

REDUCING THE IMPACT OF RAILWAY FATALITIES ON CREW MEMBERS

Cécile Bardon, M.Sc.

Brian L Mishara, Ph.D.

Centre for Research and Intervention on Suicide and Euthanasia (CRISE)

Université du Québec à Montréal (UQAM)

Montréal, Quebec, Canada



SUMMARY

The present study is part of a larger research programme that aims at understanding the incidence and impact of railway fatalities in Canada as well as identifying preventive strategies to reduce their number and impact. Today we present the results of a qualitative analysis of 40 retrospective interviews with conductors and engineers and an extensive literature review. We present a model of the impact of railway fatalities and of actions to prevent negative consequences and reduce the potential for a negative impact after the event. It is essential to evaluate prevention programmes in order to establish best practices and to suggest improvements to national and international guidelines for the industry.

INTRODUCTION

This study addresses two complementary topics, the nature of the impact of railway fatalities on rail employees and interventions to prevent and reduce the negative impact. Our approach involves taking a prevention perspective to reduce potentially traumatic reactions after a critical incident on tracks, and it is one component of an on-going larger research programme on the prevention of railway fatalities and their impact in Canada.

Train crews, in the course of their work, are likely to be involved in major incidents in which there are injuries and loss of life. There is an increasing body of literature documenting the reactions they may experience after critical events involving injuries and fatalities. A first step in the development of better interventions to help railway workers, who can be considered to be collateral victims, is to better understand the factors that contribute to trauma reactions as well as factors that can decrease the risk of negative reactions.

In order to better understand how to prevent railway suicides in Canada, Transport Canada (TC) awarded a contract to our research centre in 2008 to conduct a series of complementary studies on railway fatalities and their impact on railway personnel, with the title of "Research and counter-measures to reduce suicide on railway rights of way". The first phase of this project involved the creation of a database of all railway fatalities in Canada over the past ten years and a detailed investigation of the circumstances of the incidents, as well as analyses of the characteristics of the decedents and the location of all incidents. All fatalities, both suicides and accidental deaths, were also displayed on an interactive google map to facilitate identification of patterns.

The second phase consisted of an interview study and qualitative analysis of the impact of railway fatalities on rail workers, which we will present today. In the third phases, we conducted complete worldwide literature reviews of strategies to prevent rail suicides as well as measures to reduce the impact of fatalities on train crew members. The review of measures to reduce the impact will also be integrated into today's presentation. Based upon the first three phases, we developed concrete proposals to test potentially effective strategies to reduce railway suicides and to reduce the impact on crew members. We have completed the first four phases and we are in the process of sharing the information we gathered as part of a comprehensive knowledge application strategy. This talk is the first public presentations of our findings. The focus today is only on one part of this six year project, how to decrease the impact of fatalities on railway workers. This on-going project has a steering committee with industry partners who include CNR, CPR, VIA Rail, Go-Transit, RAC, TCRC and international partners with the FRA and Volpe Centre. Information on our railway research can be found at: www.crise.ca/rail

Period	Phase	Objectives	Results
2009-2010	1	Detailed analysis of all railway suicides over 10 years in Canada	Comprehensive database of railway fatalities (1999-2008) Analysis of railway suicides and comparison with accidents (report Phase 1) Production of a Google map layer (2011)
2009-2010	2	Analysis of the impact of suicides on train crew members	Interview study and qualitative analysis of the impact of railway fatalities Recommendations for support to employees (report Phase 2)
2010-2011	3a	Literature review on railway suicide preventive measures	Review of preventive strategies around the world and their effectiveness (report Phase 3a)
2010-2011	3b	Literature review of measures to reduce the impact of fatalities on train crew members	Review and evaluation of strategies and treatments implemented throughout the world to reduce the impact of fatalities and critical incidents on crew members (Report Phase 3b)
2011	4	Development of proposals for intervention for the Canadian railway network	Identification of 3 potentially effective strategies to reduce railway suicide and 2 strategies to reduce the impact of fatalities on crew members (report Phase 4)
2012-2014	5	Knowledge application strategy	Develop and implement a comprehensive knowledge application strategy to promote the new information gathered with stakeholders and help the industry and its partners implement suicide prevention strategies. Seek funding for pilot programmes.

OBJECTIVES OF THE STUDIES WE ARE PRESENTING TODAY

Today we present our study to determine the impact of railway fatalities on crew members and our analyses of existing and potentially helpful strategies to reduce the impact of fatalities. We conclude with recommendations for improved practices which we are disseminating in Canada and which we feel may be useful in international contexts.

METHODS

Based upon our literature review of key components to be included in a retrospective assessment of the impact of railway fatalities on conductors and engineers, we developed a semi-structured interview with questions to assess each of the factors previously investigated as well as other information we felt could help us understand the impact of train fatalities on railway personnel. Topics included: A description of the suicides and accidental deaths, close calls and non-fatal incidents, the nature of interventions and actions by emergency services at the

scene, interventions and actions by the supervisor and railway company officials after the incidents, short and long term consequences of the incident, help provided and recommendations made by the interviewees for better interventions and suicide prevention on the railway network.

The interviews were retrospective and covered the span of the whole career of interviewees. The sample consisted of 40 interviews (carried out between January and June 2010), describing 132 incidents (mean: 3.4 incidents described per person, ranging from 1 to 9), including 48 (36.3%) accidents, 5 (3.8%) cases of found body¹, 4 (3.0%) close calls², 20 (15.2%) non fatal incidents and 55 (41.7%) suicides. Those incidents took place between the early nineteen seventies and 2010.

Qualitative content analysis was performed from a thematic perspective (Taylor-Powell, 2003), based on hypothesis derived from determinants identified from previous research and emerging themes from our interviews. Impacts were analysed using models derived from the research literature on traumatic events (short, mid and long term reactions) and determinants were analysed in terms of protective and risk factors in their relationship to impacts.

A second literature review identified existing strategies to reduce the impact of fatalities on conductors. Four different sources of data were explored: (1) Regulations and guidelines published by varied bodies around the world to guide the development of what is considered best practices in terms of incident management; (2) Current railway practices in Canada and as reported elsewhere; (3) Empirical studies that evaluated the effectiveness of specific interventions for train crew after a traumatic event; (4) recommendations made by participants in our research study on the impact of railway fatalities which may be promising to test and evaluate.

The results of our content analysis of the interviews we conducted on of existing practices and recommendations by crew members and this literature review formed the basis for our proposal for a comprehensive prevention and intervention strategy to reduce the impact of railway fatalities on crew members, which we present at the conclusion of this talk.

IMPACT OF RAILWAY FATALITIES ON CREW MEMBERS

Acute Stress Disorder

Acute Stress Disorder (ASD) appears in the DSM-IV³ (1), the manual used by mental health professionals to categorize various mental health problems. It is brought on by life-threatening incidents (victim's life or someone else's), which elicits a combination of fear, horror and helplessness. ASD sufferers can have dissociative responses, such as feeling that everything around them is odd or unfamiliar. Those experiencing ASD have symptoms from three categories: re-living the event (ex: dreams or thoughts), avoiding the event (ex: thoughts, situations, people) as well as showing signs of anxiety (ex: hyper-vigilance, irritability, altered work or social functioning)(1). ASD is an acute disorder, which means that it is a reaction immediately following the incident, but does not necessarily continue after several hours or days. However, because of its intensity it is considered a diagnosable psychiatric disorder.

Most of those interviewed in the present study showed signs of ASD, although they may not have displayed enough symptoms to qualify for an ASD diagnosis. The most common responses identified at the time of impact were *rush of adrenaline*, *horror/shock*, feelings of *helplessness*, feeling *upset*, a sense of *disbelief* as well as *anger*. Feelings of responsibility are also common at this stage. These feelings are common immediately after the incident but disappear between a week and a month following the event.

¹ A case of found body occurs when the crew notice a dead body by or on the tracks, but was not involved in the incident that killed that person.

² A close call occurs when a person or a vehicle come close to being hit by the train. The crew may have put the train in emergency stop or not.

³ DSM-IV : Diagnostic and statistical manual of mental disorders, fourth version

The most common reactions in the moments and hours following the impact (after the initial reaction at impact) were feelings of *guilt, anger/irritability, feeling of detachment, exhaustion, being upset, emotional upheaval, difficulty sleeping, and nightmares*. These symptoms were reported to quickly recede within the following days.

Post-Traumatic Stress Disorder (PTSD)

The circumstances for developing Post-Traumatic Stress Disorder are the same as for ASD. As with ASD, those with PTSD have experienced a life threatening incident for themselves or someone else and have responded with fear, horror and helplessness. A person suffering from this condition will try to avoid thinking about the incident. This can be accompanied by physiological symptoms, such as edginess and anxiety. However, the distinctive characteristic of PTSD is that it persists beyond the time when ASD ends, one month after the incident. Many people who experience PTSD also feel excessive guilt (2).

Of the 40 train crew members interviewed, only seven reported being diagnosed with PTSD.

Long term low key effects of train fatalities

Previous studies have shown that the impact of suicides and accidents on train crews tends to diminish with time (3, 4, 6, 7). This reduction of symptoms occurs for both accidents and suicides. People “learn to live with it.” However, we have found that after the initial shock recedes, there are still mid and long-term effects (after 3 months) for 40% of the incidents. The impact usually manifests itself in the form of flashbacks in situations that recall the incident. They can also be observed in dreams, in hyper vigilant behaviour and generalized anxiety. None of these effects seem to be so severe that PTSD can be diagnosed, but they still cause significant suffering and impairment to crew members.

Delayed trauma reaction

Although it is documented in the trauma literature (2), none of the interviewees reported delayed development of PTSD after fatalities. In our sample, the strongest predictor of long term symptoms was the presence of an intense immediate reaction after the event. However, several interviewees described very strong subsequent reactions to lesser events. After having experienced a fatality, sometimes close calls and non fatal incidents induced a traumatic reaction in people who did not have traumatic reactions to such events before they were involved in a fatality. This could be considered a form of delayed symptoms, where a later stimulus triggers the traumatic symptoms that did not develop at the time of the original event.

Accidents versus suicides

Generally, we found that suicides induced more short-term reactions (particularly anger). We also noted differences in long term effects. Of the 7 persons who were diagnosed with PTSD, 6 were involved in suicides (15% of the 40 crew members, 10.9% of suicides).

Participants were asked to reflect upon the difference between being involved in a suicide versus an accident. Whatever the type of incident, the initial reactions are of shock and pain. However, after these initial, almost visceral reactions, crew members developed different attitudes, depending upon whether the death was a suicide or an accident.

- The intent of the person

Knowing that the people chose to put themselves in front of their train as a suicide seemed to make it easier for some crew members to come to terms with the incident. This knowledge alleviated their sense of responsibility because they felt there was nothing they could have done differently. Instead, they tended to get angry, which is an emotion they found easier to deal with.

- The avoidability of the incident

When the crew member thought that the incident could have been avoided it was more difficult to deal with. Crew members tended to get upset with those who they thought could have prevented the fatality, whether it was a

reckless driver, a local police force who did not inform of the presence of a known trespasser or a manager who pressurises crew members for efficiency. They tended to see accidents as more avoidable than suicides, in part because of the notion of intent, but also in part because of the timing of the event. They tended to think in terms of “what if...” and some crew members obsessively wondered how an accident could have been avoided. They sometimes felt more responsible for the incident in the case of accidents, even if they were operating according to regulations at the time of impact.

- **The ability to make sense of what happened**

Being able to understand why things happened seemed to help lessen the trauma. When drivers were faced with a suicide which they felt that they were able to understand, it made it easier to deal with. Making sense of things helped them come to term with the event.

Risk factors associated with increased negative impact of railway fatalities

Crew members cited the following factors that they felt make dealing with fatalities more difficult:

Factors concerning the nature of the incident and its context

- Environmental characteristics (dangerous materials, yard incident, being alone at night with the body)
- Seeing the eyes of the person – people reported being haunted by the memory of the incident up to several years afterwards.
- Dealing with the body after impact - Crew members said it was one of the most difficult things to have to do during the incident. Feeling forced to do this and to deal with the body had significant long-term consequences.
- Helplessness of the victim (young age, physical or mental impairment)
- Non-fatal incidents add to the stress and trauma. The number and nature of non-fatal incidents and close-calls were not discussed extensively because there were too many. People told about the most relevant incidents throughout their careers. Non-fatal collisions have the same initial reactions as fatalities: shock, disbelief, horror. However, knowing that nobody died brings quicker relief and mid to long-term negative effects are rare. Nevertheless,, in the immediate aftermath general functioning is severely impaired and these incidents contribute to the cumulative impact of fatalities.
- Close calls - Generally, close calls are more stressful when they occur soon after a fatality has occurred, at least for a few weeks after a fatality. They may induce a higher level of stress, a panic attack with or without memory blanks, wet hands, loss of control, and intrusive memories of the fatality. In the longer term, people are angrier than before at those who try to beat the train; they feel edgier and they are more reactive (blow the horn more often and longer, they might put the train in emergency status quicker). This increased edginess may last for up to a year after the fatality. However, a very small sample of crew members said that close calls had lost their ability to shock them. They said that they became hardened, desensitized, because of the sheer number of events they had had to face. Another 6 interviewees stated that close calls had always been difficult, even before they had experienced a fatality, especially when they had involved children. There can be no general rule about close calls. The impact they have varies greatly.

○

- **Factors concerning personal characteristics and experiences**

- Inability to make sense of the event - Generally, when it was more difficult to make sense of what happened, workers felt sadder, helpless and angry at the system, which in some cases led to them dwelling upon the events.

- Cumulative effect. Fatalities rarely occur only once in the life of a conductor or an engineer. The mean number of fatalities experienced by the participants was 4.5, ranging from one to 22.

We found that of the 7 persons with PTSD, only two developed PTSD after their first fatality. The others developed PTSD after a range from their second to seventh incident. In two cases, the repercussions of the last incident lead the person to stop working completely.

Cumulative effects are not always easy to identify. They may appear as long term changes in mood shifts, in changing perceptions about life or work, flash backs in very varied circumstances, general edginess, as well as fatigue and longer recovery periods from minor incidents. Another sign of a cumulative effect is loss of commitment to work and decreased hope that they will live to retire. Cumulative effects have been documented before (3, 4, 6), but they were limited to acute stress and PTSD measurements. In this study, we find that the cumulative effect can be insidious for crew members, affecting them in more subtle ways in the long term (for example it can be expressed in changing moods, fatigue, etc.) that do not necessarily appear when only Acute Stress Disorder (ADS) and post Traumatic Stress Disorder (PTSD) are measured.

- Masculinity

The railroad business is a very masculine one. It carries a lot of the male stereotypes. Adherence to some of the characteristics associated with very strong stereotypical masculinity may hinder the ability of crew members to deal effectively with the critical events. Many men we interviewed said that you don't get emotional; you bury it and get on with the job. This attitude results in great isolation and feelings of internal weakness. Acting tough and burying emotions does not always seem to be the best strategy and some men we interviewed are aware of the possible consequences. They said that they act tough because they do not feel they have other options. However, times are changing. Those who received professional and peer help become the best advocates for others to use these services. They compared their past experiences when they were left alone to deal with the events, to the present situation when they can talk with professionals and get the help they need. They find it a great improvement and understand the benefits of discussing what happened to them.

We can therefore say that the culture of stoicism and toughness is changing in the railroad community and people tend to more easily accept the help that is offered. Still, male stereotypes may lead men to be less proactive in seeking help. If appropriate help is not offered at the right time or does not meet their expectations, they may not seek out the help they need.

- Life events

Personal life events, occurring around the time of the incident will add to the difficulty. Whether it is grief or a divorce, these events and their emotional charge get intertwined with the fatalities and the emotional impact and memory of both tend to be linked together. Remembering one brings up the other, increasing the extent of emotional turmoil. Therefore, personal events should be considered carefully when support is offered after a traumatic event.

- **Work related factors**

- Driving the same route again – Having to drive the same route again generally has a long term negative effect (increased stress, hyper vigilance)

Having to pass by memorials is also a very difficult experience. Memorials of the deceased near tracks can induce very mixed and difficult feelings. They reminded the crew of the accident, prevented them from getting over it, bringing back the pain they felt, and also the pain family members still feel. Some rail workers felt that the memorial served as an accusation, a way to make them feel guilty about the death that occurred, although they were aware that the families who put them up did not necessarily have that intention.

- Factors associated with employer

These seem to be the elements that have the strongest negative impact on the recovery process of crew members after a fatality. The mishandling of incidents appears to have long-term effects. People tend to generalise their perception of bad management to other aspects of their work and remember incidents longer when

they have to deal with poor management. This, in turn, undermines their trust in their employer and makes it more difficult for them to come back to work comfortably.

Unmet expectations for support also make it more challenging. These include the absence of a supervisor on site after the fatality occurred and the absence of expression of concern by the supervisor on site. People also cited being questioned with suspicion (by supervisor or police), being left to wait for a long time before being relieved from duty and taken off the scene, being instructed to move the train or help with the body, having to stay close to the body and having to drive home afterwards by themselves.

Protective factors that may decrease the impact of railway fatalities

There are far fewer protective factors than risk factors for railway fatalities.

- Information on the victim

When crew members learn information that emphasizes the responsibility of the deceased (presence of alcohol, reckless behaviour, clear intent) and details that help explain the despair of suicidal victims and make sense of their suicide (e.g. having a terminal disease, important social problems, mental illness), their feelings of helplessness and responsibility may be diminished. However, in some circumstances this type of information may increase feelings of anger toward the victim, while still reducing sadness and distress associated with their ability to make sense of the event. Of the 55 suicides that were commented upon, in 11 cases the crew members said they were very angry at the deceased and that this anger helped them feel less affected by the event. Nonetheless, this anger stemmed from the feeling that the victim imposed upon them and intruded in their life and well-being, leaving the crew member no choice.

- Previous information received

Some of the interviewees were themselves peer supporters for the Employee Assistance Program. They received training in trauma and associated symptoms, so they understood what they were experiencing when confronted with an incident. They reported that the impact of the incidents was much less traumatic, compared to other rail personnel who were not trained as peer supporters. They said that this was because they knew what to expect.

- Factors associated with employer include:

- Efficient incident management, including a compassionate attitude, offer for support and follow up.
- A clearly stated critical incident response program, rigorously applied.
- Absence of pressure to return to work before ready.

PREVENTION AND INTERVENTION TO REDUCE THE IMPACT OF RAILWAY FATALITIES ON CREW MEMBERS

The analysis of interventions and the development of recommendations were carried out using an ecological and prevention conceptual framework. Our comprehensive literature review was based upon an analysis of Guidelines and regulations, Railway companies' policies (CIRP), formal research studies and needs analysis and surveys of employees, including our analysis of the Canadian interviews. Two levels of intervention were identified in the literature: 1) Protocols published by governing bodies and railway companies, include guidelines for programmes and actions to be taken at the company level. 2) Therapeutic interventions which have been implemented and evaluated and aim at working directly with conductors and engineers to reduce their individual symptoms.

Support activities are described in the Table 1. Our analysis shows that prevention activities implemented within companies have almost never been evaluated. Therefore, although there are strong indications from needs analysis that they should prove effective, they cannot currently be included in best practices if one insists that effectiveness be demonstrated by empirical research data. However, clinical interventions have been subjected to

several empirical evaluations and EMDR and CBT seem to be the most effective in reducing trauma related symptoms.

Table 1 – Brief summary of support activities and their level of empirical validation		
Activity	Implemented	Evaluated
Providing Information and training as a prevention strategy(10-12)	No Requested by crew	No
On site management(10, 13) - Compassionate handling - Taking charge of the scene	Not as part of company protocols (anecdotic) Requested by crew	Indications that it reduces post incidents symptoms
Demobilisation(13-15) – being taken off the train	Widely implemented Compulsory or optional	Indications that it helps recovery Insufficient on its own to prevent PTSD
Time off work (10, 13)	Widely implemented Compulsory or optional Between 24 hours and 72 hours	Indications that it helps recovery No empirical evaluation No assessment of appropriate length of time off
Return to work policy - Planned(14) - Evaluation of fitness to work(16)	Anecdotic Requested by crew	No
Peer support(10, 14, 16)	In several companies	Indications that it helps recovery
Debriefing(13, 15) – individual or group briefing after incident with a clinician	In several companies	Indications that it helps recovery
Group therapy (17)	anecdotic	Efficient in combination with individual therapy
Cognitive behavioural therapy (CBT) (17)	In several contexts	Efficient at reducing symptoms
Eye Movement Desensitization and Reprocessing (EMDR)(13, 18, 19)	In several companies	Efficient at reducing symptoms

Our research study has identified several strategies to help prevent long term trauma reactions in train crew members after a critical incident:

- Pre-incident training for crew and supervisors to identify and understand critical incidents, trauma reactions, cumulative effects, potential symptoms, risk and protective factors and the content and process of the critical incident response programme.
- Comprehensive Critical Incident Response Programme implemented and well known at all levels of the organisation (director, safety, local supervisors, peers, EFAP, employees) and including clear roles and expectations, compulsory 3 days off work, an external independent evaluation of fitness to work, proactive offers of help and support from the employer and EFAP, incident management on site to help re-establish a sense of control for the crew (creating the confidence that someone is clearly in charge to their advantage in a situation of absolute helplessness and vulnerability), comprehensive support from supervisors to help them implement the CIRP and the involvement of the employee and an outside evaluator in the return to work process

It is known from previous studies and confirmed in our investigations that the impact of train fatalities on crew members can unfold over several months and years (15, 20, 21). However, the most important risk and protective

factors involve what occurs prior to the incident and within the first few weeks after the incident (Bardon & Mishara, 2011). Therefore, interventions to reinforce protective factors and reduce the impact of risk factors have to be implemented before incidents take place, through comprehensive and proactive protocols.

Our proposal for an integrative strategy to prevent and reduce the negative impact of train fatalities on crew members is based upon the recommendations made by the Rail Safety Standard Board (14). It has to take into account the constraints and limits of the railway industry in terms of finances, existing resources, workers compensation board regulations and the Canadian Railway Medical Rules Handbook (22).

Table 2 summarizes the different phases of a comprehensive strategy to prevent and reduce the negative impact of train fatalities on crew members. It rests on a few key principles: Information and training are important upstream and regular independent evaluation of the crew member should be the basis for any treatment and work related decision after the incident occurs.

CONCLUSION

Different support strategies are being implemented throughout the railway industry to help train crews after critical incidents, but there is a lack of scientific data to confirm the effectiveness of these practices. There is a need to develop empirically validated best practices upon which stakeholders can rely to build their strategies.

The nature and intensity of the impact of railway fatalities on crew members is mediated by personal, professional and environmental factors. A better understanding of these factors can form the basis for prevention programmes. In this perspective, providing adequate support should be part of organisational policies and practices, carefully planned and implemented at all levels of the organisation. Information on critical incidents and support strategies should also be part of the training of crew members. This study has identified training of crew members and supervisors and incident management as key components of a comprehensive support strategy to reduce the impact of critical incidents on the tracks. We will have more information available soon on our web site (www.crise.ca) and we also have several ideas about how to prevent railway suicides which we hope we will have an opportunity to share with you in the near future.

BIBLIOGRAPHY

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR. 4th ed., text revision ed. Washington: American Psychiatric Association; 2000.
2. Brillon P. Comment aider les victimes souffrant de stress post-traumatique: Guide à l'intention des thérapeutes. Montréal: Éditions Quebecor; 2010.
3. Malt UF, Karlehagen S, Hoff H, Herrstromer U, Hildingson K, Tibell E, et al. The effect of major railway accidents on the psychological health of train drivers--I. Acute psychological responses to accident. *Journal of Psychosomatic Research*. 1993;37(8):793-805. Epub 1993/12/01.
4. Karlehagen S, Malt UF, Hoff H, Tibell E, Herrstromer U, Hildingson K, et al. The effect of major railway accidents on the psychological health of train drivers--II. A longitudinal study of the one-year outcome after the accident. *Journal of Psychosomatic Research*. 1993;37(8):807-17. Epub 1993/12/01.
5. Farmer RD, Tranah T, O'Donnell I, Catalan J. Railway suicide: The psychological effects on drivers. *Psychological Medicine*. 1992;22(2):407-14.
6. Theorell T, Leymann H, Jodko M, Konarski K. Person under train" incidents: Medical consequences for subway drivers. *Psychosomatic Medicine*. 1992;54(4):480-8.
7. Austin A, Drummond PD. Work problems associated with suburban train driving. *Applied Ergonomics*. 1986;17(2):111-6.
8. Galdas PM, Cheater F, Marshall P. Men and health help-seeking behaviour: Literature review. *Journal of Advanced Nursing*. 2005;49(6):616-23.
9. Chagnon F, Vrakas G, Bardon C, Daigle M, Houle J. Consensus entre la recherche et la pratique pour améliorer les programmes en prévention du suicide chez les hommes. Montréal: CRISE, 2008.
10. Margiotta SM. Effects of 'person-under-train' incidents on locomotive engineers [Ph.D.]. Massachusetts: Smith College School for Social Work; 2000.

11. Neary-Owens V. An in-depth analysis of the impact of traumatic stress exposure on railroad employees [Unpublished thesis]. Bryn Mawr: Bryn Mawr College; 2001.
12. Teneul S. Stress et trauma au travail. *Revue Francophone du Stress et du Trauma*. 2009;9(4):231-6.
13. Abbott R, Young S, Grant G, Goward P, Seager P, Pugh J, et al. Railway suicide: An investigation of individual and organisational consequences: A report of the SOVRN (Suicides and Open Verdicts on the Railway Network) Project. Doncaster: Doncaster and South Humber Healthcare NHS Trust, 2003.
14. Burrows MH. Minimising the impact of railway suicides on railway staff: A critical appraisal of trauma mitigation schemes within rail and non-rail organisations and recommendations for practice. London: Rail Safety and Standards Board, 2005.
15. Cothureau C, De Beaurepaire C, Payan C. À propos des conducteurs de trains confrontés à un accident de personne: La politique d'accompagnement de la S.N.C.F., outil de prise en charge et de prévention. *Archives des maladies professionnelles*. 2004;65(5):396-405.
16. Briem V, de Lima S, Siotis C. Train drivers and fatal accidents on the rails: Psychological aspects and safety. In: Wilson J, Norris B, Clarke T, Mills A, editors. *People and Rail Systems: Human Factors at the Heart of the Railway*. London: Ashgate Publishing; 2007. p. 103-13.
17. Rombom H, M. Death on New York's Subways and Buses : a Survey of the Psychological Response of New York City Transit Workers. Behavioral Medecine Associates, 2006.
18. Pagani M, Hogberg G, Salmaso D, Nardo D, Sundin O, Jonsson C, et al. Effects of EMDR psychotherapy on 99mTc-HMPAO distribution in occupation-related post-traumatic stress disorder. *Nuclear Medicine Communication*. 2007;28(10):757-65. Epub 2007/08/31.
19. Högberg G, Pagani M, Sundin O, Soares J, Aberg-Wistedt A, Tarnell B, et al. Treatment of post-traumatic stress disorder with eye movement desensitization and reprocessing: outcome is stable in 35-month follow-up. *Psychiatry Research*. 2008;159(1-2):101-8. Epub 2008/03/14.
20. Limosin F, Loze JY, Cothureau C, De Beaurepaire C, Payan C, Conso F, et al. A prospective study of the psychological effects of "person under train" incidents on drivers. *Journal of Psychiatric Research*. 2006;40(8):755-61. Epub 2005/06/21.
21. Tranah T, O'Donnell I, Farmer R, Catalan J. Variations in stress responses following involvement in a railway suicide or attempted suicide. *Counselling Psychology Quarterly*. 1995;8(2):157-62.
22. Railway Association of Canada. *Canadian Railway Medical Rules Handbook (For Positions Critical to Safe Railway Operations)*. Ottawa: Railway Association of Canada, 2010.

APPENDIX 1:

APPROVAL TO PUBLISH PAPER



I/We Cécile Bardon and Brian Mishara

of Center for Research and Intervention on Suicide and Euthanasia

hereby give permission to the International Railway Safety Conference 2012 (IRSC 2012) to publish the paper titled:

REDUCING THE IMPACT OF RAILWAY FATALITIES ON CREW MEMBERS

To be presented at the IRSC 2012 conference to be held at the St Pancras Renaissance Hotel, London, England on 8 - 12 October 2012.

In the following media (tick as appropriate):

Copied to memory stick for distribution to conference delegates

Please return this form when submitting the final version of the paper.