

The Noninvasive Carboxyhemoglobin Monitoring of Firefighters Engaged in Fire Suppression and Overhaul Operations.

Dickinson E.T., Mechem C.C., Thom S.R., Shofer F.S., Band R.A. *Prehosp Emerg Care* 2008; 12(1):4.

Purpose

It has become increasingly evident that firefighters are at risk for both acute and chronic exposure to chemical asphyxiants produced by the combustion of building materials, including carbon monoxide gas. In general, firefighters are protected from the effects of these gases by wearing self-contained breathing apparatus (SCBA). However, during the overhaul operations that follow fire suppression, firefighters often remove their SCBA when the environment appears to be smoke free. The purpose of this study was to determine the real time carboxyhemoglobin (COHgb) levels of firefighters with and without the use of self-contained breathing apparatus (SCBA) as they were engaged in various fire suppression duties in live fire training exercises.

Methods

This was a prospective, single group repeated measures sample design study. Data was collected using a finger probe non-invasive CO-oximeter device that obtained carboxyhemoglobin levels at baseline, on SCBA during fire suppression activities and off of SCBA during overhaul operations. COHgb levels obtained by this device are referred to SpCO. Statistical analysis of firefighter SpCO data was accomplished utilizing analysis of variance in repeated measures.

Results

Three full sets of SpCO data were collected on eighteen firefighters ranging in age from 18 to 51 with a mean age of 25.3 years. The SpCO levels of firefighters off SCBA during overhaul operations (mean SpCO 6.1% +/-3.3) were significantly higher when compared to the baseline levels (mean SpCO 3.1% +/-1.9) or the levels on during fire suppression (mean SpCO 2.8% +/- 2.0), ($p < 0.0001$) for both comparisons.

Conclusions

In the setting of overhaul-like operations, firefighters who were working without the protection of SCBA developed elevated and potentially harmful levels of COHgb. Standards that mandate the use of SCBA during all portions of interior structural firefighting including overhaul operations should be uniformly adopted and enforced by fire departments to help insure the health and safety of firefighters.