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EDITORIALS

Measles elimination – the end of an era?

Anita Heywood[1]

[1] University of New South Wales School of Public Health and Community Medicine, Sydney, Australia

Abstract

This editorial outlines the current global measles situation in the context of the loss of elimination status for several countries in Europe and the region of the Americas. Achieving high population immunity requires substantial, long-term disease control efforts through high functioning immunisation programs. Both vaccine hesitancy, a global issue, and issues of access to vaccines, particularly in low and middle income countries, are drivers of the current outbreaks and threaten the success of the WHO's global measles elimination goals.

Keywords: measles; elimination; immunisation; vaccine hesitancy; travel

The WHO Strategic Group of Experts (SAGE) considers that measles can and should be eradicated (1). Extensive control efforts over the past two decades resulted in an 80% decline in measles deaths and an estimated 21.1 million deaths averted between 2000 and 2017 (2), a major contributor to reductions in child mortality. However, despite the availability of a safe and highly effective vaccine and long-term global elimination efforts, measles cases are on the rise. Global case numbers have risen over the last two consecutive years, with a 300% increase in the first quarter of 2019, compared to 2018, and large outbreaks occurring in all World Health Organization (WHO) regions, the largest numbers in the African and European regions (3).

While feasible, measles elimination targets are ambitious and require massive and sustained global measles control efforts, including achieving and maintaining immunisation coverage >95% through routine and supplementary immunisation campaigns to maintain the high population immunity required. The Global Measles and Rubella Strategic Plan 2011-2020 included a goal of measles elimination in at least five global WHO regions by 2020 (1). At the time, only the region of the Americas had achieved regional measles elimination,(4) defined as "*the absence of endemic measles transmission for greater than 12 months in a defined geographical area in the presence of a well-performing surveillance system*" (5). Despite regular importation of the virus by international travellers, the Americas maintained endemic measles elimination for over a decade (2). However, large global outbreaks coupled with increasing numbers of cases in the region resulted in the subsequent re-establishment of endemic transmission and loss of measles elimination status in 2019 (6). In August 2019, four European countries also lost their elimination status (7) and the USA just managed to keep their status, fortuitously controlling the large New York outbreak after 10 months of continued transmission (6). Countries who have lost their elimination status, including the UK, will need to demonstrate the return to an absence of endemic transmission through the verification of an absence of endemic measles transmission for three years.

The extent of the current outbreaks and loss of elimination status are major setbacks to the WHO's global measles elimination goals. How can we explain the large increase in measles cases globally? Measles is a highly contagious virus requiring population immunity of over 95% to achieve and sustain measles elimination from a region (8). With vaccine effectiveness estimated at greater than 95% after one and greater than 98% after two doses (8), greater than 95% two dose coverage is needed to maintain adequate population immunity. However, global coverage levels have been remained below target, with 86% for first dose coverage of measles-containing vaccine (MCV1) and 69% for MCV2 in 2018 (9). Globally, only 61% of countries have MCV1 coverage above the GVAP 2020 targets of ≥90% (9) and coverage in those recently adding a second dose (MCV2) to their schedule are low. While coverage globally is improving over time, ongoing suboptimal vaccine coverage has resulted in a growing number of susceptible people in the population. Further, reported national coverage does not take into account sub-national heterogeneity of coverage and clustering of non-immune populations (10). Pockets of susceptible populations have been reported as epicentres of recent outbreaks, such as the New York outbreak. While there is some evidence of waning of measles-specific IgG antibody in populations with long periods of very low measles transmission, this is not a major cause of vaccine failure (8).

Both vaccine hesitancy and issues of access contribute to under-vaccination and to recent outbreaks and are often country specific. Vaccine hesitancy, defined by the WHO as a "*delay in acceptance or refusal of vaccines despite availability of vaccination services*"(11) has recently been included in the WHO list of threats to global health (12) and there has been notably diminished support

for MMR vaccination in communities in Europe and the USA. While coverage of MMR1 in the UK steadily rose to >90% from the low of 80% following the discredited MMR Wakefield theory, (13) slight decreases in national coverage have recently been reported (13). In the USA, claims for non-medical exemption for school entry have been increasing (14). For other countries, including low- and middle-income countries, specific events have significantly impacted public trust and confidence in immunisation programs. For example, large measles outbreaks in the Philippines and Samoa can be directly attributed to loss of public trust in immunisation programs, in the Philippines as a consequence of the failed attempt to introduce the dengue vaccine and in Samoa as a consequence of two deaths in children following an MMR vaccine incorrectly mixed with expired anaesthetic. Both these examples illustrate that vaccine safety and communication are of vital importance in maintaining high community acceptance of vaccination. Advice from a healthcare provider is the most important predictor of vaccine uptake(15) and a greater emphasis on supporting healthcare providers with clear communication strategies for parents across the spectrum of vaccine hesitancy is needed. However, in most countries, issues of access and availability of a measles-containing vaccine is the main driver of low population coverage. Despite strong support from WHO and GAVI, introducing new vaccines into low resource settings is challenging, with the resurgence of measles in low and middle income countries linked to lack of resources, and weak health systems (16) as well as the challenges of achieving high coverage for vaccines such as MCV2 given beyond the first year of life (9).

For countries with elimination status, such as Australia, measles is a travel-associated disease. Few travellers seek pre-travel health advice, particularly those travelling to high income countries, such as the UK and other European countries experiencing large measles outbreaks. Further, expats and migrants travel frequently between their country of origin and their country of residence, and are less likely to seek pre-travel health advice (17). In an enhanced surveillance study of returned Australian travellers with measles, only 1 of 25 imported cases reported seeking pre-travel health advice and few had perceived measles as a travel-associated disease (18). Ensuring travellers have documented evidence of two doses of MMR is an important component of a pre-travel risk assessment. Importantly, opportunistic vaccination of adolescents and adults will ensure protection for future travel and is an important component in the global control of measles. In response to the current outbreaks in several Pacific Island nations, American Samoa has implemented mandatory MMR vaccination for travellers in an effort to prevent importation. Innovative interventions, in addition to routine practices, are needed to achieve and maintain high population immunity. This includes the targeting of under-immunised international travellers.

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