphine is out of stock in the Omnicell.	
12:20	Interview	Pharmacist begins to prepare morphine.	

<b>Date &amp; Time</b>	<b>Source</b> (Med Record, interview, etc)	<b>Event (Description and Response)</b> (What Happened)	<b>Deviation from Expected Practice (if applicable)</b> (What normally happens? What do policies/procedures require?)
12:23	Interview	Pharmacist is interrupted by a phone call.	
12:40	Interview	Pharmacist completes the morphine preparation, medication is delivered to the inpatient unit.	
12:50	Interview	The nurse hangs the morphine, administering a bolus and basal rate. Nurse exits the room to tend to another patient.	Per hospital policy, medications are usually scanned prior to administration.
13:05	Interview	The nurse arrives and finds the patient somnolent.	
13:06	Interview	The nurse identifies that the infusion contains a 10-fold higher concentration of Morphine than expected.	
13:08	Interview/ Med Record	Rapid response is called for unresponsiveness, hypotension and respiratory failure.	
13:15	Interview/ Med Record	The patient is transferred to the ICU.	

Additional Information:

## RCA<sup>2</sup> Simulation Exercise #2b: Fishbone Diagram

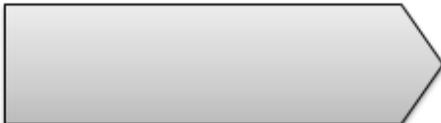
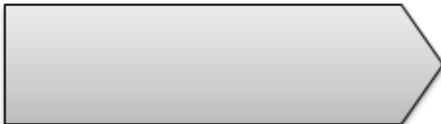
This NHS National Patient Safety Agency fishbone tool is available at <http://www.nrls.npsa.nhs.uk>



**Event**

**Contributing factor**

**Causal Statement**



**Figure 3. Action Hierarchy**

	<b>Action Category</b>	<b>Example</b>
<b>Stronger Actions</b>  (these tasks require less reliance on humans to remember to perform the task correctly)	Architectural/physical plant changes	Replace revolving doors at the main patient entrance into the building with powered sliding or swinging doors to reduce patient falls.
	New devices with usability testing	Perform heuristic tests of outpatient blood glucose meters and test strips and select the most appropriate for the patient population being served.
	Engineering control (forcing function)	Eliminate the use of universal adaptors and peripheral devices for medical equipment and use tubing/fittings that can only be connected the correct way (e.g., IV tubing and connectors that cannot physically be connected to sequential compression devices or SCDs).
	Simplify process	Remove unnecessary steps in a process.
	Standardize on equipment or process	Standardize on the make and model of medication pumps used throughout the institution. Use bar coding for medication administration.
	Tangible involvement by leadership	Participate in unit patient safety evaluations and interact with staff; support the RCA <sup>2</sup> process; purchase needed equipment; ensure staffing and workload are balanced.
<b>Intermediate Actions</b>	Redundancy	Use two RNs to independently calculate high-risk medication dosages.
	Increase in staffing/decrease in workload	Make float staff available to assist when workloads peak during the day.
	Software enhancements, modifications	Use computer alerts for drug-drug interactions.
	Eliminate/reduce distractions	Provide quiet rooms for programming PCA pumps; remove distractions for nurses when programming medication pumps.
	Education using simulation-based training, with periodic refresher sessions and observations	Conduct patient handoffs in a simulation lab/environment, with after action critiques and debriefing.
	Checklist/cognitive aids	Use pre-induction and pre-incision checklists in operating rooms. Use a checklist when reprocessing flexible fiber optic endoscopes.
	Eliminate look- and sound-alikes	Do not store look-alikes next to one another in the unit medication room.
	Standardized communication tools	Use read-back for all critical lab values. Use read-back or repeat-back for all verbal medication orders. Use a standardized patient handoff format.
	Enhanced documentation, communication	Highlight medication name and dose on IV bags.
<b>Weaker Actions</b>  (these tasks require more reliance on humans to remember to perform the task correctly)	Double checks	One person calculates dosage, another person reviews their calculation.
	Warnings	Add audible alarms or caution labels.
	New procedure/memorandum/policy	Remember to check IV sites every 2 hours.
	Training	Demonstrate correct usage of hard-to-use medical equipment.

Action Hierarchy levels and categories are based on *Root Cause Analysis Tools*, VA National Center for Patient Safety, [http://www.patientsafety.va.gov/docs/joe/rca\\_tools\\_2\\_15.pdf](http://www.patientsafety.va.gov/docs/joe/rca_tools_2_15.pdf). Examples are provided here.

## RCA<sup>2</sup> Simulation Exercise #3: Improvement Plan

**Causal Statement:** The hospital's formulary includes 4 concentrations of morphine which are stored in adjacent identical bins in the pharmacy. The labels on the bins and the medication bags are printed in the same size and color, and are difficult to read due to small and faded font. Pharmacists can be interrupted mid-task. These factors all increase the likelihood that the wrong concentration of morphine could be delivered, which led to the patient's overdose.

Recommended Action	Action Type/Strength	Due Date	Completion Date	Owner
<b>Process/Outcome Measure:</b>				
<b>Date Measured:</b>				
<b>Compliance:</b>				
<b>Responsible Person:</b>				

Recommended Action	Action Type/Strength	Due Date	Completion Date	Owner
<b>Process/Outcome Measure:</b>				
<b>Date Measured:</b>				
<b>Compliance:</b>				
<b>Responsible Person:</b>				

Recommended Action	Action Type/Strength	Due Date	Completion Date	Owner
<b>Process/Outcome Measure:</b>				
<b>Date Measured:</b>				
<b>Compliance:</b>				
<b>Responsible Person:</b>				

**Notes/Comments**

