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Vitamin A supplementation to tackle measles: From scientific discovery to a priority health intervention in emergency settings

The problem

Many fragile and/or conflict-affected states also have high risk of natural disasters, high vulnerability to climate change and high levels of poverty¹. In complex emergency settings, large numbers of civilians can be affected by war or civil strife, food shortages and displacement. The public health consequences of mass population displacement (irrespective of cause) have been extensively documented, with high rates of mortality, morbidity, and malnutrition^{1,2}. Crowding is common and can facilitate the transmission of communicable diseases. As a result, health disasters – in the form of infectious disease epidemics – can and do occur in such settings^{2,3}.

The viral illness measles is a common cause of such epidemics^{2,3}. Measles can cause severe illness and death, especially in children, but is preventable through vaccination. Despite this, it has been reported as the leading cause of mortality in refugee and displaced populations in many countries, and the leading cause of mortality in children under five during the initial phase of several emergencies such as the eruption of Mt. Pinatubo in the Philippines in 1991, after the tsunami in Aceh in 2004, and after the 2005 South Asia earthquake in Pakistan³. Low levels of pre-existing population immunisation (a result of health service and infrastructure disruption), overcrowding, and malnutrition are thought to be the main precipitating factors.

The science

In 1932, Joseph Ellison first suggested that giving vitamin A supplementation might reduce deaths from measles in children⁴. He had recently seen new research showing that bacterial diseases that infect the linings of the throat, nose and lungs could be prevented and treated with vitamin A. This prompted him to consider whether the same was true for viral diseases that affect these tissues, such as measles. He therefore conducted a small study in children hospitalised for measles and showed that those receiving vitamin A supplements were less likely to die from the disease⁴.



Image 1: Late 1960s photograph showing a Nigerian mother and her child who was recovering from measles. Source: CDC.

In the following decades, most interest in treating and preventing measles was focussed on development of a vaccine. The impact of malnutrition on measles, and the role of vitamin A, was not fully elucidated until the 1990's when large and rigorous studies, known as randomised controlled trials, showed conclusively that treatment with vitamin A reduced morbidity and mortality in children with measles, whether or not they are thought to have a nutritional deficiency⁵. Vitamin A supplementation was shown to give other health benefits such as prevention of blindness, especially in areas where deficiency in children was not obvious, for example those who were borderline of falling below the threshold, Vitamin A supplementation was shown to prevent blindness after measles infection⁶. The Beaton Report of 1993 concluded that all deaths among children aged 6–59 months were reduced by 23% when vitamin A supplementation was provided in areas where vitamin A deficiency was prevalent⁷.

The application to policy and practice

Research led to an understanding of Vitamin A supplementation and immediate action of implementation by World Health Organization (WHO), since 1987. WHO has advocated the routine administration of vitamin A with measles vaccine in countries where vitamin A deficiency is a problem⁸ and as a high priority WHO's 'VISION 2020 - The Right to Sight Program' promotes Vitamin A supplementation to control blindness in children. It is also now recommended as standard practice in emergency settings, and



considered as a critical emergency relief measure. In their 2004 Joint Statement on Reducing Measles Mortality in Emergencies, the WHO and UNICEF advised that measles immunization with vitamin A supplementation are "a priority health intervention during and after emergencies....and among the most cost-effective preventive public health measures – particularly for displaced populations housed in camps"⁹.

Since 2009, WHO guidelines have also recommended mass measles vaccination campaigns with vitamin A supplementation even after a measles outbreak has begun¹⁰; being international guidelines, they have resulted in changes in practice in emergencies around the globe.

Did it make a difference?

In emergency relief operations in the 1980s, preventable outbreaks of

measles commonly occurred in refugee camps with subsequent high measles-associated mortality; case fatality rates (the proportion of people who get the disease that die from it) as high as 33% were reported from refugee camps in eastern Sudan¹¹.

Worldwide measles deaths are reported to have fallen from 750,000 in 2000 to 197,000 in 2007¹² and vitamin A supplementation in combination with measles vaccination is thought by many to be a significant factor contributing to this decline¹³.

Measles outbreaks continue to occur in many emergency settings, due to low levels of pre-existing population immunity, complicated by overcrowding, and malnutrition. However, vitamin A supplementation gives us an additional, low-cost intervention now have an effective, cost-effective and readily available intervention, which, if implemented early enough, can have a significant impact on measles-related mortality. Many epidemiological studies have contributed to the evidence base, which has evolved over the past 80 years, informing and influencing policies aiming to reduce measles mortality, in emergency as well as non-emergency settings.

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