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Public health challenges facing Environmental Health Officers during COVID-19: methamphetamine contamination of properties

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The World Health Organization announced the COVID-19 global pandemic to be a Public Health Emergency of International Concern on 30 January 2020.¹ Many governments from around the world, including Australia, the US, China, and the UK, responded by implementing strict public health interventions. Globally, police, Army Reserves and other military services were used to enforce measures that included closing borders to overseas travellers, limiting group gatherings, and applying social distancing regulations.² Despite adopting mitigation strategies, in some countries (e.g. China, Spain, Italy and Brazil), the spread of disease surpassed containment measures.³ Within countries, there have also been hotspots of infection, and even more stringent containment methods, such as lockdowns – which limited the movement of all residents – have been implemented in high-risk locations.³ Throughout 2020, social distancing regulations have changed the way people interact with each other and there has been a significant increase in public health messages for hand hygiene, sanitation and self-isolation.^{4,6} Every country has faced increased and, in some cases, overwhelming demands on healthcare,⁷ increased unemployment^{8,9} and economic uncertainty.^{10,11}

Environmental health workforce

Environmental health officers (EHOs) are frontline educators and enforcers of the public health sector. They have the multifaceted task of ensuring public safety through infection control, water quality, food safety, waste management, chemical exposure and climate change. It has already

been determined the environmental health role is overlooked in Australia, the US, UK and South Africa,¹²⁻¹⁵ and that it is difficult to recruit and retain employees in this field.¹⁶ Tasks assigned to EHOs in response to the pandemic varied across countries. For example, a recent analysis of Australia, UK, US and Portugal EHOs showed that they were assigned with a range of COVID-19 tasks that varied between states and locations.¹⁷ Responsibilities included, but were not limited to, isolation and quarantine compliance checks, new food safety inspections for takeaway options, and advising social distancing restrictions for public spaces.¹⁷ As of December 2020, time delays in 'normal' activities are to be expected due to the increased workload, as EHOs are still assessing and investigating environmental health issues while working safely within current restrictions. As time and pressure mounts, we can expect the emergence of new environmental health challenges and exacerbation of existing challenges, such as food safety, healthy homes and climate change.^{18,19} It is critical that this workforce is adequately resourced to ensure public health regulation is enforced, and a risk-based approach is used to tackle these emerging issues.²⁰ The response to COVID-19 has resulted in a sudden and single-minded shift in priorities.^{13,21} When faced with so many immediate issues associated with the worldwide pandemic, it can be difficult to maintain existing public health activities. This paper will use methamphetamine contamination of properties as an example of an emerging environmental health issue that has been exacerbated due to COVID-19. This highlights the need for an increased labour

force to ensure that this overlooked but critical public health workforce is supported to ensure public health protection now and into the future.^{12,22}

Arising public health issues due to COVID-19

As this pandemic continues to move across the globe, it is predicted there will also be a surge in mental health issues such as depression and anxiety,²³ and increased domestic violence.²⁴ There are also a significant number of environmental health issues that have arisen due to COVID-19 (Table 1) and the enforced restrictions, including home isolation. Methamphetamine contamination of properties is an issue examined below in detail through the lens of the COVID-19 pandemic and the 'new normal' world we live in. It is essential that public health workers do not overlook these non-COVID emerging issues of concern and quickly identify control strategies to minimise the potential for detrimental impact on public health during and beyond the COVID-19 pandemic.

Methamphetamine contamination of properties

Methamphetamine is a synthetic drug that is illegally used and manufactured all over the world. The 'ice-like' crystalline structure has become increasingly popular and is commonly injected or inhaled through smoking. The most common methods for manufacturing methamphetamine employ combinations of lithium from batteries, ammonia from household cleaner, phosphorus, iodine and acids, resulting in toxic by-products or volatile organic compound (VOC) contamination.³⁵ This accounts for the harmful nature of the residues from the precursor chemicals and their by-products, as well as the drug itself.

It has been well established there are health hazards involved with entering clandestine laboratories, especially for first responders.³⁶ If the illegal drug activity is not discovered by law enforcement, it is likely the property will not be adequately cleaned prior to new residents moving in, posing a potential public health risk. Contamination from personal users or clandestine laboratories can become absorbed by structural components

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within a property such as walls, ceilings, and flooring.^{37,38} Smoke and VOCs can be deposited and re-released again when disturbed. A study of housing walls by Wright et al.³⁹ found that methamphetamine had penetrated the outer paper, the inner gypsum wall and the inner paper layer in contact with the wooden structure. This dispersion could be attributed to vapour intrusion through the layers, or mobility via vapour movement or moisture in the roof space and down the cavity walls.³⁹

In a controlled methamphetamine cook performed by Van Dyke et al.,⁴⁰ airborne emissions moved from the manufacturing location and spread throughout other rooms in the property. Martyny et al.⁴¹ studied simulated smoking and found that residues can also travel by surface contact and air movement through air conditioner vents or foot traffic. Homes with ducted air conditioning have piping that distributes air throughout the home; therefore, potentially circulating residual methamphetamine and chemical by-products.⁴² These airborne emissions can be readily absorbed by porous items including toys, bedding and soft furnishings,^{39,43,44} which can be disturbed and redistributed. Wright et al.³⁹ also demonstrated that residues persisted for at least five years after manufacturing had ceased, and new possessions introduced to the property became contaminated. Notably, this is an understudied area, and these estimates provide only a superficial assessment of the resilience of

methamphetamine contamination.

Adverse health effects of methamphetamine-contaminated properties

Adverse health effects due to methamphetamine contamination can be experienced by anyone in contact with the residues.⁴⁵ However, the health problems are non-specific and can be attributed to a range of other causes before contamination of a property is considered and investigated. Children are most at risk of increased exposure to methamphetamine and health impacts due to their body size, developmental stages, inhalation exposure and physical contact with surfaces.^{46,47} In a recent case study of 63 individuals by Wright et al.,⁴⁸ adults, adolescents and children experienced adverse health effects after being unknowingly exposed to methamphetamine through third-hand use and manufacture of the drug. The amount of time family members spent living at the contaminated property varied from several days to 10 years.⁴⁸ Common health issues experienced by children and adolescents included but were not limited to behavioural and cognitive effects (79%); sleeping issues (72%); respiratory effects (62%); and eye and skin irritation (55%).⁴⁸ Brewer et al.⁴⁹ also demonstrated that between 0.056 and 0.34 ng/mL methamphetamine was absorbed by three racehorses transported for six hours in a contaminated float. Therefore, higher quantities of methamphetamine could be

expected to be absorbed with long-term exposure. During the COVID-19 global pandemic, there has been increased time spent in isolation. This means that people unknowingly living in methamphetamine-contaminated properties will have experienced significantly higher levels of exposure. The increased amount of time spent inside the home may increase the number or severity of health effects experienced. There are also people aware that their home is contaminated but who are unable to leave or remediate due to their financial situation. This is exacerbated as the capacity to investigate methamphetamine-contaminated houses has been impeded by social distancing measures,⁷ the imminent health concern of SARS-CoV-2, and increased workload of EHOs.^{13,17} The ability for owners to undertake assessment and remediation has also been impacted by economic hardship.¹⁰

The health issues detailed above highlight the importance of remediating methamphetamine contamination. Australia has the National Clandestine Drug Lab Remediation Guidelines,⁵⁰ New Zealand has the standard (NZS 8510:2017),⁵¹ and the US has the Voluntary Guidelines for Methamphetamine Laboratory Cleanup⁵² available for guidance. However, to date, there is no legislation or regulatory organisation in these countries to ensure compliance.⁵³ The Australian Voluntary Code of Practice for methamphetamine-contaminated properties released in November 2019 provided clarification and

Table 1: Environmental health issues of increased concern due to restrictions from the COVID-19 pandemic.

Environmental health issue	Normal process	Current concern	References
Take away food options	EHOs visit premises and assess the take-away food handling procedure	<ul style="list-style-type: none"> Many businesses that have not previously offered take away options are now using it as a lifeline to save their businesses. There are delays in assessing food premises due to the increased workload, so some businesses may be offering take-away prematurely. 	(25, 26)
Main wastewater treatment	Only toilet paper should be flushed through wastewater	<ul style="list-style-type: none"> Many people have resorted to using unflushable products due to the lack of access to toilet paper. This means the sewer system is under pressure from blockages. 	(27, 28)
Onsite wastewater treatment	Limited amount of time spent at home and only toilet paper is flushed into the septic tank. Only toilet paper should be flushed with wastewater	<ul style="list-style-type: none"> Residents are spending more time at home therefore their septic tanks are being used more. The system is having inadequate time to process and separate the particles that can cause overflow and blockages. As above, many people have resorted to using unflushable products due to the lack of access to toilet paper. This means the sewer system is under pressure from blockages. 	(27, 29)
Methamphetamine contamination in properties	Contamination testing would be conducted before contacting a remediation specialist to remediate the property	<ul style="list-style-type: none"> People are less likely to bring contractors into their home due to home isolation measures and uncertain employment Residents are spending more time at home which increases exposure in a contaminated property 	(30, 31)
Mould or dampness in properties	Depending on the severity of the situation, some can be treated by the resident otherwise, it a remediation specialist is required	<ul style="list-style-type: none"> Due to the increased amount of time in the home, health effects of mould or dampness issues could also increase. Depending on the location, the country could be in lockdown, and it may be difficult finding a remediation specialist. 	(32, 33)
Overcrowding or squalor	This would normally be investigated based on a complaint	<ul style="list-style-type: none"> The increased close contact with people in the same home would increase the risk of transmitting other infectious diseases. 	(34)

insight into the specific details recommended for remediation,⁵⁴

In Australia, when a suspected clandestine laboratory has been detected, police and forensic services investigate the property and then notify the local council. EHOs will contact the property owner and work with them to ensure they understand the ramifications of this investigation and risks to public health. EHOs enforce remediation under the relevant state or territory Public Health Act. EHOs are also able to use their powers as an authorised officer of their state or territory to issue a notice that prohibits entry onto the property until the site has been remediated and the success of the remediation validated.⁵⁰ To avoid bias towards businesses, most states and territories require property owners to independently seek a remediation company. However, the Western Australian Department of Health has a different approach and issues a list of approved forensic testing, cleaning companies and laboratories that EHOs can recommend to owners.⁵⁵ Engagement with property owners and validation experts is a time-intensive and challenging process, as financial and inadequate remediation problems often arise. It is recommended that EHOs are involved in the assessment, remediation process and validation to ensure appropriate measures are taken before notices are removed.⁵⁰ This process is time-consuming and costly; as such, it is a significant burden and risk to public health, especially for those of a lower socioeconomic demographic.

Methamphetamine manufacturing, usage, and increased exposure during COVID-19

During 2020, drug shipments hidden and imported among legal products were restricted by the reduction in international air and sea cargo.⁵⁶ Similarly, border closures restricted the movement of drugs and precursors. The closure of entertainment venues and restrictions on public gatherings will have reduced the usual supply routes. While it is difficult to predict, it is reasonable to presume other tactics may have been adopted to combat these accessibility issues.⁵⁷ Anticipated changes include altered chemical composition of the drug,⁵⁸ increased street prices, increased local manufacture and inventive ways to smuggle

drugs internationally, such as in hand sanitiser bottles.⁵⁹

Conclusion

EHOs continue to be overlooked and under-resourced despite the invaluable role they have played in response to COVID-19.^{13,22} To expedite and support society's recovery, it is essential that we minimise the burden of other controllable health risks; this includes the identification of emerging environmental health challenges. While EHOs have been prioritising the implementation, education and regulation of social distancing measures, it is essential that exacerbated and emerging threats such as methamphetamine contamination of properties are not overlooked. Sufficient resources, support and recognition of the EHO workforce will enable them to identify and mitigate risks early to minimise long-term public health consequences.^{14,60,61}

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