Emergency Management After-Action Review Processes to Influence Ontario Municipalities

Final Report

Amy Leggate J0048935

Bachelor of Emergency and Security Management Studies

Justice Institute of British Columbia

ESMS 4900 19WI

Instructor: Beth Larcombe

Advisor: Amy Severson

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Abstract

Organizational agility and learning from lessons play an important role in enhancing emergency management programs and the after-action review (AAR) facilitates this process. This paper discusses the role of the Office of the Fire Marshal and Emergency Management Ontario (OFMEM) and how it can better encourage the standardized use of the AAR by municipalities in Ontario. This paper reviews different methods and essential elements of the AAR and makes recommendations for the OFMEM to consider.

Keywords: After action review/report, after-action process, hot-wash, lessons learned, debrief.

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Background

The after-action review (AAR) process is an important one that allows organizations and municipalities to address organizational limitations, enhance strengths, and to learn from experiences. The AAR is designed to promote employee and team development and is founded on several areas of science, including information feedback, performance measurement, cognition and memory, group processes, communications theory, and instructional science (Tannenbaum & Cerasoli, 2013). The AAR is a structured opportunity for a shared retrospective learning, innovative development, and continuous improvement (Scott, Dunn, Williams, & Allen, 2015). Despite the encouragement found in emergency management literature, there is no governance that mandates municipalities in Ontario to record or address lessons learned from AAR's after an incident or an exercise.

At a Federal level, the policy on emergency management (EM) articulates the need for continuous improvement, lessons learned, and best practices for each of the four pillars of EM; prevention/mitigation, planning, response, and recovery (Friesen, Kelsey, & Legere, 2017). The identification of lessons learned at a Federal level across the EM pillars provides a basis for the requirement at a provincial level.

At the provincial level, the Office of the Fire Marshall and Emergency Management Ontario (OFMEM) is responsible for supporting municipalities to achieve the requirements of the Provincial Emergency Management and Civil Protection Act (EMCPA), R.S.O. c.E.9 (1990), EM program requirements. The OFMEM fulfills this responsibility by supporting the

implementation of municipal and provincial EM programs with suggested tools, developing training, providing advice, and guidelines.

Another method of supporting municipalities was the OFMEM's development of the incident management system (IMS) for Ontario. By encouraging this system, OFMEM provided a standardized organizational structure with functions, processes and terminology that can be assumed by all levels of emergency management governance in Ontario (Ontario, 2017). Although, federal governance and the full implementation of IMS encourages the practice of documenting lessons learned in AARs when evaluating exercises and incident or event response (Ontario, 2018), the doctrine does not provide AAR templates or clear procedures. This could explain the reason that there is no clear evidence that the AAR process is utilized, or consistency of the practice across Ontario municipalities.

Definition of the Question and Rationale

The research question is what literature is available to assist the OFMEM when making AAR process suggestions to municipalities in Ontario? To define the question and the rationale, this study utilizes the PICO method, identifying the problem, intervention, comparison, and the outcome of interest.

Problem

Without proper guidance from the OFMEM in Ontario, the lessons learned process may be avoided when a municipality experiences an incident or exercise. This is unfortunate because lessons learned will increase organizational agility and play an important role in EM (Friesen et al., 2017). Municipalities may not build well-rounded, broader, and strategic approaches to lessons learned without proper steps taken after an incident or event (Friesen et al., 2017). Errors may be repeated in the future if there is no organized system that considers their rectification.

Further, if municipalities do complete the AAR process, what method do they use to input and track the changes they have identified? What recommendations are there for sharing the information with others inside and outside of the organization? And what research studies are available to assist with these recommendations?

Intervention

Establishing an AAR process could allow municipalities to learn from what went well and areas for improvement as a result of an incident or event. There are multiple approaches to the AAR that may be considered and will be outlined in this study. The method for completing an AAR can be verbal or written and should be followed up to ensure the lessons learned process is functional. The amount of time taken, best practices, culture and learning environment are considerations to take during the AAR initialization. Continuous improvement and encouraging teams to work collaboratively are important goals to highlight when implementing an AAR system (Scott et al., 2015).

Comparison

The main alternative to completing an AAR would be to partially complete or not complete one. The choice ultimately will depend on the nature of the incident or event. When considering the AAR process, there are many identified methods within the literature that should be considered. Certain aspects such as communication, openness of the environment, participants, and leadership styles should be considered. These considerations will be important for the OFMEM when creating a thorough AAR process. The comparison process for municipalities that do or do not complete an AAR is a good consideration for future research.

Outcome of Interest

The outcome and desired effect of this study is to identify and articulate some AAR processes that may be of use to municipalities in Ontario. The process of surveying municipalities to begin research on how they manipulate the AAR process now will allow a small amount of insight to the common practices in Ontario. The literature search will provide multiple levels of AAR involvement at different agencies and organizations. This insight may lend itself to future research and whether or not the AAR, when done completely and appropriately, has an impact on community safety and resilience in Ontario.

Literature Review

This literature review begins with a detailed explanation of the search methodology and selection process conducted to narrow the research used. Next, a review and analysis of each selected article is conducted through a description, followed by a critical analysis of the literature. Finally, a conclusion will bring together all of the sections of this literature review in a comprehensive manner.

Search Methodology

Multiple electronic databases were searched for literature containing variants of the keywords which included: after action review/report, after-action process, hot-wash, lessons learned and debrief. The choice for these keywords relied on their meaning and interchangeability within the emergency management field. The initial search for resources was completed through the Justice Institute of British Columbia's (JIBC) library system, followed by Google Scholar, ResearchGate and other websites related to the topic.

The initial search for "after action review" recommended over 17,000 unique non-duplicated references with a filter for only scholarly journals. Further, with an inclusion of only

"full text" articles, the results provided was within the 10,000 range. Similar results were found when searching for the various other combinations of keywords identified above. When searching "after action review" and "process" together the results were fewer at approximately 1900, by simply adding a dash between after-action in this search, the recommendations were then limited to 180. Finally, with the use of a Boolean search, 130 hits were found when searching for: "after-action reviews" OR "after action reviews" AND "process" NOT "health." Health related articles were found to use too much jargon. This final search was the most successful and held the most relevant articles related to this topic.

Selecting Articles to Review

Twenty-one articles were chosen for abstract review. These were selected for their reliable source and their clear method or process of AAR's. When reading the titles, they were broad enough to encompass the research focus of this paper and detailed enough to inform the content of the article would be beneficial to the research of the study topic. When scanning the abstracts of these twenty-one articles, eleven articles that did not fit the scope of this paper were excluded due to their use of jargon, lack of AAR method or redundant information. Ten clear and concise articles that included some of the keywords within their abstracts were selected for full review.

At a minimum, articles selected for full review included information regarding an AAR and its importance to training or work environments; lessons learned and the future; the model or process used for an AAR that is well defined; the definition of an AAR and its characteristics; best practices, and some statistics supporting or not supporting the AAR. From the 10 articles fully reviewed, one article was excluded due to a significant focus on the industry and job title it was written about. Finally, nine articles were carefully chosen for final review and analysis.

Description

The following is a review and analysis of nine selected articles including the title and author(s), a brief description of the content, quotes, concepts or ideas that help define and describe the research problem, and an explanation of how the article relates to this research.

The first article discussed is Do Team and Individual Debriefs Enhance Performance? A Meta-Analysis by Tannenbaum and Cerasoli (2012). Tannenbaum and Cerasoli (2012) completed their study using quantitative meta-analysis across published and unpublished research on team and individual-level debriefs to conclude their effectiveness. It was found that organizations can improve individual and team performance by approximately 20% to 25% by using properly conducted debriefs. They further go on to discuss how the learning technique of AAR's can push learners to engage in further experimentation with ideas and actions. In summary, Tannenbaum and Cerasoli (2012) discuss the effectiveness of debriefs and support the research problem of this paper by stating that "self-discovery has been shown to be a key factor in effective developmental experiences" (p. 232).

Reflections Today Prevent Failures Tomorrow, (Brock, McManus & Hale, 2009) is an article written to discuss the use of the AAR effort to improve processes at the organizational level, specifically to develop computer software. This article compares the U.S. Army AAR process and the AAR steps that would be used on a software project. This distinction will allow readers the ability to think outside the realm of using AAR's in an army context and provides an example of an AAR process within an organization. The following table was excerpted from this article (Brock et al., 2009) and gives a brief example of how the process between the two can be distinct.

Table 1.

Parallels between AAR's conducted for military and software projects

Table 1: Parallels Between AAR's Conducted for Military (adapted TC 25-20)[11] and Software Projects

AAR Step (Army Training Exercise)	AAR Step (Software Project)
1. Introduction and AAR rules	
2. Review of Action Objectives and Intent	
3. Summary of recent events	
4a.Discussion of key issues (chronologically, by functional area, or objective. Fratricide (friendly fire) is always a separate issue)	4b.Discussion of key issues (chronologically, by functional area, or objective. Project failure or risk factor realization are always a separate issues)
5. Tasks to sustain or improve	
6. Discussion of optional issues (skills or statistics)	
7a. Discussion of force protection (safety)	7b. Discussion of Risk Assessment/Management
8. Closing comments (summary)	

(Brock et al., 2009, p. 141).

In addition to this, the article details the process of using an AAR, which includes when to conduct them, how to ensure success, expected leader mindset, accountability, owning the process, and who can use the AAR.

Defining a Risk-Informed Framework for Whole-of-Government Lessons Learned: A Canadian Perspective" (Friesen et al., 2017) discusses how lessons learned can play an important role in organizational agility and that virtually all aspects of emergency management can derive a benefit from a lessons learned program. This article provides insight for implementing an AAR program from a Canadian perspective. Friesen et al. (2017) suggest a robust lessons learned process and methodology that provides an evidence base used to inform decisions, guide emergency management plans, strengthen prevention/mitigation strategies, as well as assist in the development of tools for exercises and responses to "real operations" (Friesen et al., 2017, p. 219). This quote reinforces the argument for the need of guidance in the area of AAR program development for Ontario municipalities.

Implementing After Action Review Systems in Organizations: Key Principles and Practical Considerations, a chapter written by Scott et al., (2015) within the edited book named The Cambridge Handbook of Meeting Science, presents an input-process-output model of AAR systems. The model shared in this chapter outlines a process that includes rules of engagement, cultural inclusions, facilitation, and best practices. Scott et al. (2015) suggest that employees in bona fide groups will find that they are more successful when they effectively capture and process information and knowledge from their environments through discussion with their peers. This model can be applied to the AAR conversations as it offers considerable opportunities for employees to develop and refine what they know through discussion (Scott et al., 2015).

After-Action Reviews: Linking Reflection and Planning in a Learning Practice, (Darling & Parry, 2001) describes the basics of AAR's and best practices. The Darling and Parry (2001) five step AAR model is modular and gives a basis for comparison in this research paper. Examples of deeper questions are discussed such as "…[w]hat was our actual performance compared to our intent, and what do we think caused our actual results…" (Darling & Parry, 2001, p. 67). This quality of dialogue offered in an AAR is just as important to their research as the method or process itself.

The U.S. Army's After Action Reviews: Seizing the Chance to Learn is an excerpt from the book Learning in Action, a Guide to Putting the Learning Organization to Work written by Garvin (2000), which describes the AAR process used by the U. S. Army in great detail. This process, and the reasons they adopted it are advantageous as it provided examples to influence the AAR suggestions by OFMEM. Garvin details the discussion points that an AAR would revolve around as: "What did we set out to do? What actually happened? Why did it happen and what are we going to do next time?" (2000, p.106). In the example, each question is broken

down into greater detail. This encourages a comprehensive understanding to the process and concludes with the valuable advice that participants must reflect on their experiences to fully understand the reasons for success or failures. The guidance shared in this book could provide insight to the emergency management professionals of Ontario.

Emergency Management Ontario (2017) shares fifty-two recommendations on their webpage Emergency Management Review from an independent consultant that encourages the OFMEM to include a goal of ongoing improvement that identifies gaps in Ontario's Emergency Management program. One of these recommendations is to implement the AAR process. An AAR process template is shared (Emergency Management Ontario, 2016) within the area of exercise templates on the webpage Phase 4: After Action Report in the resource section of their website but is not shared within their newest version of the community emergency management coordinator (CEMC) handbook that is dated 2014.

Finally, an article written by Bolton (2016) called Use of the After-Action Review to Improve Learning suggests the adoption of the U.S. Army method of AAR's to improve classroom quality of learning. This article lends itself to this research as many emergency management professionals at the municipal level conduct training and exercises and this approach would enhance their efforts to improve emergency management programing. For example, Bolton (2016) suggests the first step of the U.S. Army AAR (review what was supposed to happen) is based on the desired training objective and overall intent of the organization commander (Bolton, 2016, p. 3). This equates in the classroom to the identification of student learning objectives and outcomes as identified by the instructor and articulated in the course syllabus (or training manual, etc.). This model also suggests a discussion format for engaging students in course evaluation, which moves away from the traditional feedback form.

The previous literature reviewed provides formidable evidence for this research paper. Multiple methods or processes from different sources will be discussed. A significant focus on the U.S. Army AAR process is discussed within the literature as it has been adopted after many years and serves to be the basis for AAR models. The following section of this literature review will provide a critical analysis.

Critical Appraisal

This critical review of the literature begins with the report provided to the OFMEM and background information. Next, it includes the themes that emerged within the analysis: the issues that connected the sources together including some different views and solutions identified. Identified themes within the literature include culture, best practices, active learning, and reflective learning.

The OFMEM

As mentioned in the background, in Ontario, the OFMEM is responsible for overseeing the EMCPA and assisting municipalities and provincial ministries in implementing their emergency management programs by providing tools, training, advice and guidelines. The Minister of Community Safety and Correctional Services was asked by the Premier of Ontario to conduct a review of Ontario's emergency management systems (Emergency Management Ontario, 2017). A report was released in August of 2017 by the independent consultant, Lansdowne Technologies Inc. The consultant suggested the following in their report:

> "Continue to promote the sharing of lessons learned and best practices. After Action Reports (AARs) and tracking of lessons identified and corrective actions are important for continuous improvement and fiscal planning. Re-energize the Provincial Emergency Management Coordinating Committee (PEMCC) and regularize meetings. Utilize social

media and e-forums when possible" (Emergency Management Ontario, 2017, Recommendation number 52, no page number available).

As of February 2019, there is only one document provided from the OFMEM that provides a template for AARs, it is located deep within the website suggesting the use of a six-step AAR process to be completed after exercises (Emergency Management Ontario, 2016). The six steps consist of: executive summary, exercise overview, exercise goals and objectives, exercise events synopsis, objective-based evaluations, and conclusions. Although, the methodology of an AAR program is outlined in the OFMEM website, there is no mention of AARs within the newest version (updated in 2014) of the CEMC handbook.

AAR Background Information

In order to guide AAR use in Ontario municipalities, a thorough understanding of AARs and processes mentioned within the literature is required and included below. The after-action review can also be called debrief, lessons learned, or a hot-wash. They are relatively inexpensive and can be a quick intervention for enhancing performance (Tannenbaum & Cerasoli, 2013). The U.S. Army has been effectively utilizing the AAR since the 1980's, embraced by soldiers, it has become an integral part of a mission plan (Brock et al., 2009).

Culture

It is critical the AAR process be integrated into the culture of the organization (Brock et al., 2009; Darling & Parry, 2001), and supported by senior leadership and employees alike. A sure way to do this is to take the feedback of an AAR and implement it, as participants will see that the energy they spend conducting the AAR is beneficial and productive. The process of the AAR "is truly a [culturalized] phenomena used to maintain a focus on continuous process improvement (Brock et al., 2009, p.141). It is found that when organizations facilitate AAR's on

an ongoing basis (post event/incident/exercise) individuals learn as a result, therefore growing the organization (Brock et. al., 2009).

The people who facilitate and participate in an AAR are not just individuals but are also representatives of various cultural groups (Scott et al., 2015) and an important cultural factor to consider. Different risk perceptions and interpretations will be found across the spectrum of individuals. An open sharing environment that allows individuals to express candid information is imperative.

Best Practices

AAR industry or organizational best practices have been outlined by several studies included in this literature review, for example, ensuring someone is assigned to facilitate who is skilled and able to keep the group on track, and encouraging an open and sharing environment that leaves rank and status at the door (Bolton, 2016; Brock et al., 2009; Garvin, 2000; Scott et al., 2015).

When to complete the AAR will depend on the situation, but in most situations, it is recommended to complete an AAR shortly after the completion of an activity, or as soon as possible to minimize memory losses (Garvin, 2000). A different point of view suggests the AAR should provide continuous reflection after event milestones and be completed during and after the event to maximize planning for the next event (Brock et al., 2009; Darling & Parry, 2001). The differences in this approach and efficiencies is dependent on the event being planned.

The discussion processes that occur during an AAR are recommended to include the core elements of enactment, selection, and retention (Scott et al., 2015). *Enactment*: early portions of the AAR discussion generally focus on bracketing off (enacting) relevant portions of the event for further attention, in other words the most important elements of the incident (Scott et al.,

2015, p. 1105). It is necessary to pause here as a facilitator and remind participants of the opportunity to make suggestions about other issues they would like to discuss to ensure that nothing is left out (Scott et al., 2015, p. 1105).

Selection: facilitators will notice the inputs that the group chooses to enact may be interpreted a certain way. During selection, the information should be organized in a way that discovers what it means and what should be done about it. Facilitators should understand that this process is not linear but can occur through ongoing trial and error (Scott et al., 2015, p. 1105). The facilitator plays a critical role in the selection process in two ways, they manage the flow of discussion to make sure that a wide range of individuals have the opportunity to participate. Secondly, the facilitator must control their influence on the direction of the discussion by maintaining a neutral physical and verbal response to conversations (Scott et al., 2015, p. 1105).

Retaining: to influence retention of information and lessons learned in the AAR process for participants, the facilitator must summarize repeatedly the key lessons learned and carryout any follow-up that the participants collectively deemed necessary (Scott et al., 2015, p. 1106).

In addition to best practices, there are some practices to avoid, including: misdirecting and subversion within the AAR to promote a false representation of the event, stifling communication by responding in a way that prematurely disconfirms their viewpoint, assigning blame and inhibiting the processes that help to synthesize explanations (Scott et al., 2015).

Recommended AAR Facilitation Processes

The best AAR's follow a well-defined path, where timing and discussion points are pre-determined (Garvin, 2000). Roughly 25 percent of the time allotted to complete the AAR should be devoted to the objective and actual events log. Following this, another 25 percent of the time

allotted should be used to discuss the "why" or the reason it happened that way. The last half of the AAR should be used to discuss future actions and what should be expected next time (Garvin, 2000). A facilitator should be prepared and accepting of criticism and should begin a discussion regarding future actions with a statement explaining what they did wrong and how they plan to rectify it in the future. The facilitation process should be seen as an art form and regarded as such. The facilitator should have the ability to guide a conversation without dominating it, ensure that all necessary discussion points are achieved, and possess the ability to read and understand non-verbal cues from the crowd through their body language to ensure a successful AAR is achieved (Garvin, 2000).

Active and Reflective Learning

Active learning is a consistent theme in the AAR process that encourages participants to engage in experimentation with ideas and actions (Tannenbaum & Cerasoli, 2013, p. 232). "A true AAR practice pays attention to future actions, not just reflections on what has happened to date" (Darling & Parry, 2001, p. 65). This quote gives a deeper meaning to Tannenbaum and Cerasoli's (2013, p. 232) mention of experimentation with ideas and actions. By experimenting with new ideas and actions, enhancements are being implemented. This process of active learning allows the participants to have "a state of mind where everybody is continuously assessing themselves, their units, and their organizations and asking how they can improve" (Garvin, 2000, p. 106). Reflective learning is a product of the AAR, as it provides the opportunity for both individuals and groups to engage in a multi-dimensional learning activity which allows continuous improvement (Bolton, 2016; Brock et al., 2009; Friesen et al., 2017; Tannenbaum & Cerasoli, 2013).

Inter-organizational AAR Sharing

Finally, the process of what to do with the AAR after it has been completed has been identified as a gap in operationalizing AAR's in some of the literature, for example, adding them to an online database (Friesen et al., 2017). Without follow-up or sharing of AARs with others in the organization or possibly other organizations, some lessons learned may be lost which leads to the same errors being repeated again in the future. Sharing knowledge and best practices with other organizations can be completed face-to-face, voice/video-conference, or electronic postings (Brock et al., 2009). The submission process should be clear and concise and should provide the opportunity to serve the larger EM community. Table 3 (Appendix C) outlines a process or method for incentivizing EM professionals to share their completed AAR's, and provides an overview of general issues and recommendations for the lessons learned submission process (Friesen et al., 2017, p. 229).

The right reporting forms, templates, and instructions that enable a variety of end users to complete and submit an AAR is an important component (Friesen et al., 2017). Artifacts must be easily accessible, such as checklists, a common submission template and tools for process reporting to senior management that allow recommendations, lessons learned and AAR information from stakeholders to be captured and reviewed (Friesen et al., 2017).

Essential Elements Supported by Evidence

Five hypotheses were tested in the study completed by Tannenbaum and Cerasoli (2013). Of these five, three were supported. The information found in this study should be helpful for the OFMEM when determining the direction and goals of the AAR program. The following hypotheses were supported (Tannenbaum & Cerasoli, 2013, p. 233): "Hypothesis 1: Individuals and teams that use debriefing are more effective than individuals and teams that do not use

debriefing." This shows the AAR is a systematic and credible method for improving performance. "Hypothesis 2: Debriefs are more effective when levels are aligned" (Tannenbaum & Cerasoli, 2013, p. 234). The debrief effectiveness hinges on the goals that are set, and that they are the same for everyone involved. For example, the focus of the AAR is team performance rather than the performance of each individual team member in a group setting. The last supported hypothesis is: "Hypothesis 3: Facilitated debriefs are more effective than [nonfacilitated] debriefs (Tannenbaum & Cerasoli, 2013, p. 234). Structure during an AAR is more effective than without, but as seen in the next unsupported hypothesis, the higher the level of structure does not determine a more effective debrief. "Hypothesis 4: A higher level of structure is associated with a more effective debrief" is unsupported (Tannenbaum & Cerasoli, 2013, p.234). Finally, "Hypothesis 5: Debriefs using multimedia aids are more effective than debriefs not using multimedia" (Tannenbaum & Cerasoli, 2013, p. 234) is also unsupported.

The results provide empirical support for the use of team and individual debriefs. A low-cost option that has the potential to increase up to 25% improvements through proper structure and effective facilitation (Tannenbaum & Cerasoli, 2013). A table detailing essential elements (Appendix B) describes the definitions and exclusions for active self-learning, developmental intent, specific events, and multiple information sources. Self-discovery and active involvement are encouraged as long as there is a clear intent for improvement. Additionally, external sources of information should be considered, such as observers. Finally, it is recommended that negative or passive feedback should be avoided (Tannenbaum & Cerasoli, 2013).

Municipal Surveys

To gain a deeper understanding of the AAR methods used in Ontario and whether or not there is any continuity between municipalities, survey questions were sent to four different

emergency management professionals in southern Ontario. Those were: the CEMC for the City of Sarnia, the CEMC for the County of Lambton, the CEMC for Guelph Wellington, and the alternate CEMC for the City of London. Three surveys were returned completed from the City of Sarnia, City of London, and the County of Lambton. The following survey questions were asked:

1. Have you ever completed an after-action review?
2. What was the process?
3. What was the outcome?
4. What terminology do you use to define the after-action review?
5. Do you have an after-action review that you can share with me? Completed and template?
6. Have you implemented lessons learned?

The survey questions were each designed to allow answers based on fact and not opinion. All emergency managers answered the questions completely but one (one question left unanswered). Appendix D contains Table 4 with each question and answer included and Table 5 with the AAR steps.

With the OFMEM's suggestion of an AAR process that promotes active and reflective learning, emergency management divisions within Ontario municipalities will be able to grow their programs. The OFMEM should consider outlining AAR best practices, and how to introduce and facilitate AAR's within a municipality. The next section provides insight to the AAR process used by the municipalities.

Discussion

The AAR is a powerful, yet simple tool to improve the effectiveness of individuals and teams (Tannenbaum & Cerasoli, 2013), when completed with proper guidance. There are

essential elements and best practices that should be followed to ensure success. The literature shows that the process of completing an AAR is just as important as the procedure itself. Facilitation and participation are the grounding foundation of the AAR and provide a truthful and influential AAR that allows for lessons learned to be considered.

The AAR processes found between the three municipalities surveyed were not identical to each other or the process outlined by the OFMEM. The processes do, however, involve mostly the same steps (Table 5, Appendix D) in a slightly different order. Each municipal AAR process included: background information and overview, event chronology, recommendations, and conclusions. Additionally, one municipality also included consequences and two municipalities included an analysis. The survey results show that all three municipalities have completed an AAR, their templates are slightly different, but outcomes and lessons learned were noted.

For any developmental interventions to work, lessons learned must be integrated into everyday practice (Tannenbaum & Cerasoli, 2013). The AAR process and methodology provide a base in which to inform decisions, guide emergency management plans, strengthen mitigation and prevention strategies, and assist in the development of tools for response to real operations and exercises (Friesen et al., 2017). Building this framework will assist to prevent mistakes from being made in the future building of a structure to learn from experiences that focus on challenges (Darling & Parry, 2001). The following section will discuss evaluations and recommendations for the OFMEM and provide options to consider when creating an AAR process for implementation.

Evaluation and Recommendations

A benefit can be derived from an AAR whether it is a major event, or an exercise event. A lessons learned program should be built into the culture of the organization to ensure that it

becomes second nature. Eventually, a new mind-set will develop in the organization and learning can be incorporated into daily work (Garvin, 2000).

The recommendation for the OFMEM to implement an AAR process within their organization and structure would provide additional guidance to municipalities in Ontario. In order to maximize the AAR process, the OFMEM should consider the essential elements as well as what to do with the finished product.

The following recommendations were made by Friesen et al., (2017):

1. develop a database, to allow structure, organization and accountability, and to track lessons learned and implemented,
2. establish a policy and standard, using existing governance for the completion and collection of AARs
3. create a shared accountability model, this will encourage municipalities and the OFMEM to share pertinent information with a larger audience,
4. validate forms and templates, ensure ease of use, usability and effectiveness are embedded in the design,
5. validate project methodology and risk-informed prioritization, provide ongoing validation to ensure continued suitability for implementing a robust, flexible and adaptable lessons learned processes,
6. involve lessons learning in training and exercises, this will allow further continuous improvement and will build the AAR process into the culture of the organization,
7. conduct training for working group/secretariat members, develop training and orientation courses for the key members of the emergency operations centre,

8. and, create partnerships, partner with academic or community members to build relationships and learn from each other's experiences during the same incidents or exercises (pp. 230-231)

Each of these items will assist to providing a general framework for an AAR program. Further research should be completed to determine the best approach that the OFMEM could take to appeal to different size municipalities that would also encompass the different needs and hazards that each community is faced with.

In order to address hazards in a community, the OFMEM should consider a revision of their hazard identification and risk assessment (HIRA) table that would allow emergency managers to determine which lessons learned should be implemented first. Friesen et al., (2017, p. 226) recommend an impact-likelihood risk matrix and risk rating factor (Appendix E). Weighting the risks this way would allow factors such as people affected, the cost or the level of public confidence to be considered (Friesen et al., 2017). The AAR can set out an organizational roadmap for initiating, planning and implementing process improvements for the future (Brock et. al., 2009).

Conclusion

Organizational capacity can be expanded by implementing a comprehensive and well-developed lessons learned program following incidents or disaster exercises, known as the after-action review. According to Tannenbaum and Cerasoli (2013), organizations can improve performance up to 25% by using properly conducted after-action reviews. The themes discussed in this paper; best practices, active learning, reflective learning and culture provide an informative approach to creating an improved AAR process for the OFMEM. This inexpensive process can deliver great results if completed properly. The benefits of the AAR are found to

enhance strengths, address limitations and learn from experiences within organizations. These benefits should be maximized to ensure municipalities are completing their due diligence within their communities. The OFMEM may play a large part of the AAR process that municipalities choose to use within their emergency management divisions to promote active and reflective learning.

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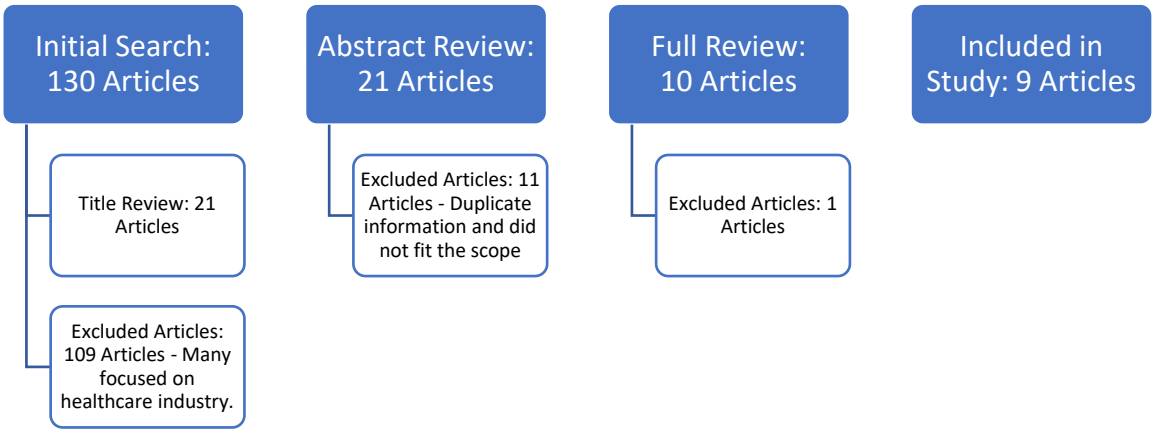
Appendix A

Graphic Chart.



Appendix B

Table 2.

Debriefs: Essential Elements.

TABLE 1: Debriefs: Essential Elements

Element	Definition	Excludes
Active self-learning	Participants engage in some form of self-discovery or active involvement and are not merely passive recipients	Passive receipt of feedback; being told how to improve by a coach or facilitator
Developmental intent	A clear, primary intent for improvement or learning that is nonpunitive rather than judgmental or administrative	Performance appraisals or reviews; incidental learning
Specific events	Involves reflection on specific events or performance episodes rather than general performance or competencies	General discussion of a team's or person's overall strengths/ weaknesses; 360° feedback about overall competencies
Multiple information sources	Includes input from multiple team members or from a focal participant and at least one external source, such as an observer or objective data source	Personal diary keeping; self-reflection

(Tannenbaum & Cerasoli, 2013, p.233).

Appendix C

Table 3.

General issues and recommendations for the lessons learned submission process.

Table 1. General issues and recommendations for the lessons learned submission process	
ID #	**Recommendation**
1	**Support tools:** Guidelines should be created and provided to users regarding the process and criteria for writing recommendations, providing evidence of completion to each group of stakeholders. These guidelines may need to be customized based on the group type and/or the users' level of involvement and knowledge.
2	**Continuous improvement process:** To ensure that the lessons learned program continuously improves, a satisfaction survey should be created and distributed semiannually or annually.
3	**Ensure transparency:** Create an end-of-year report or newsletter to highlight successes, barriers, changes to the process, and tools to be distributed to all users.
4	**Responsibility assignment matrix:** Roles and responsibilities with regards to the submission of recommendations and interactions with multiple departments/agencies involved should be explicitly stated and distributed along with any improvements/changes/updates to the process or tools on a continuous basis.
5	**Training:** Training and related materials regarding the submission process should be provided to all stakeholders and end users.
6	**Process automation:** To reduce human error and workload, a method for automating the input, review, analysis, and reporting of the recommendations should be developed.
7	**Validate the process and materials:** Conduct tabletop exercises for the lessons learned process and artifacts to validate and obtain buy-in from end users.
8	**SharePoint:** If SharePoint is the chosen technology for submission, criteria for access should be defined, maintained, and user access lists should be routinely verified; improving and simplifying its functionality; training and providing access to more users; defining better the responsibilities of who enters tasks and information into the platform; and assigning more than one person to enter and manage records
9	**User-centered design:** It is recommended that "Human Factors Design Guidelines" are followed in the final process and design of these artifacts to ensure that ease of use, usability, and effectiveness are embedded in the design.
10	**Informal process:** The proposed process is a "formal" one, but there should also be an entry into the process informally from other organizations that may not be part of the federal event lessons learned/AAR reporting cycle (eg, academia and the public). This could be as simple as access to the Web portal and submission of an observation informally.
11	**Point of contact:** A point of contact should be provided for all stakeholders to reach out to regarding any questions or concerns they have with the process or tools.

(Friesen et al., 2017, p. 229).

Appendix D

Table 4.

Comparison table of municipal survey questions.

Question Number	Municipality	Answer
1. Have you ever completed an AAR?	City of Sarnia	For incidents, yes. For exercises, not formally, no documentation, discussion-based hotwash/debrief only.
	City of London	The City of London completes an After-Action Review (process) annual after our EOC exercises. Also after other training events and smaller scale exercises we conduct a less formal review.
	County of Lambton	Yes, we have conducted a few after-incident reviews at the County, however the review following Snowmageddon in December 2010 was the most in-depth and involved the largest number of stakeholders. The County held three reviews (EMO organized and held a fourth review by teleconference shortly after the event, which also included representatives from abutting counties). An internal review was conducted within a week of the termination of the emergency. An external review was held with local stakeholders and external agencies within the month. A final report was prepared and shared with all stakeholders for comments and review prior to being submitted to County Council. A third review took place in November, prior to the one-year anniversary of the blizzard and included municipal representatives who were not necessarily involved in the 2010 emergency and response. This third review was held as a joint, discussion-based exercise with local municipalities and stakeholders. Formal reviews involving relevant stakeholders were also conducted following the Central Lambton Tornado of July 2011 and following the sinking of the Tug Madison and Authur J barge in July 2012. We also have a protocol to review all significant incidents on Highway #402 or the County's Emergency Detour Route with our stakeholder group, which includes

		the MTO, local municipal emergency services that respond to #402 and the EDR, Public Works Departments and the MTO maintenance contractor (and others as required). County personnel also participate in local municipal after-actions reviews (i.e. 2014 Boil Water Advisory, 2015 Indian Hills' emergency declaration) and chemical valley emergency coordination organization (CVECO) incident reviews.
2. What was the process?	City of Sarnia	CVECO uses a process, uses Codes/time/timelines and who was called in. Conclusions and recommendations are done for response. Kenwick Fire – no AAR form completed, everyone submitted their notes. A debrief was done at County level 2 weeks after, and at City Hall 3 weeks after the incident.
	City of London	After the EOC exercise we conduct a "Hot Wash" review immediately after the "end X". Where we look at the exercise outcome, strong points, points to improve on the exercise objectives and exercise design. Minutes/notes are taken from the "Hot Wash" process and added to our exercise participates critique and exercise evaluator reports. Our CEMPC committee also reports on an After Action Review process with the exercise design team. Using the SWOT format or pre designated questions, or check lists, we prepare an After Action Report from that exercise. The AAR is presented to the Community Emergency Management Program Committee (CEMPC).
	County of Lambton	For Snowmageddon, stakeholders were asked to attend the reviews in person. Given the size of the group, the review took place in Council Chambers. The first internal and external reviews were chaired by the County Emergency Coordinator and the third review was led by a hired facilitator. The discussion generally followed the attached Incident Review Format. High-level comments (not attributed) and recommendations were captured in the final report.
3. What was the outcome?	City of Sarnia	Reaffirming obvious issues – such as human error and communications errors. CVECO completed AAR's go to community awareness emergency response (CAER) office, the response review committee reviews, then the CAER board shares to all industries.
	City of London	For planning purposes for the next years exercise design team we review the AAR to make the next exercise better. The AAR as a CEMPC we try to remedy the recommendations of that report by training education of for funding for the next year.
	County of Lambton	Although the stated goals of an incident review are to identify what went well and what did not, identifying problems is usually more constructive. Identifying issues, which can be worked on and hopefully resolved prior to the next incident, improves future emergency

		responses. Following the Snowmageddon reviews, a final report was provided to County Council (attached to original email) listing many of the actions taken for improvement.
4. What terminology do you use to define the AAR?	City of Sarnia	Learnings are reviewed, recommendations are made and follow-up takes place. This process only works if participants are truthful and feel comfortable to speak their mind creating a positive experience.
	City of London	The After Action Review is the process used to complete an After Action Report. The review process of a hot wash, participant critiques or evaluations, the exercise evaluators reports and AAReview of the exercise design team to review lessons learned from the exercise objectives and how to make the exercise better to finalizes it in an AAReport.
	County of Lambton	Sorry, I don't know what this question is asking.
5. Do you have an AAR that you can share with me? Completed or template	City of Sarnia	Just the CVECO template.
	City of London	Yes
	County of Lambton	Attached is a template that I first saw used at a CVECO incident review (reviews are conducted by the Response Review Committee following all major industrial incidents). I retained a copy of the template and modified it slightly so it could be used for municipal purposes.
6. Have you implemented lessons learned?	City of Sarnia	With CVECO, each industry receives a copy for their own implementation. With the Kenwick Fire, no implementations completed yet.
	City of London	Yes. We implement the LL to better the exercise itself and what training or courses, our participates can take or do. The formal EOC process or documentation or Planning P can be implemented to work more smoothly in a revised operating procedure.
	County of Lambton	Yes. For one, a Pre-Winter Traffic Meeting is now held each fall to meet with various stakeholders involved in #402 or EDR response or maintenance. Internal protocols were adopted to improve communications between stakeholders and readiness to respond to snowsqualls (i.e. relocation and purchase of resources such as cots and blankets), MTO implemented a number of actions (i.e. planting living snow fences, portable and permanent message signs, access ramp swing gates, etc.), etc. Many of these details are contained in the attached Council report. In other reviews, communications were often identified as an issue for emergency response. Even with continuing improvements, it has been necessary to revise or expand contact lists or reassess how individuals or agencies are contacted. More robust protocols have been developed to ensure relevant stakeholders are contacted, but on-going meetings (even if only

		annually) help to ensure contacts are updated and new people in positions are introduced. A maxim of emergency management is, "make your friends before you need them"… the value of "putting a face to a name" cannot be overstated. It should be noted, with the adoption of MyCNN for public alerting and internal notification, sending emergency notifications has been greatly improved.

Table 5.

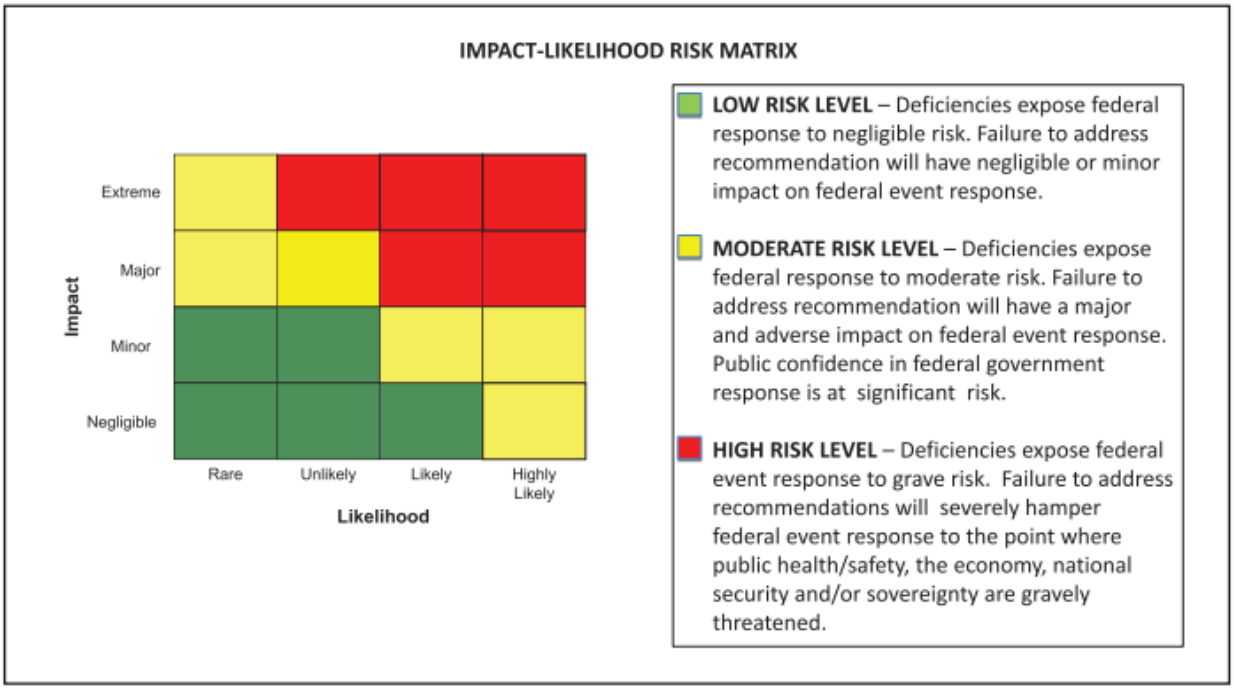
AAR Processes provided by municipalities.

Step	**Municipality**			
	City of Sarnia	City of London	County of Lambton	The OFMEM
1	**Background event chronology**: Industrial event chronology: Sarnia dispatch event chronology:	**Aim**: Background	**Background**: Describe the location, actions and conditions preceding the event.	**Executive summary**
2	**Discussion Comments**:	**Objectives**: Strengths and weaknesses	**Events**: List events in chronological order.	**Exercise overview**: details of exercise
3	**Conclusion**:	**Analysis**: Capability: Activity observation: Reference: Recommendations:	**Incident**: Describe the incident.	**Exercise goals and objectives**
4	**Recommendations & Follow-up**: Recommendations Follow-up/action items:	**Conclusion**:	**Consequences**: Describe consequences resulting directly from the incident – provide facts not conjecture.	**Exercise events synopsis**: overview of what happened.
5	**Adjourned**:		**Analysis**: Using stated facts obtained from all parties, evaluate the timeliness and level of the response/actions. The analysis should provide the framework for the resulting conclusions.	**Objectives-based evaluations**
6			**Conclusions**: Formulate specific conclusions as a result of the analysis of facts.	**Conclusions**
7			**Recommendations**: Each recommendation must be assigned for follow-up within a specified timeframe.	

Appendix E

Table 6.

Impact-Likelihood Risk Matrix



(Friesen et al., 2017, p. 229).