Inquiry into Health Impacts of Air Pollution in Victoria

March 2021

Introduction

The Australasian College for Emergency Medicine (ACEM, the College) welcomes the opportunity to provide a submission to the Inquiry into Health Impacts of Air Pollution in Victoria.

ACEM is the peak body for emergency medicine and has a vital interest in ensuring the highest standards of emergency medical care for all patients. ACEM is responsible for the training and ongoing education of emergency physicians and the advancement of professional standards in emergency medicine in Australia and New Zealand.

The College commends the Victorian Parliament for recognising the urgent need to review existing policy and regulatory approaches to air pollution, particularly in the context of the immediate and evolving threats posed by climate change. We urge the Victorian Government to seek to develop effective, evidence-based strategies to better prevent, monitor, mitigate and enhance the resilience of the Victorian community to the acute and chronic health impacts of air pollution.

Emergency Departments (EDs) are at the forefront of the impacts of climate change and health, and in particular the threat to health services posed by the increasing intensity and frequency of severe natural disasters. Acute, severe and prolonged air pollution events pose significant health impacts on the community, which can manifest in surged presentations to EDs and demands improved integration into emergency management plans. Chronic air pollution exposure similarly poses a long-term threat to public health, manifesting in a range of preventable negative health impacts, which although more difficult to quantify nonetheless manifest in increasing demand on EDs.

Following a brief description of the health impacts of air pollution, our submission focusses on the need to understand and proactively address the risks air pollution poses to the functioning of EDs through application of the emergency management cycle of Prevent, Prepare, Respond, and Recover. We will also address points (a)(d) and (e) of the Terms of Reference (TOR) of the Inquiry.

(a)   state-wide practical, real-time, cost-effective mitigation strategies

(d)   strengthening commitments across all Victorian Government portfolios to reduce air pollution and minimise the impact on health

(e)   any other related matters

Air pollution and health

Air quality has direct effects on human health. The WHO estimates air pollution prematurely kills an estimated seven million people annually worldwide[1]. New research from Harvard University, in collaboration with the University of Birmingham, the University of Leicester and University College London has demonstrated a higher level of attributable mortality to air pollution globally, estimated at 8.7 million lives lost in 2018[2].

Specific populations are considered more vulnerable to the negative health effects of air pollution, but in aggregate this represents a large portion of the community. This includes:

- Pregnant women and their unborn children – air pollution exposure may be linked to adverse pregnancy outcomes, including foetal growth restriction and possibly preterm birth[3], and in utero exposure has been associated with longer term paediatric health effects[4].

- Children – who are more physiologically vulnerable to the effects of air pollution and spend more time outdoors than adults, increasing the likelihood of exposure.

- People living with respiratory disease, including asthma, emphysema, and chronic obstructive pulmonary disease – exposure to air pollution may aggravate the underlying diagnosis, with more severe effects.

- People living with cardiovascular disease and Type 2 Diabetes – exposure to air pollution can precipitate and aggravate underlying cardiovascular conditions and is associated with increases in blood glucose level for people living with diabetes[5].

- Older people – more vulnerable to physiological effects of aging and higher prevalence of underlying cardio-respiratory conditions.

- Outdoor workers – who are at greater risk of prolonged exposure to air pollution.

- People living in lower socioeconomic groups – who may experience poorer housing quality, lower health literacy and limited ability to adopt preventative measures[6,7].

Even low levels of ambient air pollution pose risks to human health. Exposure to small particulate matter (PM) less than 2.5µm (PM2.5), photochemical oxidants (measured as ozone) are a major concern as they have been associated with increased risk of premature death and acute and chronic morbidity. Long-term and short-term exposure to these pollutants is associated with increased mortality[8]. PM2.5 has particularly been associated with increased cardiopulmonary mortality as it can penetrate deep into the respiratory system and translocate into the bloodstream, causing oxidative stress and inflammation[9,10]. PM2.5 has been associated with increased risk of myocardial infarction (MI), stroke, arrhythmia, and heart failure exacerbations within hours or days of exposure in susceptible individuals[10].

The U.S. National Ambient Air Quality Standards (NAAQS) has set levels of pollution considered hazardous, including Ozone at 75 ppb(8 h), PM10 of 150 $\mu g/m^3$ (24 h), PM 2.5 15 $\mu g/m^3$(annual mean) or 35 $\mu g/m^3$ (24 h) and CO of 35 ppm(1 h) or 9 ppm (8 h). Comparatively, the Australian National Environment Protection Measure for Ambient Air Quality (Air NEPM) was updated in 2016 and the current maximum concentrations per average time period for these pollutants are: Ozone at 0.08ppm (4 h), PM10 at 50 $\mu g/m^3$ (24 h), PM2.5 at 8$\mu g/m^3$ (annual mean) or 25 $\mu g/m^3$ (24 h) and CO of 9.0ppm (8 h)[11]. The upgrade of PM2.5 standards to performance standards is welcome, however, the introduction of the exceptional event rule that replaced previous allowances for exceedance of the PM standards on a maximum of five days per year is a concern. Exceptional events include fire or dust occurrences that adversely affect air quality at specific locations, directly related to bushfire, authorised hazard reduction burning or continental-scale windblown dust. In the context of climate change, however, it is anticipated that such exceptional events are likely to occur more frequently and with greater intensity. It is therefore imperative that routine standards are strengthened to better ensure community resilience to these more frequent exceptional events.

Indeed, many experts have stated that there is no safe level of PM2.5 and any reductions in exposure at a population level, even from a low baseline, lead to positive health impacts. In Australia, the health effects of anthropogenic PM2.5 is estimated to contribute to 2,600 deaths annually, at a cost of $6.2 billion per year in terms of the economic cost of life years lost[12]. This notably represents more lives lost than the annual national road toll[13] and the costings estimate focuses on mortality alone and does not include the costings associated with increased hospital presentations and admissions, adverse birth outcomes, and increased medication use.

Considerations of air quality in Australia justifiably focus on the dramatically visible prolonged smoke events associated with bushfire. However, Australians spend the majority of their time indoors and the potential impact of routine exposure to indoor air pollutants has often been underacknowledged and is under-regulated. Key indoor air pollutants include woodfire smoke, gas cookers and heaters, fungi, microbial contamination, house dust mites, PM and air toxics such as formaldehyde[14].

Climate change and bushfire smoke

ACEM considers climate change a population health emergency requiring urgent and sustained action to prevent, mitigate, and adapt to this urgent health threat.

Although the major sources for routine air pollution in Victoria relate to industrial sources, vehicle emissions, home wood heaters and open burning[15], bushfire smoke, with its potentially massive population exposures, represents a major health threat. Smoke from bushfire and prescribed burns contains a complex mixture of PM, chemicals and gasses that can travel long distances[16]. The bushfires across the 2019-20 summer in Australia showed that a warming climate change is increasing the duration of fire seasons and the risk of more extensive and intense bushfires[17]. It was estimated there were 417 excess deaths associated with air pollution over the 2019-20 fire season and 1124 hospitalisations for cardiovascular problems and 1305 presentations to EDs with asthma in NSW, Queensland, the ACT and Victoria[18]. Earlier data from the 2006-07 Victorian bushfire season demonstrated that PM2.5 was associated with an increased risk of out of hospital cardiac arrest, even when adjusted for temperature and humidity, as drawn from the Victorian Ambulance Registry[19].

A major challenge is that bushfire-associated air pollution is often amplified by coinciding heatwaves, with overlapping vulnerable populations at a further increased risk of mortality[7]. As these climate related disasters are predicted to increase in intensity and frequency, EDs will need to be staffed and equipped with additional resources including space and an appropriate surge response to cope with the associated increased burden.

The Victorian context

Victoria has had a long-standing vulnerability to catastrophic bushfires. The deadliest of these were the 'Black Saturday' bushfires in 2009 that claimed 173 lives. Other significant disasters include the fires in 2003 in the Eastern Victorian Alpine area and the 2006-07 Eastern Victoria Great Divide bushfires, both of which destroyed more than one million hectares of bushland. Most recently the 2019-20 bushfires that swept both the NSW and Victorian bushlands caused extensive damage in both states to flora, fauna, and properties.

As well as hazardous air quality exposure through major bushfire events, recent Victorian events demonstrate the impact of specific local challenges. The Hazelwood coal mine fire was considered at the time an unprecedented national outdoor air pollution event, affecting the surrounding area for six weeks in February-March 2014. This affected predominantly regional communities in the Latrobe Valley, with underlying relative socioeconomic disadvantage compared with other areas in Victoria. The long-term effects of the mine fire have been studied through the establishment of a cohort study, with a primary focus on obstetric, perinatal and paediatric outcomes. Initial findings demonstrate an association between hazardous air quality exposure and gestational diabetes during pregnancy, particularly if the exposure occurred during second trimester of pregnancy; and an increased risk of respiratory infections and wheeze in children who had experienced in utero exposure[20].

Victoria is also particularly vulnerable to epidemic thunderstorm asthma events. The November 2016 event was the world's largest and most catastrophic event of this type leading to ten deaths and a 672 per cent increase in respiratory related presentations to Melbourne and Geelong public EDs[21]. ACEM commends the Victorian Government's review and response following the November 2016 event, particularly the establishment of Thunderstorm Asthma Warning protocols. However, ACEM also recognises that climate change may increase the confluence of extreme weather events like thunderstorms with extended pollen seasons, which raise the risk of similar recurrent events in the future.

Recommendations

ACEM has set out its recommendations below using a PPRR (Prevent, Prepare, Respond and Recover) mitigation framework.

Prevent

Addressing climate change

Urgent coordinated action to respond to the health threat of climate change must be prioritised at every level of government. While ACEM supports the Victorian Government's commitment of Net Zero emissions by 2050, more ambitious action is vital to avoiding catastrophic damage to the environment. ACEM recognises that the health sector itself is a major contributor to carbon impact, estimated at seven percent of national emissions[22]. As a major industrial source of air pollution and fossil fuels, urgent transition to renewable energy sources accompanied by a just transition from coal mining and power generation should be prioritised by the State Government.

The key component of prevention is a commitment to Net Zero Emissions by 2050 by not just the State of Victoria, but Australia as a nation. A necessary step to achieving this is by powering economies with clean energy, replacing polluting coal, gas, and oil-fired power stations with renewable energy sources such as solar or wind farms.

Improved coordination, monitoring and communications

Improved infrastructure to enable real-time air quality monitoring, particularly of PM2.5 and Ozone, should be expanded to include all metropolitan areas as well as major regional centres. ACEM is supportive of the Victorian EPA's AirWatch service and the availability of hourly real-time measurements through this website. However, the existing network must be further localised to enable targeted health protection advice and expanded with a view to ensuring coverage of growing populations in outer metropolitan areas. This must be accompanied by an effective communication strategy that better prevents exposure for vulnerable populations through coordinated responses to even moderately hazardous air quality days.

It is especially important to continue to expand capacity to rapidly establish temporary emergency air monitoring in areas affected by bushfire smoke or other air quality hazards. This must be accompanied by an effective communication strategy to empower individuals, community organisations, and employers to enact tailored advice to prevent exposures to poor air quality. For example, even during prolonged smoke events such as those associated with the 2019-20 bushfires there were periods of the day where air quality was relatively improved, and outdoor physical activity and employment might be considered safer. Localised real-time monitoring and communication via platforms like apps, social media and websites for rapid communication should be implemented, promoted, and evaluated for their potential health impacts.

ACEM recognises the value of a coordinated approach to prescribed burning that routinely integrates health advice and considerations[23]. In Tasmanian there is an approach of a temporary stopping rule for igniting further fires until air quality improves, along with a preference for mechanical thinning or grazing to reduce fuel loads as alternatives to burning[24]. These initiatives, among others, could also be implemented in Victoria.

Tighter regulation and enforcement of vehicles as a priority

The primary source of atmospheric pollution is vehicular traffic[25]. In terms of preventative policy, more ambitious air quality targets, more stringent restrictions and improved regulation of common air pollutant sources, notably those associated with motor vehicles and industry, are required.

While the rollout of electric buses by the Victorian Department of Transport is welcome, further strategies are needed to promote public transition to electric vehicles and more tightly regulate vehicles that produce unsafe emissions. Careful monitoring and management of vehicle associated emissions for residential areas adjacent to major roadways should be a consideration, particularly in light of the major infrastructure development plans of the Victorian Government.

Non-vehicular transport and urban planning

In addition to limiting the amount of vehicular traffic, effective urban planning is needed to reduce traffic congestion and promote public transport and active non-vehicular transport options (i.e. walking and cycling).These initiatives will help drive down emissions, reduce the health risk to the population, and promote healthy living through the co-benefits of physical activity. Research undertaken by the University of Cambridge has shown that the health benefits of walking and cycling outweigh the negative effects on health of air pollution, even in cities with high levels of air pollution[26].

ACEM strongly supports existing initiatives such as the Victorian Cycling Strategy 2019-2028 and investment in new paths that have the added health benefit of reducing risk of injury to pedestrians and cyclists. Further initiatives must be considered, such as opening community streets to pedestrians, particularly around schools to encourage walking and cycling to school. Reducing emissions at peak times – such as the school run and rush hour – is a key step in improving air quality in Victoria.

Health promotion and public health

A broader whole of government Air Quality Health Promotion Strategy addressing common sources of air pollution should be developed and prioritised. Many of the recommendations put forward in this submission align with the principles of the Ottawa Charter to seek to empower individuals, communities, and health services to respond to air quality threats[27].

In terms of indoor air quality, efforts to improve housing quality to reduce the impact of outdoor pollutants is an important long-term measure to mitigate the effect of bushfire smoke and other ambient pollutants. Older Australian houses are considered "leaky," such that outdoor pollutants can penetrate indoors and compromise indoor air quality[19]. This is especially important for public housing, as residents who experience socioeconomic disadvantage are more likely to be at greater underlying vulnerability to air pollutants because of disproportionate chronic disease burden. Similarly, policies to incentivise alternatives to woodfire and gas heating should be considered alongside improved communications about the associated health risks of these routine exposures.

Green spaces

Through decades of urbanisation in Victoria many green spaces in urban areas have been lost. There is a growing field of research that is showing that reintroducing and maintaining green spaces – and encouraging people to use them – has tangible health benefits for the population, cools temperatures and leads to cleaner, healthier air[28]. Vegetation – trees in particular – act as natural filters for both gasses and particulate matter in urban environments, which in turn reduces mortality in cities due to cleaner air[29]. Creating more green spaces will provide more people the chance to undertake physical activity and live healthier lifestyles, which is shown to tackle health inequalities[30].

Prepare

Strengthening Government and Community Capacity

As part of a broader air quality strategy, community awareness and preparation for hazardous air quality events should be improved. In particular, engagement through primary care and communications campaigns to ensure that at risk individuals have an up-to-date asthma management plan and optimised routine respiratory disease management. Strengthening community response can also include the dissemination of P2/N95 masks, alongside careful risk communication and advice on appropriate use. Notably, Asian or Indian ethnicity was a specific risk factor in the November 2016 thunderstorm asthma event[31]. Ensuring priority populations, including First Nations and Culturally and Linguistically Diverse communities are able to access culturally appropriate health information to improve preparedness for these events should be prioritised.

Risk communications and emergency response plans should be developed to ensure that air quality emergencies have a robust and coordinated response. Early notification and dissemination of pragmatic messaging is vital and long-term planning should consider avenues to improve health sector capacity for surging in emergency events. ACEM notes that NSW Health has a Public Health Plan for Prolonged Smoke Events to support the coordination of public health action and response[32]. Unlike a mass trauma incident or other acute emergencies, prolonged bushfire smoke events may be experienced for weeks to months and over large areas, requiring a sustained workforce surge and placing additional strain on EDs over a prolonged period.

Respond

Risk communications

Improved risk communications to enable the delivery of nuanced and tailored public health advice is vital to improving the health response to acute air quality emergencies. Common public health recommendations for prolonged smoke-events include shelter-in-place advice. These recommendations focus on remaining indoors and reducing exposure to outdoor air by closing windows. However, little is understood about the efficacy of this advice, particularly in the Australian context where housing quality may not be adequate to ensure effective sealing to prevent infiltration of air pollutants over prolonged periods[19]. A Canadian study demonstrated that simply remaining indoors was unlikely to be sufficiently protective for exposure to PM generated in vegetation fires in summer. However, air cleaners with HEPA filters decreased infiltration in both winter and summer sampling periods[33].

Community clean air shelters

Further research in the Australian context is urgently needed to improve the evidence base to support the establishment of home clean air shelters. However, in adopting a precautionary and pragmatic policy approach, community clean air shelters should be considered a policy priority as part of the emergency response to prolonged smoke events in Victoria, and potentially integrated into the State Smoke Framework. Community clean air shelters are a particularly important strategy for communities that experience socioeconomic disadvantage and poor housing quality. These communities are disproportionately vulnerable to the negative impacts of air pollution and less able to implement protective strategies within the home. Ensuring community clean air shelters are accessible, acceptable and consider the social-distancing and screening needs of the current COVID-19 pandemic are important additional considerations. Guidance and recommendations on the minimum filtration requirements and management of community clean air shelters should be developed by the Department of Health and Environmental Protection Authority, while implementation and management of community clean air shelters could be undertaken through partnership with other organisations, including local councils.

Recovery

Addressing psychological impacts

The long-term health implications following prolonged periodic air pollutant exposure such as those posed by the Black Summer events requires urgent further research. However, the immediate mental health impacts of bushfires and hazardous air quality are increasingly established and require a nuanced and sustained health system response. ACEM recognises that recommendations from the Royal Commission into Victoria's Mental Health System to improve supports for mental health and wellbeing and establish a state-wide trauma service will be applicable to this issue.

Improving data and surveillance systems

Improving the integration of routine health service data in Victoria could enable real-time monitoring and reporting of health service usage in the context of prolonged smoke events. For example, the Public Health Rapid Emergency Diseases and Syndromic Surveillance (PHREDSS) system in NSW Health enables near real-time monitoring of presentations to NSW public EDs and all NSW Ambulance 000 calls, which are monitored daily and enable early activation of risk assessment and public health action. Improvements to integrated data systems would support translational research activities to better understand the impact of hazardous air quality events in Victoria and to evaluate the effect of policy and programming.

Improved prevention

Finally, it is vital that post-disaster recovery focusses on promoting long-term individual and community resilience. In accepting that bushfire smoke events pose an ongoing health risk to the Victorian community, further efforts to reduce more common exposures to air pollution are vital. In adopting the cyclical approach to emergency response, this returns us to the importance of more ambitious air quality targets, more stringent routine monitoring and improved implementation and regulation of common air pollution sources as part of a whole of government air quality health promotion strategy.

Conclusion

ACEM is grateful for the opportunity to contribute to this submission. It is an important first step towards developing a robust and meaningful response to reduce the health impacts that are caused by air pollution, which in turn is one of the biggest contributors to climate change and the destruction that it causes.

We urge the Victorian Government to commit to renewable energy sources, improved real time collection of air pollution measurements, improved electrical vehicles (cars and public transport), encouragement for non-vehicular transportation, and more green spaces. We would welcome a strong commitment towards zero emissions by the year 2050 in line with the call by the Paris Agreement (of which Australia is a signatory).

If you require any further information about any of the above issues or if you have any questions about ACEM or our work, please do not hesitate to contact Jesse Dean, General Manager, Policy and Regional Engagement (jesse.dean@acem.org.au; +61 3 9320 0862).

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