



Bulletin No. 11

June 14, 1985

Carbon Monoxide Poisoning in Alaska 1981-1984

Eight Preventable Deaths at Sea

During 1983, while an EIS Officer detailed by the Centers For Disease Control to the Epidemiology Office, Alaska Division of Public Health, Tom Kosatsky, M.D., began a review of records of Alaskans whose deaths could be attributed to carbon monoxide poisoning. For purposes of this investigation, deaths attributable to carbon monoxide were defined as: those where a postmortem blood or tissue fluid specimen with >30% carboxyhemoglobin saturation had been obtained, or where no such specimen was taken but where the victim's clinical condition (e.g., livid postmortem color) and the circumstances of his death (i.e., obvious carbon monoxide source identified) made such a diagnosis highly likely.

Among over 100 deaths which were ascertained, 19 were either coded as suicide on the death certificate or appeared to represent suicide based on a review of pathology and police investigative reports. About 50 deaths were related to uncontrolled fire with death pathologically attributable to carbon monoxide asphyxia (carboxyhemoglobin saturation >30% indicating that the victim had expired due to carbon monoxide poisoning before other effects of the fire might have caused death). In the remaining 31 cases carbon monoxide attributable death was associated neither with uncontrolled fire nor as a result of suicide. Of these, six victims were occupants of boats. Characteristics of their deaths will be presented along with two other non-fire, non-suicidal, carbon monoxide deaths on boats which occurred in 1980.

The eight deaths on boats relate to five separate incidents. Three persons died in one incident, two in another. There were two incidents in 1980, and one each in 1981, 1983, and 1984. Seven of the victims were male, one female; one was a child less than 18 years old. The oldest victim was 76. There was no evident seasonal trend. Several areas of southeast and southcentral Alaska were involved.

The likely mechanism of death was determined from police investigative reports. In two cases, victims appeared to have been overcome by the offgas of a propane stove enclosed in a tight cabin, in another a charcoal heater used for cooking was an evident source of carbon monoxide. In the fourth case, a boat was found adrift with the victim in his bunk; the only evident carbon monoxide source was the engine which had run out of fuel by the time the boat was found. In the fifth situation boaters whose bodies were discovered in the water had carboxyhemoglobin saturation levels of 57-58%, indicating carbon monoxide poisoning rather than drowning as the fatal event.

Given that Alaska's recorded deaths have not been analyzed by occupation of the decedent, it is difficult to estimate the magnitude of carbon monoxide intoxication as a cause of death among boaters. Five of the eight victims described here were commercial fisherman. The Alaska Department of Labor, Research Analysis Section estimates that during an average month 8000 Alaskans are fishermen. The rate of carbon monoxide death among this population during 1980-84 would have been 12.5/100,000.

Fishermen and boaters generally should be aware of the dangers of carbon monoxide exposure. Carbon monoxide is produced by the incomplete combustion of fuel and is increased by inadequate air-fuel mixture. Toxic atmospheres can be obtained where combustion gasses are insufficiently ventilated. Although itself tasteless and non-irritating, carbon monoxide is often found with other gasses which produce a sharp odor and irritate the eyes. Carbon monoxide is absorbed through the lungs. Because carbon monoxide binds to hemoglobin with an affinity approximately 210 times greater than oxygen, inspired carbon monoxide can rapidly produce asphyxia and death.

Specific precautions include:

1. adequate ventilation of engines, heaters, and cookstoves,
2. never using a charcoal heater inside a boat or cabin,
3. have a qualified technician install and convert fuel burning equipment,
4. awareness by would-be rescuers of the danger to themselves of enclosed spaces. Rescuers must ensure their own fresh air supply first.
5. awareness of headache, nausea, and drowsiness as signs of sublethal carbon monoxide exposure.

The Epidemiology Office welcomes correspondence concerning the hazards of carbon monoxide at sea, on land, and in the air.

(Acknowledgements: Donald Rogers, M.D.; Michael Propst, M.D., Anchorage; J.N. Joy, M.D., Fairbanks; Joan Brooks, Registrar of Vital Statistics, Juneau; coroners, magistrates, and police departments throughout Alaska; Article submitted by Tom Kosatsky, M.D., Center for Environmental Health, Centers For Disease Control, Atlanta, Georgia)