A DEBATE ON THE NEW RCA: IS IT A STEP IN THE RIGHT DIRECTION? THE TRADEOFF BETWEEN IMPROVING IDEAS AND IMPROVING SYSTEMS

Michael F. Rayo, PhD[1] and Rollin J. "Terry" Fairbanks, MD, MS[23]
[1] The Ohio State University, Columbus, OH, USA
[1] rayo.3@osu.edu, +16145198809
[1] https://discovery.osu.edu/tda/faculty/members/mike-rayo/
[2] National Center for Human Factors in Healthcare, MedStar Health, Washington, DC, USA
[3] Georgetown University School of Medicine, Washington, DC, USA
rjf48@georgetown.edu, +1-202-244-9811
www.medicalhumanfactors.net/about-us/our-team/rollin-j-terry-fairbanks-md-ms

Abstract

When asked to predict the future success of a new process or method for assessing and making recommendations for system resilience, there is little consensus on what the most advantageous heuristics should be. What attributes of the method should be most closely scrutinized? Which do not matter as much? How does our community ensure that the lexicon of resilience engineering is not misconstrued, misinterpreted, or co-opted by techniques that will ultimately mimic the linear, causal models that we have struggled to dislodge from popular safety management practices? We debate these characteristics in the context of two recent attempts at Root Cause Analysis (RCA) reform in the United States healthcare system. We alternatively praise and criticize these new methods, citing factors such as increased transparency, the risk of shallow analysis, more consideration for frontline practitioners, and lack of mapping to resilience engineering concepts. We hope that this debate serves as a platform for future debates and, ultimately, data-driven consensus on what we attributes we should be prioritizing in future analyses.

1 INTRODUCTION

It has been difficult for the resilience engineering community to know how best to inculcate resilience engineering concepts and precepts into safety management processes. Research findings that are now thirty-five years old are still not broadly reflected in practice. It is widely agreed that current Root Cause Analysis (RCA) processes should be improved to make high-complexity, safety-critical industries safer (Hassall, Sanderson, & Cameron, 2016; Hollnagel, 2014; James, 2013; Leveson, 2004; National Patient Safety Foundation, 2016). However, there is much debate as to exactly what the shortcomings of the RCA are, and what the most advantageous next steps should be. For example, can the structure of the RCA remain in place with minor changes, or does it need to be completely replaced? We discuss two recent initiatives to reform the RCA in the United States healthcare industry, and discuss the merits and potential shortcomings of each. It is our hope that this provides a productive platform to discuss these and future safety management methods and initiatives.

2 PERSPECTIVE 1: THESE SMALL STEPS ARE THE RIGHT STEPS

R.J. (Terry) Fairbanks, MD MS

By and large, hospitals in the United States follow a very consistent process after an adverse event occurs. As noted above, it has been shown by many authors to be not only ineffective but actually damaging to safety culture. In this process, an adverse event occurs and everybody is told not to talk about it, for fear of discoverability during a future deposition. Indeed, plaintiff's attorneys often ask involved providers if they have spoken to anyone about this case. If the answer is yes, they go on to depose the third party. This often causes a fear that leads to lack of transparency, and it is hidden from the patient and their family, hidden from the medical record, and a wall of silence is created, doing further damage to the family and injured patient. In the traditional RCA process, a

mandatory meeting is scheduled, often several days or weeks after the event, and usually with leadership present. This is the context in which involved frontline providers come to tell their story. Needless to say, it is unlikely that those empowered to change the system will gain a true understanding of the system in this way. Observers of this process will often tell you that they walk out feeling like members of each department have focused on protecting their own.

However, many organizations are aware of the shortcomings of these methods and have been working to find a better way. In addition to the hospitals that, with the help of external safety scientists, have improved their safety processes, two influential national organizations have created and disseminated new RCA-based safety processes to improve adverse event review. The National Patient Safety Foundation (NPSF) enlisted the help of systems engineers, human factors engineering experts and leaders from Kaiser Permanente and the Veterans Administration safety program to develop the "RCA-squared" (RCA^2) method to improve the quality of adverse event review by emphasizing a systems approach. At the same time, the Agency for Healthcare Research and Quality (AHRQ) funded the creation of a new program called CANDOR. This program shares methods for an immediate response to adverse events, emphasizing transparency and disclosure to patients and their families, care for the caregiver, and a systems based event review process, including individual, non-threatening, one-on-one interviews with those involved (including the patient and family), an early consensus meeting, and a validation meeting that involves leaders who can support change. There is an emphasis on approaching the review with a systems perspective. My perspective is influenced by the fact that I was involved in both of these processes. I served on the committee to advise the development of the in RCA^2, and I was part of a three-person team charged with writing the event review process for CANDOR, which we adapted from an event review process we had recently developed for MedStar Health. For context, MedStar is a large non-profit healthcare delivery system in Washington DC and Baltimore MD (USA) region, with 31,000 employees, $5.4B annual revenue, 300 clinics, and 10 hospitals, including Georgetown University Hospital. During the past seven years, MedStar Health supported the development of an internal group of human factors engineers and cognitive psychologists to support their mission to innovate their approach to safety.

Although neither of these processes are ideal, they are both major steps in the right direction. These areas improvement are perhaps best stated in the goals of CANDOR: encourage event and error reporting by making frontline practitioners feel safe, value firsthand accounts over secondhand accounts, facilitate increased transparency to internal and external stakeholders, and more broadly disseminate the final findings to detect potential hazards earlier.

2.1 Encouraging reporting by making frontline practitioners feel safe

One of the most common contributors to the gap that we typically see between work as imagined and work as performed (Dekker, 2013) is the creation of covert work systems. In covert work systems, frontline practitioners fail to disclose or actively hide certain aspects of work that they believe are essential to the normal function of the system, but if communicated to management would result in admonishment or punishment (Woods, Dekker, Cook, Johannesen, & Sarter, 2010). This includes the tendency of frontline practitioners to underreport errors or events for fear of reprisal. CANDOR addresses this with their care for the caregiver program. This encourages caregivers to immediately report events and errors by communicating that they will not be admonished or punished. It includes one-on-one meetings in a closed and safe environment and extensive training of the review staff to conduct open, non-judgmental interviews, so that the reviewers can get a deeper understanding of work as performed. The goal is for practitioners to feel safe participating in the review process. RCA^2 addresses this by using repeated language to not blame the frontline practitioner for these events, but to look for more systemic contributors. The CANDOR program addresses this by including formal training for safety reviewers in interviewing techniques, body language, even choice of clothing that the interviewers use.

2.2 Facilitating increased transparency to internal and external stakeholders

Organizational learning, which is one of the four cornerstones of resilience (Hollnagel, 2009), is nearly impossible if newfound knowledge is not effectively disseminated broadly throughout the organization. A lack of available

organizational knowledge is one of the common contributors of events that are incorrectly attributed to errors of frontline practitioners (Woods et al., 2010). CANDOR requires that event review materials are available to internal and external stakeholders, including the affected patients and their families. Sometimes this results in increased claims, but it is always the right thing to do, and this is why the organization does it. This creates a partnership with the patient and facilitates better understanding of how work was really performed.

2.3 Valuing firsthand accounts over secondhand accounts

Once an event has been reported, the organization needs to mitigate the risk of falling into the trap of using stale, incorrect knowledge of how work is performed when devising explanations of what happened and potential interventions. CANDOR addresses this by sending reviewers immediately to the location of the incident. Much like the National Transportation Safety Board sends investigators right away to a crash site, it is a priority for reviewers to be present quickly to collect data and accounts that soon after will not be available, or will be distorted. Each person involved is given time for discussion, with a focus on those at the front line. Contrast this to the 'old' way, which often involved recommendations of discipline, counseling, or training of the frontline provider, by panels who *never spoke directly to this provider* during the process.

2.4 Broader dissemination of findings to deliver more sustainable solutions

In addition to making new knowledge available, it must be readily accessible to practitioners when addressing future events (Woods et al., 2010). Both processes address this by actively engaging multiple internal stakeholders at multiple levels of the organization at multiple time intervals. After the reviewers reach consensus on the emerging themes of the case, they communicate with key stakeholders in areas where opportunities for improvement have been identified. In the CANDOR approach, all internal stakeholders come together for a final consensus meeting. They discuss proposed solutions and bring the right leaders to the table. With the involvement of safety scientists who are embedded in the health system, these solutions will often be both sustainable and effective.

2.5 Positive results from these new RCA's

We have seen positive results implementing these new processes at Medstar Health. Because of our size, there are many people responsible for conducting event reviews, and there was wide variation in the way they were done. This was not an immediate change, and there are certainly still some pockets where there is strong influence of the "old RCA" approach. However, we've seen a tremendous movement forward towards a more enlightened approach. People are using the word review instead of investigation, are meeting with involved parties in a one-on-one, non-threatening environment, and have become much more in oriented towards systems thinking. We disclose everything to the patient and family from day one. We support the caregivers involved. And the reviews are performed with a different goal. The review teams know that "nurse error" is not an appropriate conclusion, and they approach with a learning attitude. At time, we still struggle to find the right ways to learn from events and to find sustainable and effective solutions. But when you contrast this with the old method which created a wall of silence, focused on determining blame, and usually closed out without identifying system factors or identifying effective mitigations, this change is a major step in the right direction.

3 PERSPECTIVE 2: THESE AREN'T THE STEPS WE'RE LOOKING FOR

Michael F. Rayo, PhD

It has long been a frustration of the resilience engineering community that the vast majority of safety investigations are conducted with some form of Root Cause Analysis (RCA). Historically, these investigations highlight individuals' mistakes and either miss or underrepresent the system attributes that shaped those individuals' behaviors. However, multiple industries have determined that utilization of the RCA has not improved

the safety of their organizations. Many have revised their RCA guidance and have included language consistent with resilience engineering concepts and precepts. However, it is unclear whether these new versions of the RCA move them closer to systemic analyses in any substantive way. As resilience engineering practitioners, how do we know what a step in the right direction looks like?

Observations of complex adaptive systems conducted over the last thirty years have repeatedly reconfirmed that system failures require multiple contributors, which are all necessary but only jointly sufficient (Hollnagel, Woods, & Leveson, 2006). These contributors are often difficult to see, especially during normal work, but can be detected if the investigation explicitly addresses some or all of the following:

1. *Mechanisms*: recurrent general patterns of distributed cognitive work (Woods & Hollnagel, 2006)
2. *Interplay between agents*: interdependency, coordination, synchronization (Woods & Hollnagel, 2006)
3. *Progression over time*: event patterns (e.g., deterioration and recovery) (Woods & Hollnagel, 2006; Woods & Wreathall, 2008)
4. *Pressures*: goal priorities, conflicts, and trade-offs (Woods et al., 2010)
5. *Adaptations*: to gaps/conflicts or opportunities (Hollnagel, 2009)
6. *Emergent*: What emerges from interactions (Hollnagel et al., 2006)
7. *Multi-level*: pressures from the blunt end and external to the system must be understood (Woods et al., 2010)

Recent revisions of the RCA that have attempted to include systems thinking have either unintentionally (or perhaps quite intentionally) misperceived, misunderstood, or co-opted the language of resilience engineering. Ultimately, these new RCA's risk performing the same analyses and coming up with the same conclusions, albeit with different words. In order to mitigate against the risk of inadvertently falling back on previous habits with different labels, updates to RCA's must include the following:

1. Scope of *data collection* is broad enough to reveal the systemic forces that, when understood, rationalize the behaviors of the local agents
2. *Analysis and synthesis* includes abstraction to larger patterns of distributed cognitive work that are associated with system success and failure
3. *Proposed interventions* aim to address systemic contributors over individual causes, and facilitate future proactive learning

In the United States healthcare industry, NPSF and AHRQ have recently released new RCA methods infusing resilience engineering language in the hope of better supporting their goals to ultimately design "effective systems-based improvements to make health care safer" (National Patient Safety Foundation, 2016). Used as examples, they can provide insights as to whether other investigation methods are systemic in how they collect and analyze data as well as propose interventions.

3.1 Data collection: is it broad enough? Are we able to localize local behaviors?

The underlying perspective of an RCA is that safety and performance can be understood by constructing a linear, causal set of events, which leads investigators to the root cause (Dekker, 2013). This inevitably emphasizes the weight of agents and behaviors closest to the sharp end, and deemphasizes the impact of distal systemic contributors derived from forces exerted at multiple levels, both internal and external to the system (Dekker, 2013; Woods et al., 2010). This focus on proximal, sharp end agents begins with what data is collected, and how far into the past is determined in scope for the investigation.

In order to detect the blunt end forces, data collection in systemic investigations include two important aspects. First, investigators directly observe the system to understand how typical work is performed, and how, if at all, the behaviors surrounding the incident were atypical. This is not trivial, because work as performed is different than how work is imagined by remote actors (Dekker, 2013). Second, since observed behaviors are locally rational, even

if they are globally maladaptive (Woods et al., 2010), the investigation must increasingly explore events that are further proximal and towards the blunt end to reveal the pressures that rationalize sharp end behaviors.

Although it attempts to deflect blame from sharp end actors, data collection methods advocated by these new methods risk that the investigation will ultimately be prematurely narrow and focused on the sharp end. This is especially true of RCA^2, which continues the use of linear flowcharts to diagram incidents, reinforcing the notion of accidents resulting from a chain of events. Also, even though both CANDOR and RCA^2 emphasizes that investigators get firsthand knowledge about the actors and location of the incident, they do not advocate explicitly seeking out blunt end contributors to the incident, and do not give a recommendation on how to determine how far back in time a review should cover. It emphasizes that reviewers should be looking for systemic issues, but gives little guidance as to how to identify them.

3.2 Data analysis: is it corroborating general patterns of collaborative cognitive work?

Rationalizing local behaviors requires associating them with general patterns of cognitive work. Instead of categorizing actions as right or wrong, which requires hindsight (Dekker, 2013; Woods et al., 2010), they are mapped to patterns of what makes cognitive work difficult. Ensuring these mappings is a safeguard to prematurely closing a line of inquiry or analysis. Researchers have mapped these difficulty patterns to associated macrocognitive functions (Patterson, Roth, & Woods, 2010), the perception-action cycle (Dekker, 2013) and to research-based heuristics (Woods et al., 2010). For example, a nurse not double-checking a patient's medication with a barcode is not determined to be fully understood until its associated patterns are revealed, whether they be goal conflicts (Woods et al., 2010), potential fixation (Patterson et al., 2010), or drift towards failure (Dekker, 2013; Hollnagel et al., 2006). From the published materials, neither RCA^2 or CANDOR encourages this mapping to larger patterns of cognitive work.

3.3 Recommendations: are they targeting the sharp and blunt end? Are they sustainable, or are they susceptible to drift?

Systemic recommendations focus on capabilities that increase the overall system's ability to adapt to future foreseen and unforeseen events. This system attribute has been called adaptive capacity (Branlat & Woods, 2010), margin of maneuver (Stephens, Woods, & Branlat, 2011) and slack (Saurin, 2015; Schulman, 1993). It is preferable that proposed interventions are not extra static resources, but instead are dynamic capabilities that can be accessed either through local or interunit reorganization (Stephens et al., 2011). For example, when car and bus bombings increased in Israel, ambulance drivers drove their ambulances home at night to reduce response time to emergencies (Cook, 2016). This solution was essentially zero-cost and increased flexibility, which made it resistant to future cost-saving measures seeking to redeploy or remove unnecessary resources. From the published materials, neither RCA^2 or CANDOR explicitly encourage these types of recommendations or interventions.

In addition, recommendations focused only on the frontline practitioners and not taking into account the pressures exerted by management and other distant actors will likely not insulate the system from future issues and are more susceptible to future drift towards failure (Dekker, 2013). To its credit, CANDOR shows examples of some of these pressures, although does not provide explicit strategies to address them. RCA^2 does not explicitly address these issues.

4 CONCLUSIONS

Although there is general consensus around current RCA's inadequacies and the benefits of systematic analyses, it is still debatable as to what aspects of RCA reform will drive us towards system thinking, and which will not. On one hand, we must embrace well-meaning RCA changes, even if they do not go as far as we think they should. On the other hand, each of these changes runs the risk of improving small aspects of the overall process without changing the overall tenor of the analyses and recommendations. What's worse, these efforts can lull us into a false sense of security. To compound matters, change in our organizations is slow. We are constantly being asked

to predict the future but will not get feedback for years, if at all. It is true that we cannot spend all of our time focused on the negative aspects of new processes that do not fully embrace resilience engineering, but must target those areas that, if changed, will truly make a difference. Hopefully by looking at how these new methods do or do not allow practitioners to see systemic factors we can more expertly focus our attentions where they are best directed.

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