WORK-RELATED ROAD CRASHES OF EMERGENCY VEHICULE IN QUÉBEC

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Current Situation in Québec...

- Fatalities caused by road crashes add up to **25-30%** of all accidental work-related deaths compensated
- ***Highest cause*** of accidental deaths at work
- ***Few studies*** looking at the characteristics of these crashes and their risk factors
- Prevention of road crashes at work is a great challenge

Aims of the study

- Better understand the ***circumstances*** and the ***characteristics*** associated with the occurrence of work-related road crashes in Québec

- Support the Québec Worker Compensation Board (CSST) in their efforts for ***prevention***

Data sources

- Linkage of data from the CSST and the *Société de l'assurance automobile du Québec* (SAAQ)
- File of ***8,598 accepted injuries*** following a road crash at work Between 2000 and 2008
  - matching rate of nearly 58%

Definition of work-related road crash (WRC)

- Accident involving a motor vehicle in motion that resulted in an injury to a worker:
  - that occurred in Quebec
  - has been declared to the CSST and accepted
  - for which a collision report was made by a police officer

Data

- Over ***150 variables*** providing information on:
  - The collision (SAAQ)
    - environment, time, weather conditions, speed zone, category of road, traffic control, causes, etc.
  - The vehicle (SAAQ)
    - type (i.e. car, light truck or van, heavy vehicle, bus, etc.), model year
  - The injured worker (SAAQ, CSST)
    - age, sex, seating position, driving experience, injury severity, worker's occupation, industry,
  - Injury site (CSST)
    - e.g. head, upper limbs, lower limbs, etc.

Methodology

1. Multiple correspondence analysis (MCA)
   - To *synthesize* the information in the database into a smaller number of dimensions
2. Cluster analysis
   - To identify *homogeneous groups (segment)* using the results from the MCA (dimensions)
   - Hierarchical cluster analysis followed by K-Means
3. Descriptive analysis
   - To compare characteristics of each emergency occupations to all Work Related Road Collision and segment 5

Results

- Seven groups of work-related road crashes:
- Main characteristic of each group:

1. ***two vehicles*** in ***low speed*** zone (n=2158; 25.1%)
2. ***two vehicles*** in ***high speed*** zone (n=1947; 22.6%)
3. ***one vehicle with and without*** collision (n=1565; 18.2%)
4. Collisions ***without apparent injury*** (n=1376; 16%)
5. ***Emergency vehicle*** (n=849; 9.9%)
6. ***Pedestrians*** (n=520; 6%)
7. Collisions in ***forest environment*** (n=183; 2.1%)

Group 5: emergency vehicule (n=849; 9,9%)

- vehicle:
  - emergency vehicle (55% vs 10%)
  - automobiles (20% vs 33%)
  - heavy vehicle (8% vs 23%)
- speed limit 60km/h or less (85% vs 36%)
- intersection (50% vs 17%)
- 8 pm to 4 am (39% vs 12%)
- weekend (33% vs 10%)

Group 5: emergency vehicule (n=849; 9,9%)

- younger (mean age 33 yrs vs 39 yrs)
- women (32% vs 26%)
- more passengers (39% vs 11%)
- minor injury (84% vs 65%)
  spine/neck (45% vs 39%)

Group 5: emergency vehicule (n=849; 9,9%)

- activity sectors:
  - public administration (54% vs 22%)
  - medical and social services (16% vs 10%)
- workers' occupations:
  - police officer (42% vs 10%)
  - nursing and therapeutic (11% vs 3%)
- main causes :
  - Running stop sign/traffic light (32% vs 10%)
  - distraction/inattention (40% vs 40%)

Distribution of emergency occupations among segments, Québec, 2000 to 2008

WRC segment	All WRC	Police officers	Ambulance technicians	Firefighters	% by segment	N
1 2 Veh Low Speed Zone	25%	19%	12%	28%	18%	212
2 2 Veh High Speed Zone	23%	12%	6%	14%	11%	132
3 1 Vehicule	18%	17%	25%	17%	19%	225
4 Without Apparent Injury	16%	7%	8%	8%	7%	86
5 Emergency Vehicule	10%	41%	49%	28%	42%	504
6 Pedestrian	6%	3%	0%	5%	3%	30
7 Forest Environment	2%	1%	1%	2%	1%	10
% by occupation		74%	21%	5%	100%	
N		882	252	65		1199

Distribution of user type and age among segment 5 and emergency occupations, Québec, 2000 to 2008

Characteristics	All WRC	Segment 5	Police officers	Ambulance techniciens	Firefighters
Number of victims	8 598	849	882	252	65
User type					
Driver	83%	60%	71%	52%	68%
Passenger	11%	39%	25%	47%	28%
Pedestrian	6%	0%	3%	0%	5%
Unspecified	0%	1%	0%	0%	0%
Age					
Mean and SD	(39;12)	(33;9)	(33;8)	(37;10)	(37;10)
0-15	0%	0%	0%	0%	0%
16-24	11%	17%	15%	10%	15%
25-34	28%	46%	50%	34%	35%
35-44	27%	24%	24%	31%	22%
45-54	23%	10%	9%	22%	25%
55-64	10%	2%	1%	4%	3%
65+	1%	0%	0%	0%	0%

39%[55%[63%[65%[50%[

Distribution of time and day of accident among segment 5 and emergency occupations, Québec, 2000 to 2008

Characteristics	All WRC	Segment 5	Police officers	Ambulance techniciens	Firefighters
Number of victims	8 598	849	882	252	65
Time of accident					
4:00 a.m. to 7:59 a.m.	11%	9%	9%	14%	11%
8:00 a.m. to 11:59 a.m.	32%	15%	21%	23%	23%
12:00 p.m. to 3:59 p.m.	29%	18%	20%	17%	25%
4:00 p.m. to 7:59 p.m.	17%	19%	19%	23%	25%
8:00 p.m. to 11:59 p.m.	12%[7%	39%[22%	31%[16%	23%[14%	15%
Midnight to 3:59 a.m.	5%	17%	15%	9%	2%
Day of accident					
Monday	18%	12%	12%	14%	22%
Tuesday	19%	13%	15%	12%	22%
Wednesday	20%	15%	16%	18%	14%
Thursday	18%	13%	14%	14%	12%
Friday	15%	14%	14%	17%	14%
Saturday	10%[6%	33%[19%	28%[16%	25%[15%	17%[8%
Sunday	4%	14%	12%	10%	9%

Distribution of temperature characteristics among segment 5 and emergency occupations, Québec, 2000 to 2008

Characteristics	All WRC	Segment 5	Police officers	Ambulance techniciens	Firefighters
Number of victims	8 598	849	882	252	65
Season					
Winter	30%	27%	29%	42%	26%
Spring	44%[21%	23%	22%	21%	56%[28%
Summer	23%	26%	23%	19%	28%
Fall	26%	24%	27%	19%	18%
Weather					
Clear	53%	53%	53%	36%	63%
Precipitation and wind	48%[25%	47%[18%	47%[25%	64%[31%	37%[15%
Cloudy and overcast	23%	29%	22%	33%	22%
Surface condition					
Dry	55%	59%	56%	43%	62%
Not dry	43%	40%	43%	55%	37%
Unspecified	1%	1%	1%	2%	2%

Distribution of type of accident and diagram type among segment 5 and emergency occupations, Québec, 2000 to 2008

Characteristics	All WRC	Segment 5	Police officers	Ambulance techniciens	Firefighters
Number of victims	8 598	849	882	252	65
Type of accident					
With collision (unsecured object)	74%	81%	76%	73%	72%
Collision with stationary object	5%	10%	16%	21%	20%
Without collision	20%	9%	9%	6%	8%
Accident diagram					
Rear-end collision	21%	8%	19%	18%	12%
Collision at an intersection	17%	50%	22%	32%	28%
Front-end collision	8%	2%	4%	5%	5%
1 vehicle running off the road	18%	6%	14%	23%	18%
to the right or the left					
1 vehicle - other	11%	9%	9%	2%	11%
2 vehicles - other	7%	5%	12%	1%	8%
Unspecified	17%	20%	19%	18%	18%

Distribution of accident cause among segment 5 and emergency occupations, Québec, 2000 to 2008

Characteristics	All WRC	Segment 5	Police officers	Ambulance techniciens	Firefighters
Number of victims	8 598	849	882	252	65
Accident causes					
Distraction/inattention	40%	40%	35%	35%	39%
Speeding/reckless driving	28%	11%	22%	26%	26%
Weather conditions	16%	8%	16%	23%	13%
Running a stop sign/traffic light	10%	28%	12%	26%	24%
Temporary obstacle/animals/	7%	4%	7%	6%	6%
Fatigue	5%	2%	2%	2%	2%
Problem with the vehicle	4%	2%	2%	1%	3%
Impaired driving	2%	5%	5%	4%	3%

Limits

- The database provides information mainly about the circumstances surrounding the immediate collision.
- Some factors about the conditions of workers are not documented:
  - number of consecutive work hours
  - Safety training, etc.

Conclusion

- These results contribute to our understanding of the problem
- Provide useful information for the development of relevant prevention measures addressing the specific characteristics of emergency occupations crashes
- Some important results
  - Collision at an Intersection
  - Running a stop sign/traffic light
  - Collision with a stationary object (ambulance technicians; firefighters)
  - Bad weather conditions (ambulance technicians)
  - Weekend
  - 8:00 pm to 4:00 am
  - 4:00 pm to 8:00 pm (ambulance technicians; firefighters)

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English: Report R-826 (2014 may)

Français: Rapports R-792 et R-791 (septembre 2013)

Web site: WWW.IRSST.qc.ca