

# Patient Safety Tip of the Week

## June 13, 2017 Layering Up

In our May 23, 2017 Patient Safety Tip of the Week “[Trolling the RCA](#)” we make our case that there is nothing wrong with the RCA (root cause analysis). Rather, the problem is in what you do with it or don’t do with it. The basic problems are failure to implement solutions that are strong actions, failure to monitor how effective those solutions are (also watching for unintended consequences), and failure to more widely share lessons learned.

So timely is an ISMP Medication Safety Alert that beautifully illustrates how such failures can allow recurrences of serious adverse events ([ISMP 2017](#)). We hope you’ll go to the ISMP alert for details but, basically, the events described involve cases where IV infusions of substances in similar bags, each covered with brown overwraps and with similar looking pharmacy-applied labels, were transposed and hooked up to the wrong smart pumps so each medication was infused at the wrong rate. The second event occurred within months of an RCA following the first event, despite the action plans put in place to prevent such events.

The action plan put in place after the first event relied largely on education and policy change. In our March 27, 2012 Patient Safety Tip of the Week “[Action Plan Strength in RCA’s](#)” we noted that all too often action steps never get implemented at all or consist solely of “weak” action steps and organizations are then surprised when a similar adverse event occurs in the future. We typically see weak actions like education and training or policy changes as the sole actions undertaken rather than strong actions like constraints and forcing functions. (We discussed strength of actions in our March 27, 2012 Patient Safety Tip of the Week “[Action Plan Strength in RCA’s](#)”. In that column we included an analogy to the effectiveness of signs and tools used to try to get drivers to slow down in construction zones on highways. We put them together in pictures with RCA action items and now incorporate them in our webinar presentations on doing good RCA’s. [Click here](#) to see them. Remember: images are more likely to be remembered than words!)

The action after the first event was educating nursing staff on changes to the infusion policy which included:

- Labeling all infusion lines between the pump and the infusion bag
- Ensuring the labels are visible during bag changes
- Tracing all infusion lines from the patient, through the pump, to the medication (to verify the correct route of administration, pump, and line prior to starting an infusion or changing the bag)
- Using the barcode system to scan each infusion at the bedside prior to set-up and administration (rather than pre-scanning the bags on receipt from the pharmacy)

In the second event the IV lines were labeled but the labels were between the pumps and the patient, not between the pumps and the infusion bags. The nurse did not trace the lines back from the patient to the infusion bags (and apparently did not even notice the labels on the tubing). The infusion bags again looked very similar (same size, both covered with light-protective overwraps, and with pharmacy-applied labels that looked very similar).

The ISMP alert has several valuable lessons:

- Don't rely on just one action when you could **layer** interventions
- Address all causes that you have identified
- Some of your action plans may not do anything to reduce the risk of recurrence
- You need to monitor the interventions you've put in place and measure the effectiveness of your action plans

The ISMP alert calls heavily upon David Marx's "3 dice" principle ([Marx 2017](#)). Everyone in patient safety is well familiar with James Reason's "swiss cheese" theory of error occurrence and understands that multiple defenses prevent many more errors from occurring. Marx (whom you all recognize of "Just Culture" fame) says we should use the mathematical probabilities of rolling dice to help us construct effective interventions to prevent errors. In the Marx article he gives the example of a person being run over by a vehicle that was backing up. Rolling a "one" on one roll of the dice puts the person behind the vehicle. Doing a second roll of the dice by doing a pre-drive safety walk around still could roll another "one" but now the odds of rolling "one" on two rolls has increased. Doing a third roll by using a rearview camera would further increase the odds against having a bad accident. (Do the math: chance of each die coming up "one" is 1/6 so chance of all three coming up "one" is  $1/6 \times 1/6 \times 1/6 = 1/216$ ). So Marx recommends you "play with three dice, when you can". Of course, if you could do even more dice rolls (i.e. establish even more actions that might prevent an accident) you could do even better. (And P.S.: don't ever ask Google what the odds are of getting three ones when you roll 3 dice. You'd be amazed at how many different answers you get!)

**Redundancy** is a great approach to safety in any field – as long as you **don't over-rely on it!** For example, in one of our recent columns (our May 30, 2017 Patient Safety Tip of the Week "[Errors in Pre-Populated Medication Lists](#)") we noted that physicians may over-rely on pre-populated medication fields and fail to perform a thorough medication reconciliation. And you've often heard us say that improperly performed "double checks" may have higher individual error rates for both the initial checker and the person doing the second check. (See our October 16, 2012 Patient Safety Tip of the Week "[What is the Evidence on Double Checks?](#)" but note that we still consider double checks to be an action of intermediate strength worth using in multiple situations. But they need to be truly "independent" double checks.) And make sure when you are backing up your vehicle that you roll all 3 dice and don't skip the middle one because you over-rely on your backup camera!

The cases also illustrate both failure to address all causal factors identified and addressing some factors that were not causal. Using an action for one vulnerability uncovered during

the first RCA (the barcode pre-scanning) that actually was not a causal factor in the event was exemplified by the change in policy regarding barcode scanning at the bedside even though the smart pump system had not yet been integrated with the electronic health record. So the new barcoding policy simply ensured the correct medication and correct patient but did not ensure the correct infusion pump hookup and, hence, the correct rate of infusion.

But a big causal factor not adequately addressed was the similarity of the infusion bag preparations. As above, they were the same size, were covered with the same brown overwrap, and had labels that looked very much alike.

The last ISMP recommendation (need to measure implementation and effectiveness of action plans) is one we've echoed over and over. In our March 27, 2012 Patient Safety Tip of the Week "[Action Plan Strength in RCA's](#)" we noted prior studies in the VA system ([Hughes 2006](#)) which analyzed action items from RCA's and found that 30% were not implemented and another 25% were only partially implemented. Stronger action items were more likely to be implemented. Actions that were assigned to specific departments or people were more likely to be implemented than those assigned to general areas. And they found that the patient safety manager plays a critical role in RCA action implementation.

In our March 27, 2012 Patient Safety Tip of the Week "[Action Plan Strength in RCA's](#)" we emphasized the importance of tracking whether recommended action steps were implemented following an RCA, whether they were effective, and whether there were any unintended consequences. Even the most well intentioned and well planned action steps sometimes lead to consequences that were never anticipated. One of the biggest issues we see in hospitals related to RCA's is **failure to follow up and close the feedback loop**. In fact, probably the majority of hospitals lack formal procedures for ensuring the corrective actions recommended in an RCA are actually carried out (or barriers to their implementation identified and alternative steps taken). In our March 30, 2010 Patient Safety Tip of the Week "[Publicly Released RCA's: Everyone Learns from Them](#)" we discussed an incident at a hospital in which a similar incident had occurred several years prior. After the first incident an extensive root cause analysis was done and multiple recommendations were made, including key recommendations that should have prevented the second incident. But all those recommendations had never been fully implemented. Importantly, the recommendations were communicated back to those individuals deemed to be in the "need to know" but not widely disseminated to middle or front line management nor to front line staff.

We recommend you **keep a list or table of such identified action items from all your RCA's** to discuss at your monthly patient safety committee or performance improvement committee meetings. Action items should remain on that list until they have been implemented or completed. Only that sort of rigorous discipline will ensure that you did what you said you were going to do, i.e. that you "**closed the loop**". And don't forget you need to monitor your implemented actions for unanticipated and **unintended consequences**. For example, you might take the strong action of removing a drug from a

particular setting, only to realize later that there were circumstances where that drug was needed in that setting.

We'd really like to emphasize one other point in the ISMP alert. They commented specifically about avoiding changing two infusions at the same time. For many years we have cautioned against trying to do more than one thing at a time. In our June 19, 2007 Patient Safety Tip of the Week "[Unintended Consequences of Technological Solutions](#)" we wrote about an unfortunate case in which a patient died as the result of transposition of telemetry units with another patient. One day, right around nursing change of shift, two patients were admitted to the remote floor and telemetry was ordered on both. The nurse took two transmitters with him and hooked the patients up, then called the CCU monitoring nurse to tell her about the two patients just hooked up. About an hour later the CCU monitoring nurse called the remote floor because one of the patients was in ventricular fibrillation. A code was called and the floor staff and code team ran to the patient's room, only to find him sitting in bed, watching TV and eating a meal. Only after several minutes of fiddling with his EKG leads and talking to the nurse in the CCU did anyone realize that the patient several rooms down the hall was really the one in ventricular fibrillation. The transmitters obviously had been transposed! (This is a variation of the "two in a box" phenomenon we talked about in the April 23, 2007 Patient Safety Tip of the Week "[Predictable Errors](#)".) And, of course, the system was poorly designed in that it allowed the first nurse to take out two remote telemetry transmitters at the same time.

ISMP recommends that each infusion bag should be changed independently, completing the process for one bag before bringing the next bag to the pump. Sometimes we don't even think about the little things we do that might contribute to such errors. For instance, did the pharmacy deliver both infusion bags to the site(s) at the same time? Perhaps a pharmacist should deliver the bags and wait with the second bag until the first bag has been appropriately hooked up.

Another feature worth our comment is that the second incident occurred in the cardiac cath lab. New bags of the two infusions were needed after the patient had finished a procedure in the cardiac cath lab. In our October 22, 2013 Patient Safety Tip of the Week "[How Safe Is Your Radiology Suite?](#)" we had a section about medication errors that occur when patients are in the radiology suite or MRI suite. The cardiac cath lab is no different. Many of the same circumstances that lead to errors in those other suites are also present in the cath lab.

ISMP recommends you ask 5 key questions in addressing a safety hazard or error:

- Is there a single pathway to an error, particularly a harmful error?
- Are we rolling at least 3 dice when building an action plan?
- Does the action plan address all causal factors associated with the hazard or error?
- Do the planned actions have the potential to prevent or detect hazards or mitigate patient harm?
- How will I know if the action plan has been implemented and whether it is successful?

As usual, ISMP has provided another extremely valuable contribution to our better understanding of patient safety and the complex issues involved. Using real-life scenarios makes us all wary that “Wow! That could happen here!” and take appropriate steps to minimize the risk of similar incidents in our organizations. That’s the last problem with RCA’s that we noted in today’s introduction: **failure to more widely share lessons learned**. ISMP is one of the few organizations that provides us with RCA’s of real events and examples of action steps that are likely to prevent similar occurrences in our organizations.

**Some of our prior columns on RCA’s, FMEA’s, response to serious incidents, etc:**

July 24, 2007	<a href="#">“Serious Incident Response Checklist”</a>
March 30, 2010	<a href="#">“Publicly Released RCA’s: Everyone Learns from Them”</a>
April 2010	<a href="#">“RCA: Epidural Solution Infused Intravenously”</a>
March 27, 2012	<a href="#">“Action Plan Strength in RCA’s”</a>
March 2014	<a href="#">“FMEA to Avoid Breastmilk Mixups”</a>
July 14, 2015	<a href="#">“NPSF’s RCA2 Guidelines”</a>
July 12, 2016	<a href="#">“Forget Brexit – Brits Bash the RCA!”</a>
May 23, 2017	<a href="#">“Trolling the RCA”</a>

**References:**

ISMP (Institute for Safe Medication Practices). Common missteps with medication safety: Rolling a single dice, ineffective strategies, and unexecuted action plans. ISMP Medication Safety Alert! Acute Care Edition. June 1, 2017  
<http://www.ismp.org/newsletters/acutecare/showarticle.aspx?id=1168>

Marx D. Play with three dice, when you can. What We Believe. Outcome Engenuity 2017; 1(3): 1-2  
[https://www.outcome-eng.com/wp-content/uploads/2017/03/WhatWeBelieve\\_Issue3\\_030917.pdf](https://www.outcome-eng.com/wp-content/uploads/2017/03/WhatWeBelieve_Issue3_030917.pdf)

Hughes D. Root Cause Analysis: Bridging the Gap Between Ideas and Execution. VA NCPS Topics in Patient Safety TIPS 2006; 6(5): 1,4 Nov/Dec 2006  
[http://www.patientsafety.va.gov/docs/TIPS/TIPS\\_NovDec06.pdf#page=1](http://www.patientsafety.va.gov/docs/TIPS/TIPS_NovDec06.pdf#page=1)

Weak vs. Strong Responses to an RCA (Power Point presentation).  
[http://patientsafetysolutions.com/docs/RCA\\_strong\\_vs\\_weak\\_responses.ppt](http://patientsafetysolutions.com/docs/RCA_strong_vs_weak_responses.ppt)



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