Railway Association of Canada

Shared Lessons about Near Miss Reporting Across Industries

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Executive Summary

A near miss is defined as “a hazardous event or situation where the sequence of events could have caused an accident if it had not been interrupted” [1]. Research suggests it may only take a few near misses until a hazard can be identified and mitigated, making near miss reporting a crucial component of proactive safety management.

Near miss reporting is a relatively new initiative in the Canadian rail industry. Research across industries suggests there are opportunities to improve the uptake and use of near miss reporting systems. Barriers to near miss reporting include:

- A blame culture within the organization in which the social consequences of feeling shame, blame, or receiving disciplinary actions discourage staff from reporting near misses.
- Sub-cultures in an organization where some departments/working groups have different perspectives of near miss reporting or safety in general. The existence of sub-cultures means the organization may need to have a strategy specific to each culture when implementing/promoting a near miss system.
- Perceived usability of the near miss system including the ease of use and how/if employees receive feedback after reporting a near miss.
- Whether people can report near misses anonymously or are identifiable when reporting a near miss.

There are multiple, third-party near miss reporting systems within the North American and U.K rail industry that organizations can learn from including the Confidential Close Call Reporting System (C3RS), the Confidential Incident Reporting & Analysis System (CIRAS), and the former Professional Railroaders Event Confidential Reporting Hotline (PREVENT).

Best practices and lessons learned from near miss reporting systems include:

- Creating an easy-to-use near miss reporting system.
- Increasing trust between the workforce and management and reducing a culture of blame if one is present.
- Consistently encouraging reporting behaviours and promoting the importance of learning from safety events.
- Provide feedback to the workforce when near misses are reported (ex. a newsletter that shares learnings from near miss trends).

A review of safety culture assessment reports conducted by the Railway Association of Canada (RAC) revealed that survey items related to near miss reporting received a higher percentage of “neither disagree nor agree” responses compared to the average survey item. Common themes related to near miss reporting from RAC safety culture assessment focus groups include training (ex. the need for more training on what a near miss is and how to report a near miss), the need for increased feedback following a near miss report, and the need for formalized near miss reporting systems. One railway that participated in a safety culture assessment through the RAC created an action item to implement a near miss reporting system as part of their safety culture assessment action plan.

The RAC has a complimentary report presenting the findings of interviews with member railways about the implementation and management of their near miss reporting systems.

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Shared Lessons About Near Miss Reporting Across Industries

Introduction

The railway industry has recognized the importance of near miss reporting for many years, but like many other industries, there is room to improve near miss reporting and to learn from the information collected. This paper will provide a brief overview of the importance of near miss reporting and the background of reporting in the railway industry, common organizational barriers to near miss reporting across industries, best practices that can be shared across industries facing similar issues, and lessons from RAC safety culture assessments. In the future, research on near miss reporting and the sharing of knowledge across industries should be encouraged to promote learning and improvement.

Why is Near Miss Reporting Important?

Near miss reporting through a formalized system is seen as a proactive way to identify safety hazards before they cause a potential incident or injury. The general definition of near miss is "a hazardous event or situation where the sequence of events could have caused an accident if it had not been interrupted" [1]. Near misses are sometimes referred to as close calls, near hits, good catches, or "warning" events. Near miss reporting systems have been formalized in many high-hazard industries like aviation, shipping, healthcare, nuclear energy, manufacturing, construction, oil and gas, military operations, and railway [2].

The importance of near miss reporting, and, more generally, incident reporting, can be traced back to the iceberg model [3], which proposed that for every serious incident there are 29 less serious incidents and 300 near miss events that occur. In support of this perspective, the Swiss Cheese model argued that underlying, less observable latent factors can be identified prior to a major incident [4]. Recent research indicates it may only take a few near misses until a hazard can be identified and mitigated [5], making near miss reporting even more important as a means of a proactive approach to safety management.

Based on a review of the literature [6], the following are common steps involved in near miss management systems.

- Identification (and response[1]) – The near miss is recognized.
- Reporting – The near miss is reported using means provided by the organization.
- Prioritization – The company assesses what resources are required, how the cause analysis will be conducted, and what can be done to identify solutions.
- Distribution – Information about the near miss is provided to the person(s) conducting the analysis and corrective actions.
- Cause analysis – Causes of the near miss are identified.
- Solution identification – Corrective actions are implemented to stop the near miss/potential for incident from occurring.
- Dissemination – The persons involved in the near miss are informed about how the issue was resolved. If relevant, this information is shared with other departments or the broader workforce.
- Resolution – Corrective actions are implemented and periodically evaluated.

[1] One near miss model [7] included "response" in the first step with identification to highlight the importance of acting on the circumstances and checking-in with the involved employee(s) to ensure they are okay.

Near Miss Reporting Systems in the Railway Industry

Dating back to the 1999 London Paddington incident, railway organizations have faced issues with the reporting and analysis of near misses. In the case of the Paddington incident, many signals passed at danger (SPADs) had been documented prior to the event [8]. Recent research indicates that many industries still struggle with similar issues of engaging and learning from near miss reports [1, 9]. For example, in the Swedish shipping industry, 60 of the 76 members of the Swedish Shipowner's Association, are registered to use the reporting system, yet less than 10 are actively reporting near misses or incidents in the system.

There are multiple, third-party near miss reporting systems within the North American and U.K rail industry. Although not all are currently running, some have websites that are still functional. Most of the reporting systems work in a confidential and voluntary manner. For those organizations who have the capability of using a third-party reporting system, it is a beneficial option for organizations where employees may not be comfortable reporting the issue internally.

Within the U.S.A., the Confidential Close Call Reporting System (C3RS) is a confidential, non-punitive third-party system run for rail carriers through the Federal Railroad Administration (FRA) and NASA [10]. It is a voluntary system for employees to report close calls or near misses through a paper-based or electronic system. Similarly, the U.K. has the Confidential Incident Reporting & Analysis System (CIRAS) that is also confidential and anonymous. The CIRAS reporting system is run by an independent committee of the Rail Safety and Standards Board (RSSB) [11]. CIRAS collects both near miss reports and incident reports and then sends anonymized reports back to their respective organizations. CIRAS is responsible for contacting the individual who made the initial report to indicate the resolution. CIRAS also publishes a selection of its reports in a quarterly newsletter for all participating organizations.

In Canada, the former Professional Railroaders Event Confidential Reporting Hotline (PREVENT) system was run through Saint Mary's University and Canadian National (CN) [12] for a few years. PREVENT functioned as a near miss hotline where employees could call in and leave message or could call in at set weekly hours. Although the hotline was confidential, it was not anonymous like the U.S.A. and U.K. systems. The hotline was also specific to CN railway employees and therefore not comparable to data from other organizations. Research assistants would contact employees who reported a near-miss to guide them through an interview process consisting of research-based questions and open-ended questions to accumulate details about the near miss. Reports were discussed with a steering group and details were included in quarterly newsletters that were shared internally at CN and on the PREVENT website.

Barriers to Near Miss Reporting

From the small amount of research that has been done, certain organizational barriers are shared across industries in relation to near miss reporting, including dealing with a blame culture or multiple subcultures, usability, and choosing an appropriate method of participation.

Blame Culture

One potential barrier encountered across industries when implementing a near miss reporting system is the existence of a blame culture. Blame culture is related to the social consequences of feeling shame, blame, or receiving disciplinary actions when reporting a near miss. Embarrassment is reported to be a significant contributing factor as to why certain organizational groups would not report a near miss [2]. Feelings of embarrassment can stem from potential peer reaction and/or community reaction.

An opportunity to reduce this perception of potential embarrassment is to report near misses more frequently at a departmental level and at industry conferences. If near misses are shared more

frequently and the intent is to learn from error, reporting may seem less intimidating. Lack of feedback or inadequate feedback also contributes to a blame culture as it fosters employee distrust. Therefore, the more feedback, particularly learning focused feedback, the less blame-oriented the system will be. Additionally, near miss reporting systems that are designed to protect confidentiality and anonymity can help to alleviate concerns about blame.

Existence of Subcultures

Another issue faced by many industries with near miss reporting is dealing with the existence of multiple subcultures within an organization [13]. Having multiple subcultures indicates that differing attitudes towards reporting near misses could exist. The difference between subcultures can be partially due to differing work environments. For example, work groups who feel they are adequately staffed relative to their workload and receive appropriate resources, may report more near misses.

In healthcare, research indicates that those in leadership roles may be unsure how to use near miss reporting systems. For example, there is difficulty in getting physicians to report more than other occupational groups like nurses or therapists. It is thought physicians may not encounter near misses as frequently as other healthcare staff as they have fewer encounters with patients. When physicians are involved in near misses, they may also commit higher-risk errors which are harder to catch [14]. Regardless of the industry, it is important that leadership participates in and supports near miss reporting [15].

Conversely, research in the shipping industry [6] suggests that people who work at the frontline are less likely to report near misses than those in a management or supervisory position. This is an important finding as those who work closest to the hazards are more likely to encounter near misses; suggesting that important information about safety operations is being lost due to low participation in near miss reporting. Reasons given for lack of reporting included time constraints, lack of training on what constitutes a near miss, and perceived “minor” near misses that occur daily and would take too long to report if every near miss encountered was submitted. The findings from the research suggest that employees understand that it is important to report near misses, yet less than 40% of participants reported the near misses they encountered.

Usability

Lack of utility concerns the functionality of the reporting system itself. If employees view the reporting system to be a burden (i.e., if it is time consuming or has detailed paperwork), this can impact reporting rates [16]. When the reporting system has clear, simple definitions and standards, and the importance of its use is reiterated through multiple methods, this can increase the use of the reporting system.

There is research to suggest that employees who intend to report near miss events they encounter will not do so when reporting becomes burdensome. In a study of ICU and in-patient nurses, patient safety culture was positively correlated with the intention to report near misses [17]. 80% of nurses in the study reported they had positive intentions to report near misses they encountered, however, in practice, over 50% of nurses had not reported a near miss in the last year. Nurses who had positive perceptions of “teamwork across units, feedback and communication about errors” were more likely to report the intention to report near misses. Potential reasons for low reporting in healthcare include mental burnout, high workload, lack of time, lack of trust, and lack of feedback [17].

Anonymous Versus Identifiable Reporting Systems

Near miss reporting systems can be created with the option for users to report anonymously or be identified in the process. Organizations implementing a near miss reporting system should consider their culture when deciding on anonymous versus identifiable reporting options. Having an identifiable system in an organization with a blame culture would be particularly difficult to encourage participation, as employees can be fearful to report. Providing anonymity encourages candid

participation and can work well in certain settings. Anonymity also has its drawbacks in terms of accountability and the message it sends about learning from near misses.

In organizations where there may be less of a blame culture, having identifiable forms or reporting processes (ex. near misses are phoned in or completed with a supervisor) may help enable the learning process. For certain industries like chemical processing, it was reported that having a system in which employees are identifiable is advantageous. This is often because it is necessary to follow up with the individual who reported the near miss for more details.

Anonymous systems may help increase the number of reports received but may also affect the number of details given [18]. Among some industries, there is the perception that anonymity leads to less accountability and more information [2]. It is important to keep this distinction in mind when offering a near miss reporting system to employees. The type of participation method may influence reporting rates.

Gaps in Near Miss Reporting

To facilitate learning, a systems perspective should be adopted in the management of near miss reporting systems. A recent review of 22 near miss reporting systems indicates these systems are partially at odds with systems thinking [19]. The near miss reporting systems were reviewed for elements of systems thinking based on Rasmussen's model of risk management. An interesting finding in the review is that none of the near miss reporting systems reviewed focused on the protective factors of the near miss; the factors that led to the event being a near miss rather than an incident. In addition to recognizing what went wrong, we also need to understand what worked. Capturing protective factors can help an organization recognize and build upon existing strengths. The authors noted that protective factors may be mentioned in the description of the near miss, however the reporting systems reviewed did not have a section explicitly identifying protective factors.

In addition to focusing on protective factors in near miss events, we should also evaluate the corrective actions that implemented following a near miss report. Results from a small case study of a mining company explored the relationship between the potential severity of near miss reports and subsequent corrective actions. The research indicated that implementing safe work procedures, compared to engineering controls, was associated with higher severity near miss reports [20].

Best Practices

Research suggests most industries face similar issues when it comes to near miss reporting. There are opportunities to learn from long-standing near miss reporting systems such as the Aviation Safety Reporting System (ASRS), an esteemed reporting system established in 1976. The success of the ASRS is attributed to three factors: reporting is simple, safe (no blame will be received), and useful [5].

Making Reporting Simple and User-Friendly

Research indicates the near miss reporting system should be simple, accessible, and convenient for the user [21, 5]. A clear, broad definition should be given to employees when they receive training on identifying and reporting near misses to help reduce misunderstandings. It should be very clear what a near miss is[2], and the importance of learning from them. When developing near miss reporting forms, consider the following "Fives L's" from the construction industry [22]:

1) Literacy – Are the forms clear? Are they easy to read and understand?

[2] A recent review of the scientific literature stated, "the debate is still open about the definition of near miss and what type of events could be collected and analyzed as near miss events [15, p.11]."

2) Language – If necessary, is the form provided in multiple languages?
3) Length – Is the form short and concise?
4) Location – Are the forms in the most accessible location for employees?
5) Logistics –Will the information recorded be helpful in contributing to potential solutions? How can wording be improved to capture more useful information?

User-friendly near miss reporting systems may look different depending on the organization. If a company is comfortable reporting incidents and communicating electronically, having an electronic near miss reporting system is a viable choice. If the workforce is unfamiliar with how to use existing electronic communication systems, a paper-based reporting system may be more widely used. Whether an electronic, paper-based, or combination reporting system is implemented, training should follow to ensure the workforce knows how to use the near miss reporting system.

Reducing Blame Culture & Increasing Perceptions of Utility

Recommendations to reducing blame culture and increasing perceptions of utility from research in the chemical processing industry include having employee-led teams evaluate and prioritize near miss reports, as well as widely disseminating reports that have been submitted and sharing resulting improvements with the workforce [9]. To help address the fear of discipline in industries that deal with blame cultures, certain organizations have developed non-disciplinary policies specifically for their near miss reporting system. Such policies need to be clearly communicated to enable employees to understand the circumstances when there would be no discipline. For example, if a company has cardinal rule violations, it will need to make clear that discipline will still occur even when the cardinal rule violation is reported as a near miss. Taking a no-blame approach can help move the focus away from the individual and shift it towards system or group-level factors that contribute to near misses. If a non-disciplinary policy is implemented with a near miss reporting system, it is crucial that this policy is adhered to by management. Trust can be severely damaged if punishment follows a near miss report when a non-punishment policy is in place [9].

There are three main components of no-blame systems [23]:

1. **Increasing reporting culture** –The importance of reporting near misses needs to start at the top with leadership. Managers should be continuously encouraging and rewarding employees for identifying and reporting near misses. A simple mindset to encourage within organizations is “Could someone benefit by learning from the event?” [9]. To help demonstrate and maintain management commitment, near miss reports and posts highlighting program participation and lessons learned should be regularly communicated. For example, in the aviation industry, excerpts from reports made to the Aviation Safety Reporting System are published in a weekly newsletter, known as “Callback” [2].

   To incentivize reporting, some organizations enable employees and/or supervisors who report near misses to participate in any necessary investigation as a means of increasing engagement[3]. This provides an opportunity for employees to be involved, can quicken the investigation process, and helps with workload distribution. The more opportunities employees have to engage in the process of learning and applying information from the near miss reports, the more the system will seem useful.

   Where possible, near miss reporting systems can be integrated into already-existing safety management systems which can help with workforce familiarity and acceptance. Providing positive reinforcement for reporting can also encourage engagement. Research in the chemical processing industry highlighted successes in increasing near miss reporting by

[3] Employees investigating near miss events would need to be guided by an internal safety expert.

offering employees small rewards or entering their name into a prize draw when they report a near miss [9].

2. **Proving feedback** – Once a near miss is reported, the employee should be able to track the progress of the report until it is resolved. Specifying time frames in which a report must be reviewed and having a deadline for feedback can be helpful. Even if the solution may take longer to find or implement, reports should be analyzed in a timely manner and feedback should follow. If the solution requires more time than usual, the employee(s) involved should receive updates on the progress of the near miss, so they know the issue is still a priority. Solutions identified by the reporting process should be systems-oriented, focusing on the factors that enabled the near miss to occur.

3. **Reinforcement of learning** – Employees can be involved in helping management identify appropriate corrective actions where possible. Once this is done, the corrective actions and guidelines for preventing the near miss from occurring again in the future can be communicated to the broader workforce. Any corresponding improvements and any other benefits elicited from the near miss reporting system can be highlighted through multiple methods of communication.

Lessons Learned from RAC Safety Culture Assessments

The RAC has conducted 17 safety culture assessments with member railways between 2015 and 2023. A review of survey and focus group results and action plans across assessments revealed common findings across participating railways indicating opportunities for improvement.

Survey Results

There are two items related to safety culture in the standard version of the RAC safety culture perception survey[4]:

1. Employees report near misses as an opportunity to learn from mistakes/errors.
2. Near miss reports are reviewed and acted on.

A review of survey reports that contained percentage of agreement scores for these items (N= 15) revealed that these items received a higher percentage of “neither disagree nor agree” responses compared to the average survey item[5]. Between 14.5% and 31.6% of respondents chose “neither disagree nor agree” to the near miss items. It should be noted that among many Canadian railways, near miss reporting is a relatively new initiative which could be the reason for high levels of “neither disagree nor agree” responses. Regardless of the reason, the survey results suggest a need for increased awareness of near miss reporting systems among railway staff.

In nine organizations, over 15% of respondents disagreed to some extent with the statement “Employees report near misses as an opportunity to learn from mistakes/errors”, with two organizations having over 40% disagree to some extent. Two organizations had over 70% agreement to some extent for this item.

For the item “Near miss reports are reviewed and acted on” 4 organizations had over 15% of respondents disagree to some extent and two organizations had over 70% agreement to some extent for this item.

[4] Organizations may choose to create a limited number of additional items about near miss reporting or other company initiatives.

[5] RAC safety culture perception items have five answer options ranging from “strongly disagree” to “strongly agree”. A “don’t know” option is also included; however it is not used to calculate mean scores.

Focus Group Findings
In the focus group section of safety culture assessment reports, common themes related to near miss reporting included: training, feedback, and formalized systems.

1. **Training**
   The most common theme regarding near miss reporting in the focus group reports was related to training. There were perceptions about the need for more training, such as having near miss training be part of onboarding for new hires and having near miss refresher training for other employees. The perceived need for more training was related to a lack of understanding what a near miss is, to encourage the use of near miss reporting systems, and to improve the quality of near miss reports.

2. **Feedback**
   A couple of focus group reports noted that the workforce receives feedback following near miss reports. However, it was more common for staff to perceive a need for increased feedback. There were a few reports in which the workforce wanted to see relevant near miss reports and learnings shared with other departments, regions, or the broader organization to encourage learning. Related to feedback, there were perceptions of a lack of utility in near miss reporting as employees did not think reports were being used for learning.

3. **Formalized Systems**
   A few focus group reports identified a need for a formalized near miss reporting system/increased use of an existing formalized system. Among a few railways, there was the perception that near miss reports are dealt with informally and may not be formally recorded. For example, when a near miss occurs, the employee fixes the issue and then continues working without reporting the concern as a near miss. This was viewed as a missed opportunity for learning. There was the perception that a focus on using formal near miss reporting systems and encouragement from leadership would increase the quantity of near miss reports.

Action Planning
Two organizations included the implementation of a near miss reporting system (or good catch reporting system) as part of the post-assessment action plan. Another organization included the item “encourage near miss reporting” without specifying strategies to achieve this goal.

Conclusion

Ensuring that near miss reporting systems are simple, safe from blame, and useful are steps leaders can take to communicate the importance of near miss reporting. Although it is not an overnight process to change the culture around near miss reporting, some industries have been successful at getting a few steps further (i.e., aviation) therefore, it is worth the effort to gain the potential knowledge and improvement.

Near miss reporting can be utilized in a preventative manner to help identify organizational safety hazards and errors. Many industries share similar issues with near miss reporting, like working within a blame culture, perceptions of the system’s utility, choosing the best type of participation method, and dealing with multiple subcultures. Some industry-driven research has reflected lessons learned on how to make near miss reporting systems user-friendly and how to work on reducing blame culture. Moving forward, it would be beneficial to conduct more research and continue to share information, as publicly available information on internally run near miss systems is non-existent and there is limited information on third-party systems.

Based on safety culture assessments conducted by the RAC, there are opportunities to improve near miss reporting by increasing staff awareness of near miss reporting systems, adding or

reviewing near miss training, providing feedback following a near miss, and encouraging the reporting of near misses using formalized systems to ensure shared learning is possible.

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Appendix A – Interview Guide

Near Miss Interview Guide

1. Tell me about your near miss reporting system.
2. What led the company to implementing a near miss system?
3. Explain to me how your near miss system was implemented?
    a. Probes: How did you decide what type (confidential or not) to implement? Who was involved in this process?
4. Were there barriers, facilitators, and lessons learned from your experience implementing the near miss system?
5. Did anything change as a result of implementing the near miss system?
6. Explain how employees were informed about how to use the near miss system.
7. How do you know employees are using the system?
8. How is the system promoted?
9. Once a near miss is reported, what is the process?
    a. Who does it go to?
10. How are the learnings from near miss reports shared?
11. Is there anything else you would like to share with me about the near miss reporting system at your company?