

Large-Scale Carbon Monoxide Poisoning at an Ice Rink in Wisconsin: Preliminary Findings from an Epidemiological Investigation

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Background:

- Dec. 13th 2014 a significant carbon monoxide poisoning event occurred at an ice rink
- An ice resurfacing unit was suspected
- Local Emergency Management Systems (EMS) staff responded
- 92 individuals were seen in four area emergency departments
- 2 individuals were given hyperbaric treatment



Medical Records Extraction:

- Records related to the event from four emergency departments (ED) were extracted
- Variables collected:

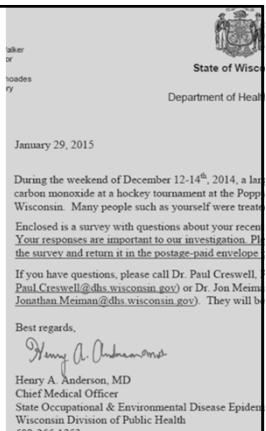
age
sex
symptoms
carboxyhemoglobin levels
method of arrival
status at discharge
treatment
participation (i.e., player, coach, or spectator)



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Survey:

- Verify and expand on ED information
- 91 of the patients were mailed a written survey
- Follow-up postcards and phone calls
- 47 responded
- Response rate 51.6%



Interviews:

- Key informant interviews
- Contextualized circumstances of exposure
- Provided data on:
 - Rink layout
 - Ventilation
 - CO rink levels
 - Resurferacer emissions



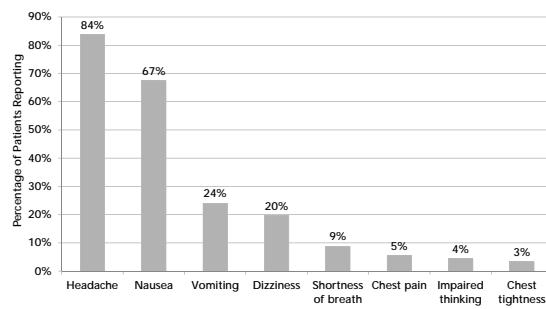
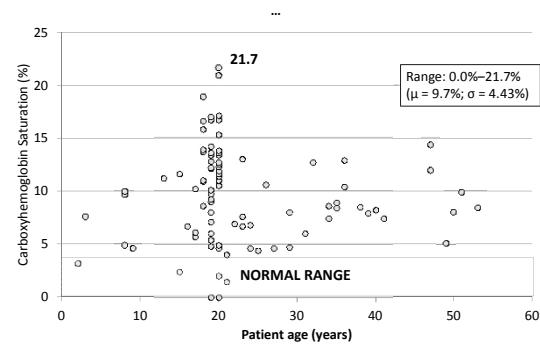
Findings:



DATA FOR PRESENTATION PURPOSES ONLY: DO NOT CITE

Table 1: Patient Characteristics

Sex:	N	(%)
Male	64	(69.6)
Female	28	(30.4)
Age (years):		
0-15	9	(9.8)
16-20	52	(56.5)
21-25	9	(9.8)
+25	22	(23.9)
Method of arrival:		
EMS	14	(15.2)
Self-presented	76	(82.6)
Missing	4	(2.2)
Status:		
Player	28	(30.4)
Coach or employee	4	(4.3)
Spectator	27	(29.4)
Unknown	33	(35.9)
Total patients:	92	(100)

Figure 1: Self-Reported Symptoms**Figure 2: Carboxyhemoglobin Levels**

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Table 2: Survey Findings

Sex:	N	(%)
Male	29	(61.7%)
Female	18	(38.3%)
Age (years):		
0-15	7	(14.9%)
16-20	22	(46.8%)
21-25	6	(12.8%)
+25	12	(25.5%)
Symptom first noticed:		
December, 12 th	12	(25.5%)
December, 13 th	31	(66.0%)
Missing	4	(8.5%)
Persistent symptoms (7+ weeks post-incident):		
None	39	(83%)
1+	8	(17%)
Total respondents:	47	(100)

Implications:

- CO can have an insidious onset – unnoticed until player lost consciousness
- Large number of non-players affected
- Always some potential for long term effects – fortunate in this case that NO₂ was unlikely an additional problem

**Outcomes:**

- The rink staff have taken steps to prevent CO poisoning events
- CO detectors in ice rinks can provide early warnings
- Maintenance of ice resurfacer will help to reduce high emission levels



Outreach:

- **Recommendations for Enclosed Ice Arena Management**
 - Audience: Ice arena managers
 - Focus: Outlines recommendations for ventilation and air monitoring
- **Healthy Air for Active Kids**
 - Audience: Coaches and parents
 - Focus: Describes why arena air can be dangerous and outlines ways to keep kids safe

Poison Center Alerting:

- EPHT has poison center call data
- Delay of roughly two days
- Poison center provides real-time data to the Centers for Disease Control and Prevention
- Real-time data for the Bureau of Environmental and Occupational Health?



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