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Short Communication

An unusual incident: carbon monoxide poisoning risk in 540 homes due to faulty wood burner installations

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ABSTRACT

Background: This report describes the public health management of an unusual incident involving an increased risk of carbon monoxide (CO) exposure due to the installation of at least 541 wood burners in a local authority area in Wales.

Public health actions: An incident management team (IMT) was convened. The IMT assessed and managed the public health risk associated with the wood burners and promoted CO awareness in the local population.

Outcomes: At least 541 homes were found to have had a wood burner potentially incorrectly installed by a Heating Equipment Testing and Approval Scheme–registered engineer. Local residents were made aware of the dangers and provided with free CO alarms.

Conclusions: This incident highlights that even registered engineers may fail to follow guidelines. It is important to inform the public of the need to have a working CO alarm at home, as well as educating the public and professionals about the symptoms and signs of CO poisoning.

Background

Carbon monoxide (CO) is a colourless, odourless and tasteless gas that is toxic if inhaled.[1–3] It results from the incomplete combustion of gas, oil, wood and coal.[3,4] There is no safe level of CO; exposure to low concentrations can lead to headaches, flu-like illness and cognitive impairment, while exposure to high concentrations can lead to breathlessness, collapse, loss of consciousness or death.[5] It is an entirely preventable burden on health, yet in England and Wales, around 40 people die each year, 200 are admitted to hospital and 4000 visit emergency departments.[2] But, this is likely to be an underestimate; the non-specific symptoms of CO may lead cases to be undiagnosed or misdiagnosed.[2,6,7]

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In homes, the main sources of CO are faulty cooking and heating appliances, usually from incorrectly fitted, badly repaired or poorly maintained appliances or due to blocked flues, chimneys or vents.[1,5] Wood burners, and other solid fuel heating systems, have become very popular and fashionable in the UK in recent years, potentially increasing the risk of CO poisoning.

The role of public health agencies in CO incident management is often underrecognised, yet critical to avoiding further cases. When a CO alarm is triggered or an individual is treated for CO poisoning, it is essential to investigate and manage the source to prevent individuals in the same home from continuing to live in, or return to, a potentially dangerous environment. It is also possible that CO exposure could be due to faults in a neighbouring property, for example, soot build up in a chimney leaking into the next door. Public health can ensure that all these scenarios are considered and dealt with.

This article describes an unusual environmental health protection incident involving the potentially faulty installation of a large number of wood burners in a Welsh local authority, placing users at risk of fire and CO exposure. It also outlines the 'added value' that public health brought to the management of the incident.

Incident

In summary, a registered solid fuel heating appliance engineer was prosecuted in October 2015 for the faulty installation of wood burners. The prosecution followed a complaint to the local authority (LA) Trading Standards (LATS) department; the complainant believed that their wood burner was emitting CO. Checks revealed that the wood burner had been incorrectly installed. Further complaints and a full investigation followed. The engineer was registered with Heating Equipment Testing and Approval Scheme (HETAS), the scheme that regulates the registration and competence of solid fuel heating appliance engineers;[8] LATS worked with HETAS and found that the engineer had installed at least 541 wood burners since November 2007. Spot checks of 12 installations found that 10 had significant faults and posed a risk of fire and CO poisoning. None of the 12 had been provided with a CO alarm. HETAS wrote to all known customers of the engineer, advising householders to contact them if they had any concerns about their wood burner. There were few responses to this letter, and the LATS were concerned that there may be more customers who had had wood burners installed, but who had not been notified to HETAS, so they issued a press release.

Incident management

Environmental Public Health (EPH) in Wales became aware of the incident through media reports of the prosecution and was concerned that the public health implications of the incident were not being recognised. As a result, EPH convened and chaired an incident management team (IMT) to assess and manage the risk to the population.

An IMT is a multidisciplinary, multiagency group with responsibility for investigating and managing an incident that may pose, or has already posed, significant harm to the public. In this case, the IMT was chaired by Public Health Wales (PHW) and included representatives from LATS, HETAS, the local Health Board Director of Public Health and Head of Emergency Planning, the Fire and Rescue Service and Public Health England's Centre for Radiation, Chemicals and the Environment in Wales (Wales). The IMT process was invoked to ensure that the appropriate actions were being taken to protect public health and that this was the priority of all partners. It was also intended to facilitate joint risk assessment, to avoid duplication, to allow pooling of resources for prompt incident management and to record and establish a timeline of events and important facts.

Public health was concerned that the actions taken before the IMT was convened and had failed to emphasise the potential public health risks of fire and CO exposure from the wood burners. The IMT, therefore, wrote to all 541 homes known to be involved in the incident, emphasising and prioritising the public health risks. Residents were given factsheets with information about the symptoms of CO poisoning and what to do if they developed such symptoms. They were also informed of the importance of having a working smoke and CO alarm at home. To emphasise this further, the IMT made 200 CO alarms available free of charge to affected residents. To prevent potential exposure to CO, residents were advised to stop using their appliances until another HETAS-registered engineer had assessed it and declared it safe. The IMT was also able to ensure that local HETAS-registered engineers were informed and provided with specific guidelines from HETAS for servicing the potentially faulty wood burners.

Public health alerted local general practitioners and emergency departments about the situation and provided guidance of the symptoms and signs of CO poisoning, including posters for use in waiting rooms.

The regulatory focus had been on contacting those people with registered installations. Public health was concerned that there were unregistered installations or that the letters were being ignored. Public health also felt that there was an opportunity to use this incident to improve knowledge of the dangers of CO more generally, both with the public and professionals. Therefore, the IMT also issued a press release to two local papers, reiterating all the information in the letter.

Incident review

No cases of CO poisoning were confirmed by local general practitioners or emergency departments following the IMT notification. However, given that installation took place over a seven-year period and the non-specific symptoms of CO poisoning, it is possible that there were unidentified and/or unreported cases during that time. Also, given that the affected homes covered the whole LA area, cases that were reported would not necessarily have been linked. However, healthcare providers do need to be reminded regularly of the symptoms and signs of CO poisoning so that they include it in their differential diagnosis. But, there is also a need to ensure that they refer CO cases to EPH for action; it is possible that the

issue could have been identified sooner through reporting of health concerns.

All 200 CO alarms made available by the IMT were collected by residents. However, with over 540 homes known to have wood burners fitted by this individual, and potentially, over 1000 at risk of fire and CO exposure, there may still have been people who were not provided with CO alarms during wood burner fitting and who did not obtain a free alarm from the IMT. Generally, CO alarm use is considerably lower than smoke alarm use. Smoke alarm installation programmes led by Fire and Rescue Services have led to significant reductions in fires, but the same approach to CO alarm use has yet to be used. Given the difficulties with accurately calculating the numbers of CO-related incidents and/or cases of accidental CO poisoning, making the case for such an approach is a challenge. An audible CO alarm meeting British or European standards is recommended for installation in every home,[9] and UK building regulations specify that a CO alarm should be provided in the room where the appliance is located or when a new or replacement fixed solid fuel appliance is installed in a home.[13] However, as this situation showed, enforcement is a challenge and even when the homeowner uses registered personnel, good practice still cannot be guaranteed.

In general, knowledge about CO and the risk of exposure within the home is low, and it is thought that most homeowners do not have their cooking and heating appliances regularly serviced by a registered engineer.[14] These issues are likely to have compounded matters in this incident. It is difficult to see what more the regulatory/legislative frameworks can offer to a situation such as this. Realistically, public health agencies have to contribute to efforts to increase knowledge of the dangers of CO, but, in times of challenging budgets, with an issue that is of a magnitude that is difficult to quantify, it is again difficult to see how significant resources will be dedicated to the issue.

The IMT, although a formal incident management approach, was invaluable in this situation; the inclusion of National Health Service (NHS) partners brought an authority to the response that calmed and reassured local people. It also allowed health to be prioritised and supported efforts to obtain and disseminate a large number of CO alarms very quickly. But, while the importance of a joined up multiagency response has been highlighted by this incident, the relatively late involvement of public health suggests a need to improve understanding of what it can contribute to the management of an incident such as this among partners.

This situation came to the attention of public health, just before Christmas, meaning that the priority was protecting health, rather than obtaining data to evaluate the actions taken. This meant that it was not possible to obtain data on the numbers of wood burners found to be faulty in the subsequent assessment and there is no information to suggest that people with previously unregistered wood burners were coming forward. However, we do know that offer of a CO alarm, which could be collected on production of the letter to householders, was taken up to the extent that all 200 were distributed. This demonstrates that the intervention of the IMT, through letters to residents, was instrumental in raising awareness of CO and prompting action. This event was used to increase knowledge of the need for a working CO alarm among affected residents and the wider public and health service.

HETAS provides a regulatory framework for wood burner installation, but issues can still arise, which place people at risk of harm. In this case, to make the installation more affordable, the engineer did not fully adhere to the regulations. The current UK emphasis is on private competent person schemes to ensure that registered engineers meet minimum standards and perform safely,[9] with the recommendation that all domestic gas and solid-fuel appliances are checked annually by qualified engineers to ensure that they are not at risk of producing CO.[5] None of this was effective in this case because the engineer worked in a small community, serviced his own installations and falsified returns to HETAS.

Prosecutions are rare; a 25-year media coverage review found only 49 occasions where individuals/organisations were prosecuted by the UK Health and Safety Executive in relation to CO poisoning incidents.[4] Those prosecuted included the engineer or installer of the faulty appliance, private/local authority landlords, British Gas, and neighbours.[4] Previous indoor cases of elevated CO levels have been associated with using butane stoves,[10] use of portable generators,[11] burning charcoal briquettes[12] and smouldering tandoori ovens in restaurants adjoining homes.[9] This also means that using prosecution as a route to identify potential public health issues would, in this situation, have little value.

This is the first published description of the risk of mass CO exposure and potential CO poisoning from wood burners. As installation of solid fuel heating appliances such as wood burners has become much more fashionable over recent years, it is possible that the number of incidents relating to such appliances will increase. It is also the first study to describe an incident resulting from the inappropriate actions of a single registered engineer, highlighting the fact that even when registered, some engineers may not install appliances safely and correctly. It is impossible for potential customers to identify such individuals, making it vital to emphasise the need for public health action to increase use of working audible CO alarms in homes, encourage regular servicing of CO producing appliances and ensure that people know the signs and symptoms of CO poisoning.

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Ethical approval

Ethical approval was not required for this study—the article describes a service delivered to protect the health of the population.

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Competing interests

There are no competing interests.

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