OH STAT, I just made a BIG mistake! What now?

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LEARNING OBJECTIVES
1. Identify biases that impact how we perceive errors.
2. Discover how goal conflicts in the systems we work in can contribute to failure.
3. Recognize how organizational culture impacts the response to an event.
4. Discuss how we can learn from errors to improve safety.
5. Apply these principles to implement system changes.

Case:

A 12-month-old boy presents for Bilateral Myringotomy Tubes (BMT) and a Tonsillectomy with Adenoidectomy (T&A). Patient information from the EMR:
- Weight: 18kg
- Allergies: No known drug allergies
- Past Medical History: Prematurity (born at 26-weeks-gestation), bronchopulmonary dysplasia (BPD), moderate pulmonary hypertension, and parents report a "bad cold" with fever ~3 weeks prior. He tested COVID Negative at that time.

Upon further questioning, the parents state that the child had been symptom free for 15 days at the time of the scheduled surgery.

Questions:
- Has anyone proceeded with a case like this?
- What impacted that decision?
    - Were you influenced by production pressure?
    - Was your confidence in proceeding impacted by prior success managing similar patients?
    - If you had previously cancelled cases and had an irate surgeon, would this make you less likely to cancel?

Intra-Op:
A mask induction is performed. The patient is mask ventilated while peripheral IV (PIV) placement is attempted by the circulating nurse. The patient's arm jerks back when the needle breaks the skin. At this point, mask ventilation becomes impossible and laryngospasm is identified. Oxygen saturation and heart rate begin to fall. 80mg of succinylcholine is administered intramuscularly (IM).

Questions:

- What do you think of the sequence of events so far?
- What would you have done differently?
- Does 80mg IM Succinylcholine seem like a lot for a 12-month-old?

Upon further investigation:
Preoperatively, a relatively new nurse was checking the patient in and did not realize the scale was toggled to provide a weight in pounds (lbs) instead of kilograms (kg). She incorrectly entered the patient's weight of 18lb (8.2kg) as 18kg into the EMR. The intended 4mg/kg IM succinylcholine dose was administered based on a weight that was increased by a factor of 2.2x.

Back to the case:
The patient's laryngospasm breaks following IM succinylcholine administration. The patient is intubated and the case proceeds uneventfully. Following recovery in PACU, the patient is discharged home with no sequelae. Fortunately, the patient suffers no ill consequences of the error.

Questions:
- How bad is this error?
- What should be done about it?
- Why?

***Alternatively*, what if this happens?**
Following IM succinylcholine overdose, the patient experiences bradycardia, which progresses to asystole. A code is called and the patient is emergently intubated. PALS protocol is followed for several rounds of CPR. After more than 15 minutes of downtime, ROSC is achieved. The procedure is aborted and the patient is taken to the ICU. In the ICU, the patient is diagnosed as having severe anoxic brain injury.

Questions:
- How bad is *this* error?
- What should be done about it?
    - Should the pre-op nurse or the anesthesiologist be punished? How?
- How did your answers change?
    - Why?
    - Did the severity of the outcome change your impression of the severity of the error?
- What contributed to this error?
    - Patient factors? Procedure factors? Equipment factors? Policy factors? Culture factors? Personnel factors? (See Figure 1)
- What changes can be made to learn from this error? How?

Discussion:

We are wired to see human virtue as the basis for safety and human ineptitude as the basis for failure. For instance, when things go well, we celebrate "good doctoring"; alternatively, when things go poorly, we blame the "bad apple." The Bad Apple Theory assumes the system to be safe; it's the worker that causes the problem. In this system the "bad apple" is inattentive, a "rule-breaker," or incompetent. The solution is to punish them by naming, blaming, and shaming. This approach treats perfection as something that is attainable and punishes the worker when it isn't achieved.

Ultimately, People do what makes sense to them at the time, given the information available to them. This is the Local Rationality Principle. None of us come to work that morning planning to do a "bad job." After an error occurs, saying "This person should have done X," doesn't address the problem. That is not the decision that was rationally made at the time with the information available.

If your impression of the severity of the error changed with the worse outcome, you are not alone. We are predisposed to multiple biases that impact how we perceive an error. Outcome Bias assumes that cause and consequence are proportional. This means that if the outcome is very bad, our brain assumes that the decisions leading up to that outcome is equally bad. We're wired to think that bad things happen to people because they did something to deserve it. In reality, bad processes can lead to good outcomes, and good processes can lead to bad outcomes. Hindsight Bias impacts how we perceive the probability of an event in light of the outcome. Once we know the result, the likelihood appears obvious in hindsight. Hindsight assumes a linear path from cause to effect.

The systems we work in are prone to error. Goal Conflicts ("Do it better, faster, cheaper!") force us to make difficult choices to manage these conflicts. Rule violations are rarely malicious. They are frequently a well-meaning action intended to get the job done. Errors are often the result of pursuing success in a resource-limited environment. Drift is the accumulation of small-scale changes in response to goal conflicts. When changes that make work more efficient have no obvious consequences, the workaround is normalized. The deviations keep becoming the new normal until a tipping point is reached.

Error is not a choice, even when it seems like one in retrospect. Expecting perfection implies that it is achievable. Instead, we should expect error and build resiliency into our systems. Blame only serves to stigmatize errors and prevents learning. Error is a normal.

Culture has a dramatic impact on how errors are addressed. A Punitive Culture asks, "who failed?" and sees the person committing an error as the problem to be fixed. A Just Culture asks, "what failed?" and focuses on fixing the system that failed the person while addressing the needs of the first and second victims. Near Miss and Error Reporting should be encouraged and seen as an opportunity for system improvement.

In order to learn from an error, it is helpful to perform a formal debrief after the event. Initially, this should focus on identifying and supporting the needs of the Primary and Second Victims.

After these needs are met, it is helpful to reconstruct the event in its context. The people involved should tell their version of the story. As a group everyone can identify which junctures were critical. The event can then be reconstructed with appropriate context. Identify what was seen and acted upon and what was unnoticed. It is helpful to reconstruct the event using an Ishikawa or "Fishbone" diagram (Figure 1).

After the debrief, recommendations may be made to improve the system and prevent the crisis from recurring. Recommendations generated by the debriefing group should be **SMART**:
- **S**pecific – Fix A by doing B.
- **M**easurable – X is fixed when Y criteria are met.
- **A**greeable – In line with organizational goals.
- **R**ealistic – Doable for those responsible for implementation.
- **Ti**me Bound – With a deadline for implementation.

Ultimately, no change should be made in a vacuum, and changes should continually be evaluated for effectiveness. It is possible that the change may have unintended consequences or not be as effective as anticipated. The Plan, Do, Study, Act (**PDSA**) cycle helps ensure that change remains data driven.
- **P**lan: Create a strategy to implement the change.
- **D**o: Employ the strategy to ensure change is implemented.
- **S**tudy: Collect data to identify what works, what doesn't, and what unintended consequences arise.
- **A**ct: Use the data to determine how the process should be modified. These modifications are the start of another PDSA cycle. The cycle repeats until the system is optimized.
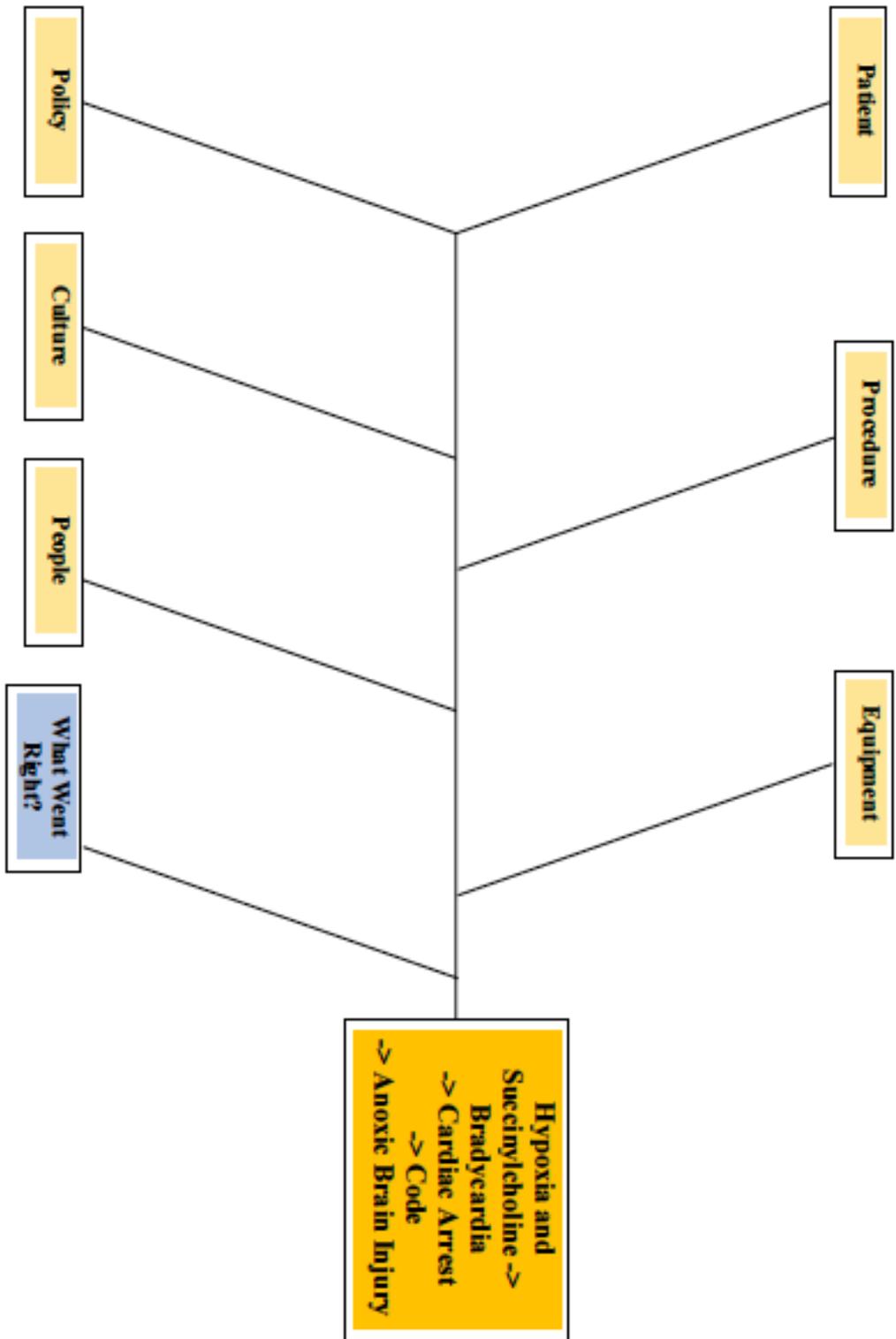
Finally, resistance to change may occur when changes conflict with other organizational goals or challenge the status quo. Demonstrating the value offered by the change is crucial to obtaining organizational buy-in. Data collected during PDSA cycles may be used to show improvement in efficiency, cost, outcomes, safety, and patient/staff satisfaction.

What changes could be implemented for the case above?

SUMMARY
1. Error is normal. It happens daily.
2. Goal conflicts are part of everyday work. Drift and error are the inevitable results of these conflicts.
3. Treat these errors as an opportunity to learn and improve.
4. Use the Plan-Do-Study-Act cycle to continually evaluate and improve interventions.
5. When confronted with a crisis, ask yourself "How can we use this to make the OR safer?"

Figure 1

Fishbone (Ishikawa) diagram with branches labeled: Policy, Patient, Culture, Procedure, People, Equipment, and What Went Right?, leading to the outcome box:

Hypoxia and Succinylcholine -> Bradycardia -> Cardiac Arrest -> Code -> Anoxic Brain Injury

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