



**Limited public understanding of the dangers of carbon monoxide is dangerous and can prevent detection**

The Department of Health (DoH) has calculated that every year in England and Wales 50 people on average are killed by CO poisoning. A further 200 are admitted to hospital and 4,000 are treated in emergency departments (EDs) for toxicity associated with CO. These figures often form the basis for discussions about the silent killer.

These figures are deceptively low, however. This is due primarily to the difficulties in detecting and diagnosing cases of CO poisoning. Underreporting of cases leads to an incomplete picture of how much the leading cause of accidental poisoning actually impacts on individuals and families. At this point the true incidence of CO poisoning remains unclear.

Low detection levels are caused in part by low public understanding of the causes and dangers of CO poisoning. Many people are aware that CO is dangerous, but there is widespread ignorance as to the range of scenarios which can result in exposure and toxicity. These include but are not restricted to:

- Incorrect installation, maintenance, usage and ventilation arrangements for all appliances based on combustion of carbon-based fuels, including gas, coal, oil and wood

## Ignorance can be fatal: Difficulties detecting and diagnosing carbon monoxide poisoning

One key audience IGEM will be welcoming to its upcoming carbon monoxide (CO) conference Ignorance Can Be Fatal will be medical professionals and associated healthcare workers.

Alongside representatives of education, local government and the fossil fuels industries; paramedics, nurses, doctors and other professionals all have vital experience and knowledge to contribute to the collective fight against CO.

Here we explore how low public awareness of non-specific symptoms associated with the “silent killer” can prevent early detection and diagnosis, leading to unnecessary tragedies and the underreporting of cases.

- Using fossil-fuel powered generators in enclosed spaces or even outside in close proximity to an open window
- Appliances fitted and operated in recreational vehicles including caravans, motor homes and boats
- Bringing lit barbeques, camping lamps and other appliances inside tents, caravans, motor homes or under awnings

Furthermore the non-specific symptoms of toxicity can easily be confused with other, much less serious ailments like 'flu or food poisoning. Inhalation of low levels of CO over a short period can cause headache, dizziness, drowsiness, disorientation and at high levels, or over longer periods, unconsciousness, coma and death can tragically follow.

Therefore victims can be unaware they are in a potentially dangerous situation and if symptoms arise they may be easily confused with other complaints which do not necessarily warrant immediate medical attention. It is thought many cases of low level acute (short term) and chronic (long term) cases are thus undiagnosed and unreported.

While confined to one particular scenario, the research involving prolonged real-time CO measurements in homes of tenants with gas appliances seems to support this view. In one such study, CO concentrations in the main living space of 18 per cent of homes sampled exceeded parameters suggested as safe by the World Health Organisation (WHO).

More research into the prevalence of accidental CO poisoning is necessary, particularly resulting from other scenarios which would not typically arouse suspicion. For instance while smokers usually have slightly elevated bloodstream CO levels, there have been reported cases of acute CO poisoning by smoking waterpipes (Shisha).

Above all efforts to educate the public through schooling and campaigns like Gas Safe Registers' annual Gas Safety Awareness week must be intensified. Meanwhile installers and engineers of fossil fuel appliances must continue and in some cases catch up with the high safety standards which recent Governments have implemented.

### Issues with detection and diagnosis of carbon monoxide poisoning

As well as the general public, it is becoming accepted that awareness among medical practitioners needs raising too. Physicians in all settings must be alert to the possibility of CO poisoning given any risk factors a patient may communicate. This will maximise the chance of an accurate diagnosis in spite of non-specific symptoms.

Practitioners also need access to appropriate equipment to test for toxicity. Paramedics in particular need portable CO atmospheric detectors to ensure their own safety. Their Patients' blood gases need checking quickly too, otherwise raised carboxyhaemoglobin levels, which indicate CO poisoning, can quickly subside leading to misdiagnosis.

High costs of equipment as well as space constraints have been cited as reasons against equipping ambulances with such portable equipment. Notwithstanding, several NHS trusts have now fitted vehicles with exhaled-air analysers or co-oximeters, which measure oxygen starvation caused by CO inhalation in potential victims.

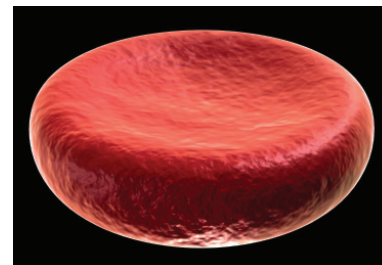
The use of effective equipment for diagnosis is also imperative in GPs' surgeries and EDs too, where physicians and other healthcare professionals have an opportunity to probe the possible causes of CO poisoning and provide appropriate advice to ensure surviving patients are able to remedy the cause of harm.

There appears to be no substitute for adequate training in this area. Increasingly officials, trusts and practitioners are called upon to do more and to ensure CO poisoning is detected, diagnosed and treated at the earliest opportunity. Further research involving industry into the effects of low level acute and chronic poisoning would also support diagnostics.

### The need for partnerships and collaboration

It is critical to remember the fight against CO poisoning cannot be effective with individuals, organisations and sectors working in isolation. Only collective action and partnerships can result in an accurate picture of the true impact of the "silent killer". Only then can we eradicate the suffering and tragedies which follow in its aftermath. ■

## HOW INHALATION OF CARBON MONOXIDE CAUSES TOXICITY



Inhaled CO binds to haemoglobin, the protein found in red blood cells which are the means of transporting oxygen (O<sub>2</sub>) all around the body via the bloodstream. Unfortunately CO has a much greater affinity to haemoglobin than O<sub>2</sub>, which means CO will bind haemoglobin at the expense of O<sub>2</sub> (forming carboxyhaemoglobin instead of oxyhaemoglobin). If significantly starved of O<sub>2</sub> by this means, the body's cells, tissues and organs will quickly die, most significantly the heart and brain.

## IGEM's Ignorance Can Be fatal carbon monoxide conference

Thursday, July 11th 2013, IGEM House, Kegworth, Derbyshire DE74 2DA

All individuals and organisations involved in the fight against accidental CO poisoning are invited to a free one-day conference to share experiences and agree common priorities. The conference will feature expert guest speakers from various backgrounds.

For further details of this event visit [www.igem.org.uk](http://www.igem.org.uk), email [Julie@igem.org.uk](mailto:Julie@igem.org.uk) or call 01509 678161.

Tweet [@IGEMGi](https://twitter.com/IGEMGi) your thoughts ahead of the event too, using the hashtag #IGEMCOconference.

