

# A REVIEW OF SURREY FIRE SERVICE'S MOTOR VEHICLE ACCIDENT RESPONSE ASSESSMENT MODEL



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## Executive Summary

In 2010, the BC Ambulance Service and the Surrey Fire Service collaborated on a project to look at efficiencies for emergency services response to Motor Vehicle crashes. This report describes the results of an analysis of data provided by Surrey Fire Service on a pilot project examining the utility of an assessment tool to identify the presence of at least one risk factor that would require a person to be transported to a hospital as a result of a motor vehicle crash, and the ability of Surrey Fire Service to correctly assess whether an ambulance is required to attend the scene of a motor vehicle crash.

The data from both agencies were matched and linked for use in the study, which resulted in a series of revisions and a refinement of the assessment tool. There have been several analyses of the dataset over the years conducted by different analysts. This report reviewed the previous analyses and conducted an independent analysis of all the data. All of the incidents in the database occurred between December 15, 2009 and January 30, 2010. The data indicated that the strategy of using an approved and tested screening tool created in partnership between BC Ambulance Service and Surrey Fire Service to allow Surrey Fire Service to assess and determine the need for an ambulance to attend the scene of a motor vehicle crash has merit and should be explored further.

Overall, there are a number of efficiencies that can be gained and resources saved by not requiring BC Ambulance Service to attend all motor vehicle crashes. While there remains a risk of false negatives or instances where an ambulance would not be requested at the scene when needed, in the pilot project, this occurred in less than 1% of all incidents (.007 per cent). Given that any human enterprise cannot guarantee zero risk, it is extremely difficult to apply the concept of acceptable risk because there are so many variables, values, conditions, and stakeholder interests that combine to define what the public and others will accept as an appropriate level of risk.

It is the conclusion of this author that the strategy of having Surrey Fire Service use an assessment tool to determine the need for an ambulance to attend the scene of a motor vehicle crash has merit. Adopting this program will enhance the usefulness of fire officers at the scene of a crash and increase the efficiency and effectiveness of BC Ambulance Service by ensuring that they only attend the scene when there is the need to transport a patient to hospital. It is also expected that the risk of false positives and false negatives will decrease with the refinement of the instrument, additional training, and better coordination between the two services.

## Background Information

The pilot project between the BC Ambulance Service and the Surrey Fire Service was never concluded, nor was a final report that both parties agreed upon completed. It was the position of Surrey Fire Service that the use of an assessment tool to determine the need for an ambulance to attend the scene of a motor vehicle crash had merit. They contended that the usefulness of fire officers at the scene of a crash utilizing the assessment tool would increase the efficiency and effectiveness of BC Ambulance Service by ensuring that they only attended the scene when there was the need to transport a patient to hospital. They further believed that the risk of false positives and false negatives would decrease with a commitment to continually refine the assessment instrument, provide additional training, ensure better coordination between the two services, and evaluate the project.

The genesis of the partnership between Surrey Fire Services and BC Ambulance Service had two main sources. The first source was an assessment of the size and scope of motor vehicle crashes in Surrey and how various service providers attended and responded to these crashes. Depending on a number of factors, crashes in Surrey can be attended by any combination of Surrey Fire Service, BC Ambulance Service, and the RCMP. The primary purpose of BC Ambulance Service attending a motor vehicle accident is to transport any patients with medical emergencies to hospital, while Surrey Fire Service is responsible for stabilizing the scene, dealing with any hazardous materials, environmental protection, ensuring the safety of emergency responders, and acting as first responders for any medical injuries. A review of data from Surrey and the Lower Mainland region of British Columbia indicated that, in many of the accidents that were attended by BC Ambulance Service, after an on-scene assessment, no one was transported to the hospital. In other words, an ambulance was dispatched, but was not needed at the scene of the accident. This is extremely important because dispatching an ambulance unnecessarily is not only a significant waste of a valuable and limited resource, but also makes it likely that it takes longer for BC Ambulance Service to respond to calls for service in situations where the timely presence of an ambulance is required and critical.

To demonstrate this point, in 2009 in the Lower Mainland region of British Columbia, BC Ambulance Service responded to approximately 26,000 motor vehicle incidents, but nearly 50% of these incidents did not result in someone being transported to the hospital (Andrusiek, 2010). In effect, considering all of the calls for service for an ambulance, nearly 10% were related to a motor vehicle crash, but, as indicated above, in nearly half of these incidents, it was eventually determined that the presence of an ambulance at the scene was not required. This limited, costly, and valuable resource could be used much more efficiently if there was a way to better determine whether an ambulance was truly needed at the scene of a motor vehicle crash. It should be noted that there are approximately 4,000 calls for service related to motor vehicle crashes every year in Surrey. This led first responder leaders to consider whether Surrey Fire Service, who are frequently the first service providers at the scene of a motor vehicle crash, could be trained on a validated risk assessment tool and could, therefore, perform an initial on-scene assessment to determine whether an ambulance was required to attend.

The second main source of the pilot project was a previous partnership between Surrey Fire Service and Surrey RCMP. In 2006, this project focused on providing Surrey Fire Service with the responsibility of diverting traffic at a motor vehicle crash and clearing the scene. Moreover, this project developed a series of protocols that Surrey Fire Service could use to triage and determine whether the RCMP was required to attend a motor vehicle crash. The pilot of this approach resulted in the RCMP only attending 38% of motor vehicle crashes in Surrey in 2009. This substantial reduction in the need for police resources at the scene of a motor vehicle crash was estimated to free nearly 1,000 hours per year of police resources that could be redeployed to attend other types of calls for service or perform other needed duties. The success of this approach contributed to the development of the current pilot project.

## **Review of Surrey Fire Service and BC Ambulance Service Motor Vehicle Response Project**

In part, as a result of the success of the project between Surrey Fire Service and the Surrey RCMP and the desire to ensure that BC Ambulance Service operated as effectively and efficiently as possible, a partnership was formed between these two services to determine whether Surrey Fire Service could apply an assessment tool at the scene of a motor vehicle crash to assess whether the presence of an ambulance was required. The assessment tool was tested by having it applied by Surrey Fire Service at the scene of a motor vehicle crash and comparing that outcome with BC Ambulance Service's outcome.

In effect, the two outcomes that would be measured to determine the success of the pilot project were the degree to which there was agreement between Surrey Fire Service and BC Ambulance Service on whether one or more of the risk criteria presented below was present at the scene of a motor vehicle crash, thus requiring the presence of an ambulance, and the degree to which there was agreement from these two services on the need to transport a patient to hospital. It should be noted that during the pilot project phase, BC Ambulance Service attended the scene of a motor vehicle crash as usual, but data was matched between the two services so that the information recorded by Surrey Fire Service on their assessment could be matched to the outcomes recorded by BC Ambulance Service.

The assessment tool focused on identifying the presence of any of 12 trauma indicators at the scene, which would require an ambulance. These indicators were:

- Air Bag Deployed
- Windshield Star
- Dashboard Deformity
- Steering Wheel Deformity
- Side Window Deformity
- Passenger Compartment Incursion
- If one of the vehicles was an All Terrain Vehicle
- Auto vs. Bicycle
- Auto vs. Pedestrian
- Ejection from Vehicle

- Rollover
- Vehicle off Bridge or Height

In addition to the presence of one or more of these indicators triggering the need for an ambulance to attend the scene of a motor vehicle crash, if the patient was under the age of 19 years old, if the patient was pregnant, if the patient requested an ambulance, if the patient appeared confused, if, due to language barriers, a proper assessment could not be completed by Surrey Fire Service, or if the first responder felt that an ambulance was necessary, the assessment tool required the fire officer to indicate the need for an ambulance. In addition to whether any of the aforementioned indicators was present, the service provider that was first on scene, if BC Ambulance Service called off Surrey Fire Service, and if an RCMP member requested an ambulance was also recorded in the database.

Surrey Fire Service data was then linked to BC Ambulance Service data to determine the degree to which there was concordance between the two service’s assessments, specifically on the issue of whether the tool accurately assessed the patient and whether the determination that an ambulance was or was not required was consistent between the two services.

There have been a number of internal analyses conducted on the data associated to this project. In one of the first reviews of the data, Dug Andrusiek (2006) examined 751 linked records from December 1, 2008 to July 31, 2009. This review concluded that between 4% and 10% of motor vehicle crashes resulted in a patient being transported to hospital by BC Ambulance Service, even though the on-scene assessment by Surrey Fire Service was that none of the criteria that would trigger the need for an ambulance was present. Andrusiek further concluded that 21% of these patients required “a substantial intervention” once at the hospital. It was recommended that the pilot be extended in order to provide additional cases and that the type of information collected be expanded to include things like who was first on scene and whether the fire service left the scene before BC Ambulance arrived, and, therefore, could not score whether a transport occurred.

In his analysis of the additional data, which was collected from incidents occurring in Surrey from December 15, 2009 to January 30, 2010, Andrusiek (2010) concluded that there were 277 fully linked and matched records for analysis. BC AMBULANCE SERVICE arrived first for 75 records, leaving 202 records where the assessment tool was used by Surrey Fire Service first responders.

**Table 1: Summary of Assessment Tool Criteria and a Patient Being Transported to Hospital**

	Transported to Hospital	Not Transported to Hospital	TOTAL
Assessment Tool Criteria Present	98	45	143
Assessment Tool Criteria Not Present	3	56	59
<b>TOTAL</b>	<b>101</b>	<b>101</b>	<b>202</b>

As demonstrated in Table 1, the proportion of times that Surrey Fire Service agreed with BC Ambulance Service that transport was required was 97%; however, in 3% of the incidents, Surrey Fire Service recommended that no transport was required, but BC Ambulance Service did transport a patient to the hospital. Moreover, for those crashes in which no one was transported to a hospital, 55% had agreement between Surrey Fire Service and BC Ambulance Service; however, of the

remaining 45 records, Surrey Fire Service found criteria for BC Ambulance Service to attend, but ultimately, BC Ambulance Service determined that no transport was required. As a result, Andrusiek concluded that there was a heightened risk in allowing Surrey Fire Service to make the decision that transport to a hospital was not required in cases of motor vehicle accidents (Andrusiek, 2010).

Interestingly, in their analysis of the data collected over the same period of time, Fry and Thomas from Surrey Fire Service (2013) identified 326 incidents in which there was data available from both Surrey Fire Service and BC Ambulance Service. In these cases, BC Ambulance Service was first on scene 22% of the time, so Surrey Fire Service was first on scene and used their assessment tool in 77% of the incidents, resulting in 251 cases. The remaining 1% of cases had Surrey Fire Service arrive first on scene and immediately clear the scene without implementing the assessment tool. The main reason for this was that, once on scene it was determined that the incident was not a motor vehicle crash.

Of the 251 incidents in which the assessment tool was used, at least one of the aforementioned criteria was determined to be present in 59% of the incidents (n = 149). Of these, transport to hospital by ambulance occurred in 64% of cases, but in 16% of cases, the outcome was not known because Surrey Fire Service left the scene before BC Ambulance Service arrived. Of the 102 incidents in which none of the assessment tool's criteria were met, it was known that no one was transported to hospital 69% of the time, but, because Surrey Fire Service left the scene, it was not known what the outcome was for the other 32 incidents. This led the authors to conclude that the assessment tool worked very well to determine when transport to a hospital by ambulance was required.

Another review of this data over the same time period indicated that BC Ambulance Service identified 382 motor vehicle crashes in Surrey in which an ambulance responded. After considering those incidents that Surrey Fire Service attended and eliminating those incidents in which data was not available from both services or it was determined that the incident was not a motor vehicle crash, there were 202 incidents for analysis. The analysis concluded that in 97% of the incidents in which transportation was required, the assessment by the Surrey Fire Service was accurate. In effect, 3% of the incidents, Surrey Fire Service recommended no transport by ambulance, but BC Ambulance Service did transport a patient. The conclusion reached from this analysis was that the tool served to substantially reduce the number of incidents that an ambulance would need to attend, thus significantly increasing the availability of this resource for other types of emergencies. Examining the amount of time that an ambulance was required on scene, when it was deemed that an ambulance was necessary, was also decreased when Surrey Fire Service was able to be the first on scene and conducted their assessment. However, in this report (BC Ambulance Service/Surrey Fire Service MVA Assessment Update, October, 2011), it was concluded that the amount of time saved did not warrant the increased potential risk of not calling for an ambulance in those cases where Surrey Fire Service determined that transport was not necessary, but BC Ambulance transported a patient to hospital.

Finally, in 2010, in a report entitled *Report on MVA Project*, the authors identified 295 motor vehicle incidents in Surrey over the same time period from BC Ambulance Service data in which Surrey Fire Service attended the scene. In the analysis of this data, 41% of the incidents resulted in a patient

being transported to a hospital and all of these incidents had at least one risk criteria identified by Surrey Fire Service suggesting a 100% agreement between the two services. Moreover, 42% of the incidents resulted in no one being transported to a hospital, and, in these cases, 27% had a least one risk criteria identified by Surrey Fire Service suggesting that Surrey Fire Service felt a patient should have been transported. For the remaining 17% of incidents, it was unknown whether a patient was transported to a hospital, but 66% of these incidents had at least one risk criteria identified by Surrey Fire Service suggesting that the patient should have been transported. Of note, 42% of these cases had BC Ambulance arrive on the scene before Surrey Fire Service. Of the remaining 58% of incidents, virtually all of them were identified as having at least one of the risk criteria. In effect, the authors concluded that in considering all of these incidents and their outcomes, the assessment tool would have an error probability of less than 1% (Emergency Health Services Commission and Surrey Fire Service, 2010).

## Data Analysis

Surrey Fire Service provided this author with a database of motor vehicle crashes that contained the incident data from both Surrey Fire Service and BC Ambulance Service. Like the data presented above, the dataset included Surrey motor vehicle incidents that occurred between December 15, 2009 and January 30, 2010. The total number of cases in the database was 277.

The first analysis focused on whether someone was transported to hospital as a result of the motor vehicle crash. The data contained three variables on this issue. The first variable was the fire officer’s opinion on the need to transport someone to the hospital. The second variable was Surrey Fire Service coding that a patient was transported to hospital, and the third variable was BC Ambulance Service’s record of whether a patient was transported to hospital. As demonstrated in Table 2, in approximately one-third of incidents (34 per cent), the fire officer at the scene felt that there was a need to transport a patient to the hospital. Surrey Fire Service coded that nearly half (45 per cent) of the incidents resulted in a patient being transported to hospital, and a similar proportion of incidents were coded as having been transported by BC Ambulance Service (48 per cent).

**Table 2: Transported to Hospital**

	Transported to Hospital	Not Transported to Hospital	Unknown
Fire Officer’s Opinion (n = 277)	34%	31%	35%
Surrey Fire Service (n = 254)	45%	40%	15%
BC Ambulance Service (n = 277)	48%	52%	-

Another way to consider the data presented in Table 2 is to examine the degree to which there was agreement on individual incidents on the need to transport someone to hospital. For the 93 incidents in which the fire officer felt there was a need to transport a patient to hospital, BC Ambulance Service did transport a patient to hospital 94% of the time. In fact, there were only six instances where the fire officer felt an individual should be transported to hospital and BC Ambulance Service did not transport. Similarly, of the 114 instances where Surrey Fire Service

recorded that someone was transported to hospital, BC Ambulance Service indicated that 95% of these incidents did result in a patient being transported. In effect, there were 108 cases in which both the Surrey Fire Data and the BC Ambulance data agreed that a patient was transported to hospital from the 127 incidents that BC Ambulance Service recorded transporting at least one patient (85 per cent).

As mentioned above, the procedure for the pilot project was that if any of the risk criteria from the assessment were present, the fire officer would recommend that the person be transported to the hospital. To begin, it should be noted that of the 93 instances where the fire officer felt transport to hospital was necessary, every one of these incidents presented with at least one of the risk criteria found in Table 2 below. However, examining the data another way, of the 178 incidents with at least one risk criteria, 52% had the fire officer at the scene conclude that there was a need to transport to hospital and 17% of incidents with at least one risk criteria had the fire officer of the opinion that transport to hospital was not required. This suggests that a further refinement of the instrument and the way that the tool is interpreted and applied might be required.

In terms of the frequency of each risk criteria, as presented in Table 3, the most frequent risk criteria was that the person presented with a chief complaint of a critical nature (66 per cent) followed by the airbag of the vehicle being deployed (40 per cent) and the motor vehicle crash being between an auto and a pedestrian (19 per cent). None of the incidents involved a vehicle off a bridge or at height, a person being unresponsive, or the side window of the vehicle being deformed. It should be noted at since more than one risk criteria could be present in a single incident, the totals presented in Table 3 exceed 100%. In fact, the 178 incidents with at least one of the risk criteria provided for 439 distinct risk criteria being identified, with those incidents with at least one risk criteria present averaging 2½ risk criterion and a range of 1 to 11 risk criterion.

**Table 3: Frequency of Risk Criteria Identified by Surrey Fire Service at Scene of a Motor Vehicle Crash**

<b>Person Presenting with Any Chief Complaint</b>	<b>66%</b>
<b>Air Bag Deployed</b>	<b>40%</b>
<b>Auto vs. Pedestrian</b>	<b>19%</b>
<b>Fire Officer Felt that BC AMBULANCE SERVICE Should Attend</b>	<b>18%</b>
<b>Existence of any Obvious Injury</b>	<b>15%</b>
<b>Altered LOC – combative, confused, hallucinations</b>	<b>15%</b>
<b>Windshield Deformity</b>	<b>14%</b>
<b>Person Requested an Ambulance</b>	<b>11%</b>
<b>Passenger Compartment Incursion</b>	<b>11%</b>
<b>Signs of Hemorrhage</b>	<b>8%</b>
<b>Patient Under the Age of 19 Years Old</b>	<b>7%</b>
<b>Steering Wheel Deformity</b>	<b>6%</b>
<b>Dashboard Deformity</b>	<b>6%</b>
<b>Rollover</b>	<b>5%</b>
<b>Auto vs. Bike</b>	<b>3%</b>
<b>Ejection from Vehicle</b>	<b>2%</b>
<b>Auto vs. All Terrain Vehicle</b>	<b>2%</b>
<b>Vehicle Off Bridge or Height</b>	<b>0</b>
<b>Unresponsive, Disoriented to person, place, or time</b>	<b>0</b>
<b>Side Window Deformity</b>	<b>0</b>



One of the main purposes of the pilot project was to determine whether a fire officer's opinion on the need to transport a patient to hospital was consistent with BC Ambulance Service's assessment. Again, based on the data provided by BC Ambulance Service, there were 134 incidents that resulted in a patient being transported to hospital. Eliminating the cases where either there was no data or it was unknown what the fire officer's assessment was, there was agreement in 95% of cases. In fact, there were only five instances where BC Ambulance Service transported a patient when the fire officer did not feel that transport was necessary. Moreover, there were only six cases in which the fire officer felt that a patient should have been transported, but BC Ambulance Service did not transport a patient. These results suggest that there was only a small risk that a needed ambulance would not be present at the scene of a motor vehicle crash.

As to measuring the accuracy of the 'Criteria Found' tool, again, the purpose of the assessment tool was to triage the incident prior to the arrival of an ambulance by a fire officer to determine whether the presence of an ambulance was, in fact, necessary. As such, an analysis was conducted to determine the frequency of at least one of the risk criteria being found and BC Ambulance transporting a patient to hospital. Importantly, of the 178 incidents with at least one risk criteria identified, BC Ambulance Service only transported a patient 69% of the time. While the data did not provide any explanation for why 32% of the time (n = 56) the assessment tool indicated that an ambulance should arrive on scene, but BC Ambulance Service did not transport anyone to hospital, possible explanations might be that the tool is too liberal in the range of outcomes that should trigger the presence of an ambulance, or it may be that a 'present' or 'not present' assessment tool is not nuanced enough for this type of decision making. Interesting, when examining which of the risk criteria were identified in those cases where BC Ambulance Service decided not to transport a patient to hospital, the leading two indicators were airbag deployment (45 per cent) and the presence of a chief complaint (45 per cent). The only either criterion that appeared more than a few times were the fire officer's view that BC Ambulance Service should attend (20 per cent) and because the incident involved a pedestrian (13 per cent). Nonetheless, the main outcome resulting from this specific finding is that an ambulance would attend fewer scenes of motor vehicles crashes than under the current system where they attend all crashes. As such, the process of having a fire officer make an initial assessment and determination of whether an ambulance was required to attend the scene would increase the efficiency of this valuable resource.

Much more important to those who must decide whether to implement this type of approach to motor vehicle crashes was the finding that there were 12 cases out of 99 where the risk assessment tool did not identify a need for an ambulance, but BC Ambulance Service transported a patient to hospital after their assessment. This suggests that there may be a risk associated with this strategy, as there is the possibility that an ambulance would not attend the scene of a motor vehicle crash when one was actually needed. A further analysis of these 12 cases was conducted using the notes from the Deputy Fire Chief of Surrey Fire Services to provide more context.

Of these 12 incidents, one was a duplicate file and three incidents were medical incidents, rather than motor vehicle crashes and, therefore, do not meet the criteria for the pilot and should not be included in the review. An example of one such medical incident was the case of a person being assaulted and injured, rather than being injured in a crash. Four of the 12 incidents involved someone being transported to hospital, but, at the scene, BC Ambulance Service either told Surrey

Fire Service that there were no injuries, BC Ambulance Service left the scene with a patient or already had a patient in an ambulance before Surrey Fire Service arrived at the scene or could use the assessment tool, or Surrey Fire Service could not locate the person at the scene that was eventually transported to hospital. An example of this is someone who was taken into custody by the police as a result of a motor vehicle crash prior to Surrey Fire Service being able to use the assessment tool and that person then being transported to hospital from police custody. Again, these incidents should not be counted as false negatives because the assessment tool was not used. Additionally, in another two incidents, Surrey Fire Service could not find any evidence that a motor vehicle crash had actually occurred. Again, these two incidents should not be counted as false negatives because they were not motor vehicle crashes.

This left two incidents. According to the notes from Surrey Fire Service, one of these incidents involved a single vehicle that crashed through a fence and stopped in a yard. BC Ambulance Service determined that the single occupant of the vehicle suffered no injuries. The RCMP was also at the scene. It was unclear whether the occupant of the vehicle or the RCMP requested transport to hospital, but BC Ambulance Service did eventually transport the patient to hospital. In the second incident, two vehicles were involved in a crash. After checking the patients, BC Ambulance Service determined that there were no injuries. However, at some point, BC Ambulance Service transported a patient to hospital and there was no explanation for why the Surrey Fire Service data indicated that BC Ambulance Service cleared the scene and did not transport any patients to hospital, but the BC Ambulance Service data indicated that a patient was transported to hospital.

Given this, of the 12 incidents that were recorded as false negatives, 10 should not have been included in the study because they were not motor vehicle crashes, they represented a duplicate file, or because Surrey Fire Service did not administer the risk assessment tool for a variety of reasons. This review of the 12 original false negatives suggests that there were only two out of 89 valid incidents resulting in only 2% of incidents in which the risk assessment tool determined that an ambulance was not needed at the scene, but BC Ambulance Service decided to transport a patient to hospital.

## Conclusion

There are several important conclusions derived from the review of the data provided by Surrey Fire Service. Given the number of times that BC Ambulance Service decided not to transport a patient to hospital when the assessment tool found a risk criterion that should have prompted a transport to hospital, it is recommended that the assessment tool be refined based on a more detailed analysis of the types of incidents driving these false positives. In addition, the designers might want to reconsider using 'present' or 'not present' for the scoring of all of the assessment tool criteria. Instead, a more nuanced level of assessment may be more appropriate for this type of decision making, while some indicators, such as being pregnant, being under the age of 19, requesting an ambulance, or being ejected from the vehicle, might continue to use the current scoring model.

Given that only 52% of the incidents with at least one of the risk criteria present had the fire officer at the scene conclude that there was a need to transport to hospital suggests that the assessment

tool should be the determining factor in whether an ambulance is called to the scene, rather than the interpretation of the data by the on-scene fire officer. It is better to err on the side of caution, in this case calling for an ambulance, than to not have an ambulance present when the screening tool indicates a need.

Most importantly, the data indicates that the strategy of using an approved and tested screening tool, created in partnership between BC Ambulance Service and Surrey Fire Service, to allow Surrey Fire Service to assess and determine the need for an ambulance to attend the scene of a motor vehicle crash is sound. The cases of false positives, where Surrey Fire Service determine that an ambulance is necessary, but BC Ambulance Service decided to not transport a patient to hospital, simply results in a waste of that resource for that incident; however, overall, there is much more efficiencies gained and resources saved by not requiring BC Ambulance Service to attend all motor vehicle crashes. The results of this small pilot project demonstrate that there is a large number crashes that BC Ambulance Service would no longer need to attend, thus saving time, money, and resources. Still, there is the risk of false negatives or instances where an ambulance would not be requested at the scene, but truly needed. In this pilot project, this occurred in less than 1% of incidents (.007 per cent).

Given that any human enterprise cannot guarantee zero risk, it is extremely difficult to apply the concept of acceptable risk because there are many variables, values, conditions, and stakeholder interests that combine to define what the public and stakeholders will accept as an appropriate level of risk. In considering risk as the seriousness of an outcome if an ambulance does not attend when needed and the probability of that event occurring, the data would support the continuation of this approach to motor vehicle crashes. The refinement of the Surrey Fire Service tool would provide greater confidence that all of the factors or conditions that would typically trigger the need for an ambulance to attend the scene of a motor vehicle crash would be accurately identified. It also seems very likely that the risk of the tool not identifying an instance where an ambulance was needed would only occur in those instances where someone suffered minor injuries that were not accompanied by any of the other patient or vehicle indicators considered by the assessment instrument. More serious injuries that present after the incident, but not at the scene, might also not register with the assessment tool, but BC Ambulance Service might also miss these types of injuries. In other words, the risk of false negatives would occur very infrequently and likely be concentrated among cases of minor motor vehicle crashes where the patient, at the scene, did not present with an injury. This risk would also be mitigated by the protocol that if someone requests an ambulance, is pregnant, or is a minor, regardless of what the assessment tool says, an ambulance would be summoned.

Given the analysis of the data provided by Surrey Fire Service, it is the conclusion of this author that the strategy of having Surrey Fire Service use an assessment tool to determine the need for an ambulance to attend the scene of a motor vehicle crash has merit. Adopting this program will enhance the usefulness of fire officers at the scene of a crash and increase the efficiency and effectiveness of BC Ambulance Service by ensuring that they only attend the scene when there is the need to transport a patient to hospital. The risk of false positives and false negatives will decrease with the refinement of the instrument, additional training, and better coordination between the two services.

## References

Andrusiek, D. (2010). *BC Ambulance Service/Surrey Fire Service Card 29 Mitigation Project Final Report*. Emergency and Health Service Commission.

Andrusiek D. (2006). *APDS Card 29 Analysis: Assessment of Surrey Fire Service Ability to Identify MVI Events Requiring Transport to Hospital*. Prepared for Jim Christenson.

Andrusiek, D. (2011). *BC Ambulance Service/Surrey Fire Service MVA Assessment Update*.

Emergency Health Services Commission and Surrey Fire Service. (2010). *Report on MVA Project*.

Emergency Health Services Commission and Surrey Fire Service. (Undated). *EHSC – Fire Services MVA Assessment Package: Implementation Package: MVA Assessment and Training Documentation*.

Fry, K. and Thomas, L. (2013). *Detailed Analysis of the Accuracy of a MVA Call Assessment Criteria Tool Used by SFS at MVA Incidents*.

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