CARBON MONOXIDE POISONING CLUSTER AMONG RECREATIONAL DIVERS

The Emergency Department's Role in Early Cluster Recognition — A Case Series of Five Divers

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DIVERS AFFECTED
Within a single morning at the same dive site

0.9–28.4%
RANGE OF BLOOD CARBOXYHEMOGLOBIN (COHB)
Levels on admission

5 / 5
TREATED WITH HYPERBARIC OXYGEN THERAPY
All recovered fully

CASE SERIES OVERVIEW

WHAT HAPPENED

- Five divers presented to the Yoseftal Medical Center ED within one morning, all having dived from the same site
- Cases were initially triaged as unrelated diving injuries (e.g., decompression sickness, near-drowning)
- A shared pattern — loss of consciousness, disorientation, new arrhythmias — prompted coordinated reassessment

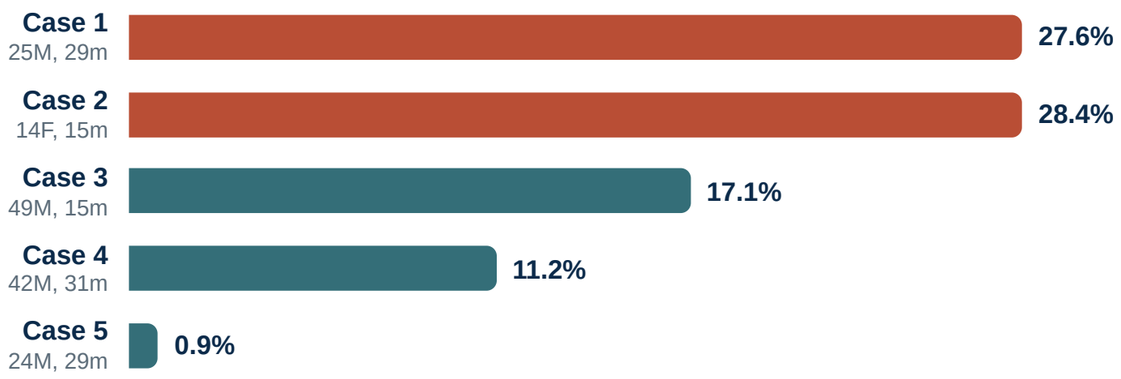
CLINICAL PICTURE

- COHb levels ranged from 0.9% to 28.4%, consistent with contaminated breathing gas from a shared compressor
- New right bundle branch block (Case 1) and rapid atrial fibrillation at HR 159 (Case 3)
- Pulmonary congestion in the youngest patient, a 14-year-old girl (Case 2)
- All five received 100% oxygen and hyperbaric oxygen therapy (U.S. Navy Table 5)

ED RESPONSE & TAKEAWAY

- Emergency clinicians recognized the cluster as a sentinel event and activated a coordinated, multidisciplinary response
- Diving clubs and law enforcement were notified; local diving activity was suspended, preventing further exposures
- All patients recovered fully with no residual complications
- Key message: pattern recognition in the ED can halt a mass-casualty event before it escalates

Key Finding: Admission COHb Levels Across the Five Cases — Blood COHb (%)



Reference: normal blood COHb is under 3% in non-smokers. Levels above 25%, seen in two of the five divers, indicate severe exposure and were treated per the U.S. Navy hyperbaric treatment table 5.

Case Summary

Case	Age / Sex	Dive Depth & Profile	COHb (Admission)	COHb (Follow-up)	Key EKG / Imaging Finding	Outcome
1	25 / M	29 m, gradual ascent with safety stops	27.6%	–	New right bundle branch block	Discharged home, stable
2	14 / F	15 m	28.4%	0.7%	Pulmonary congestion (CXR); no pneumothorax	Admitted for observation; improved
3	49 / M	15 m, rapid ascent	17.1%	0.7%	New atrial fibrillation, HR 159	Discharged home, stable
4	42 / M	31 m, uncoordinated ascent	11.2%	–	Normal EKG and chest imaging	Discharged home, stable
5	24 / M	29 m, with safety stops	0.9%	–	–	Complete recovery, discharged

PREVENTION AND EMERGENCY DEPARTMENT READINESS

MECHANISM OF EXPOSURE

- Carbon monoxide is colorless and odorless, so contamination of breathing gas often goes undetected until symptoms appear
- CO commonly enters compressed air through exhaust-gas intake by faulty compressors or chemical degradation within the fill system

PREVENTION IN DIVING OPERATIONS

- Routine compressor maintenance and air-quality testing of breathing gas
- CO alarms fitted on tanks and fill stations to catch contamination before a dive
- 24/7 hyperbaric oxygen chamber access enabled immediate treatment and prevented long-term sequelae in this cluster

ED READINESS CHECKLIST

- Early suspicion begins in the field — the first EMS team on scene should consider toxic gas exposure whenever multiple divers from the same site present with unexplained neurologic or cardiac symptoms
- Activate a mass-exposure protocol when multiple divers present within a short time frame with altered consciousness, respiratory distress, or neurologic symptoms
- Alert critical care teams early and prepare the hyperbaric chamber in parallel with initial workup
- Maintain monitored beds for continuous cardiac and vital-sign surveillance
- Ensure immediate venous blood gas access for COHb, advanced airway support, and a direct line to hyperbaric medicine for urgent transfer

CLINICAL CONCLUSIONS

Carbon monoxide intoxication in scuba diving is preventable, yet potentially fatal. These cases underscore three imperatives:

1. Prompt recognition and diagnosis, especially when presentations vary but share a common underlying cause
2. Effective management with hyperbaric oxygen therapy
3. Implementation of stringent preventative measures in diving operations