Learning From Others:

A Case Report From the Anesthesia Incident Reporting System

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Review of unusual patient care experiences is a cornerstone of medical education. Each month, the AQI-AIRS Steering Committee abstracts a patient history submitted to the Anesthesia Incident Reporting System (AIRS) and authors a discussion of the safety and human factors challenges involved. Real-life case histories often include multiple clinical decisions, only some of which can be discussed in the space available. Absence of commentary should not be construed as agreement with the clinical decisions described. Feedback regarding this article can be sent by email to **airs@asahq.org**. Report incidents or download the AIRS mobile app at **www.aqiairs.org**.

AIRS CASE 2019-8: A Butterfly Effect

A 36-year-old female with preeclampsia and admission Hb=10 presented for induction of labor with insertion of a Cook balloon. She was typed & screened, but no crossmatched blood had been ordered. Eight hours later, the Cook balloon was removed and 800cc of blood and clots were noted. The decision was made to perform an emergent cesarean section for possible placental abruption.

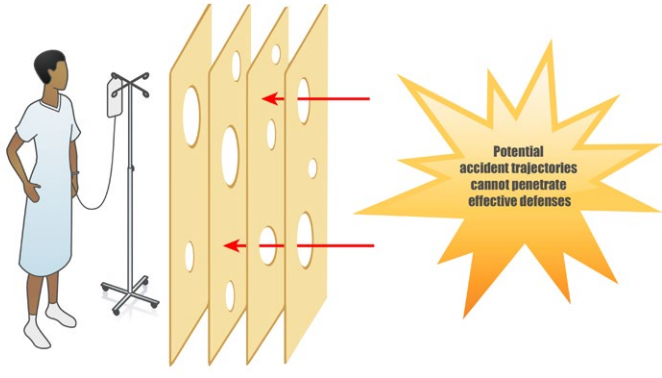
The epidural was dosed and the procedure begun. Placental abruption was confirmed. After delivery, significant hemorrhage was noted, and the patient became hypotensive. Cross-matched blood was ordered but was not available immediately. On arterial blood gas measurement, her hemoglobin level had fallen to five. The decision was made to transfuse emergency O(-) un-crossmatched blood.

An anesthesia team member went to retrieve blood from the emergency refrigerator located in the L&D suite. Unfortunately, blood crossmatched to another patient had also been stored in that refrigerator and the team member retrieved that blood instead of the emergency units. The blood was brought into the room, the unit label checked against the transfusion tag and hung. The wrong unit transfusion error was subsequently recognized and the transfusion halted. No hemolysis was detected, and mother and baby were discharged on POD#4.

Subsequent root cause investigation discovered that the L&D suite housed one refrigerator for crossmatched blood and another refrigerator for emergency O(-) blood. Several months prior, the crossmatched refrigerator had broken, and caregivers had begun storing crossmatched blood in the emergency refrigerator, even after the crossmatched refrigerator had been repaired.

Discussion

This event is an archetypal example of the Swiss Cheese model of accident causation described by James Reason.[1] Although numerous protections exist to prevent a wrong unit transfusion, in this case "holes" in those protections lined up to allow a latent error to propagate through to the sharp end of care delivery. Particularly striking in this case is that the holes were the result of subtle workarounds and normalizations of deviance accumulated over time.



The most prominent of these is the broken refrigerator. Having a refrigerator break is unavoidable, but the downstream "butterfly" effect of the broken refrigerator was to store crossmatched blood in the emergency refrigerator, thus decreasing the need to replace the broken refrigerator. As long as all involved were aware of the workaround, the perceived impact on safety could easily be considered small. As the current case demonstrates, however, this temporary workaround was a latent error waiting to happen. The risk of wrong blood in the emergency refrigerator will always exist as it is extremely difficult to prevent crossmatched blood

from being placed into an emergency O(-) refrigerator. But being aware of such a risk, and the multiplier effect of a second broken refrigerator, is a useful lesson from this event.

From an anesthesia perspective, other key decisions in the case should also be addressed. The decision to not order crossmatched blood at the beginning of the case is reasonable, as existing literature[2-4] suggests that the baseline probability of transfusion in cesarean deliveries is 2 to 3 percent, and even after accounting for predictive factors such as preeclampsia and possible abruption, the risk remains <25 percent.

Clearly, the first step to preventing a wrong unit transfusion is to not bring the wrong blood into the room. However, in this case, no explicit process for retrieving blood from a non-blood bank refrigerator existed, and no clear responsibility for who should retrieve the blood had been established. These apparent policy omissions are linked, as training across multiple departments is complex and, during emergencies, members of many different departments may be pressed into service. The diversity of potential blood "retrievers" both increases the relevance of a process for verifying that the correct blood is retrieved and the difficulty of implementing that process. While it is not clear that a workable "hierarchy" of who should retrieve blood emergently can be created, recognizing that a "Wait, I thought you were getting it" delay may occur if communication is not clear can help anesthesiologists respond more efficiently to acute, severe hemorrhage.

Finally, the wrong unit would have been recognized had the blood been checked against patient identifiers as per Joint Commission regulation.[5] Even un-crossmatched emergent blood may still be assigned to a patient, so alignment with three patient identifiers is needed. But in this case, local policy had specified the patient wristband as the only valid identification document. Subsequent iterations of this document had not kept up with the increase over time in laparoscopic and robotic procedures that required arms to be tucked (effectively making the wristband inaccessible). This mismatch between policy and reality gradually led to workarounds such as checking against the electronic medical record, patient stickers in the paper chart, record numbers written on tape, paper, scrubs or O.R. white boards, or (as in this case) not checking at all. A diversity of transfusion environments (floor, ICU, ER, O.R.) also contributed to static policy, as only the evolving O.R. environment was challenged by an inaccessible wristband.

Normalization of deviance has been implicated in high-profile events such as the 1986 Space Shuttle Challenger explosion,[6] and examples of normalization of deviance in anesthesia care have been previously catalogued.[7] Perhaps the most concerning aspect of allowing workarounds for critical processes is their insidious nature. Because by definition workarounds are effective, they diminish the urgency to address the root issue and open "holes" in the safety net unanticipated by those who depend on those nets. That a broken refrigerator could lead to a wrong transfusion event seems obvious in retrospect – but was likely less so several months previous to providers seeking to keep blood cold despite a broken refrigerator.

Minute deviations of care occur every day in complex endeavors such as anesthesia and surgery. Workarounds are almost unavoidable, and clever ones may even be publishable.[8] Ultimately, the lesson from this case is not that workarounds should always be prevented, but that the metacognitive toolbox of those providing high-risk, high-acuity care is continually evolving and event reporting is an invaluable tool to update that toolbox.

References:

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