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AUSTRALIAN COLLEGE OF
PERIOPERATIVE NURSES

JOURNAL OF PERIOPERATIVE NURSING

Volume 33 | Issue 3

Article 2

6-1-2020

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Lyn Bowen

University of Newcastle, Lynette.Bowen@newcastle.edu.au

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Recommended Citation

Bowen, Lyn (2020) "Pandemics: A COVID-19 perspective," *Journal of Perioperative Nursing*: Vol. 33 : Iss. 3 , Article 2.

Available at: <https://doi.org/10.26550/2209-1092.1092>

<https://www.journal.acorn.org.au/jpn/vol33/iss3/2>

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Pandemics: A COVID-19 perspective

The world is currently gripped by a pandemic, a term that is on everyone's lips. However, six months ago, many would have found it difficult to define the terms pandemic, epidemic and outbreak, or explain the difference.

The emergence of a novel coronavirus, commonly referred to as COVID-19 has significantly changed our awareness. It has heightened our anxiety, like a primordial fear, leaving us feeling vulnerable, similar to how past generations reacted to pandemics.

Historically, epidemics and pandemics were often considered a calamity inflicted by God. The plagues of medieval Europe, principally caused by bacteria (*Yersinia pestis*) carried on rats, resulted in high mortality, principally because populations had no immunity to the disease¹. At that time, there was no recognition of microorganisms. The microscope was still to be invented and disease was often interpreted as punishment for wrongdoing, as suggested by the term pathogen, 'patho' being derived from Greek and meaning to suffer.

The pandemic that most closely equates with our current experience was the 1918–1919 Spanish flu pandemic. It was estimated to have infected approximately one third of the world's population, being about 500 million people². The number of people infected by COVID-19 is approaching 5 million³. The approach to managing the pandemic that was applied at that time included good personal hygiene, isolation and quarantine, cleaning with disinfectants and limiting public gatherings².

More recent approaches to pandemic planning have been informed by the 'bird flu' (H5N1) experience.

They recognise the financial impact of a pandemic as well as the social impact⁴. However, a review of Australian influenza pandemic plans conducted in 2018 identified considerable differences between the plan in different states, making it more difficult for hospitals, clinicians and other government agencies to implement them⁴.

What we have learned from the past we must remember, even though our understanding of virology has improved in recent times. We have a much better understanding of transmission of infection, using evidence-based guidelines to support our decision making; however, there is still much to learn.

Firstly though, how do we define the terms pandemic, epidemic, outbreak and cluster? They are all important epidemiological terms and understanding them and what is different between them helps us to make decisions. A cluster refers to a group of cases, usually connected by place and time⁵. The number of cases is greater than normal, but there is usually a clear pattern of contact that established the cluster. An example of this is the cluster of cases of COVID-19 identified at a fast food chain in Victoria. The terms outbreak and epidemic have the same meaning, though outbreak is often considered to be limited to one geographical area while epidemic may involve a larger number of geographical areas. In both cases, there is an increase in the number of cases exceeding what would be

Dr Lynette Bowen
PhD, RN
Lecturer, Faculty of Health and Medicine,
School of Nursing and Midwifery,
University of Newcastle

expected in the normal health of the population⁵.

The term pandemic refers to an epidemic that occurs over a very wide area, such as continents and crossing international boundaries. Large numbers of people are infected⁶, as has been seen with the COVID-19 pandemic. It has been argued that a key feature of a pandemic is the almost simultaneous spread of the infection⁷, as was noted in an earlier pandemic of influenza A virus (subtype H1N1).

There are a number of characteristics that influence the potential for a pandemic. Firstly, the microorganism has to be pathogenic, that is, be able to infect and cause disease in humans. Secondly, it needs to be able to easily spread between humans⁶, like COVID-19, which is spread by large droplets, fomite and aerosol transmission from airways and through contaminate surfaces as contact transmission⁸. Other considerations include the characteristics and virulence of the pathogen, such as its ability to establish and replicate itself⁹ and the level of immunity of the population. COVID-19, while part of the coronavirus family, emerged as a new pathogen therefore the population did not have immunity to it. As well, seasonal patterns of infection, such as winter in the northern hemisphere almost certainly contributed to the susceptibility of the population, increasing exposure due to indoor living in winter conditions and transmission in close confines by

inhalation of droplets or touching contaminated surfaces.

Viruses are different to other microorganisms. They exist as a 'virion' particle and cannot replicate outside a living cell⁹. However, once a cell is infected with a virus particle, it will replicate causing infection. Viruses are either structured with a membrane, and referred to as enveloped, or structured without a membrane, and referred to as non-enveloped or naked⁹. COVID-19 is an enveloped virus¹⁰. This is a small piece of good news in an otherwise challenging pandemic, as enveloped viruses are more easily killed by a range of disinfectants, including '≥70 per cent alcohol, quaternary ammonium compounds ... or diluted household bleach'¹¹. This is an important consideration in perioperative nursing, as decontamination and cleaning of surfaces is an essential element. Early evidence from epicentres of COVID-19 infection have demonstrated that some people remain asymptomatic yet appear to be able to transmit the infection. The response should be sustained decontamination of equipment and environmental cleaning, regardless of COVID-19 infection status. Another risk associated with perioperative care and COVID-19 is aerosol, resulting from ventilation and suction⁸. Good use of personal

protective equipment, including correctly fitted P2/N95 masks, along with effective environmental cleaning of surfaces will minimise risk.

Perhaps the greatest risk that we face is complacency. As a nation, we have been avant-garde with implementing social distancing and restrictions to human movement into and within our nation. To date, we have done exceedingly well, with only our 100th death reported in the media recently. As health professionals, others look to us for leadership. If we are going to continue to keep the COVID-19 pandemic beyond our borders, we must role model good social distancing behaviours and encourage our family and friends to do the same. We need to be patient and encourage others to continue to abide by restrictions enacted for the greater good of the community. Whatever our health professional role is we can, and do, make a difference ... Let's keep it up.

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