

Immunization in Complex Emergencies: The Influence and Implications of Vaccine - Preventable Disease

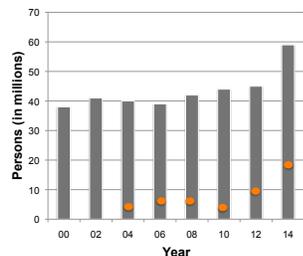
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Introduction

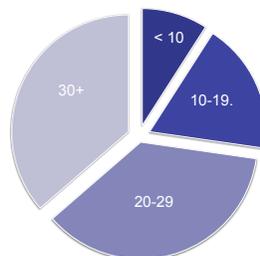
- > 40 million people are displaced annually by complex humanitarian emergencies (CHEs)
- CHEs are increasing in frequency and duration (Fig 1, 2).
- Defining features of a CHE are: displacement, armed conflict, natural or manmade disasters, political conflict, a breakdown of healthcare infrastructure, and elevated crude mortality rates
- Vaccine-preventable diseases are a known cause of significant morbidity and mortality in crisis-affected regions.
- Despite this, immunization remains an underutilized tool to decrease morbidity and mortality in this setting.

FIG 1: Displacement in the 21st Century



● Newly displaced persons that year

FIG 2: Duration of ongoing crises (years)



History and Precedent

- CHE-response efforts were developed in the 1970s and focused on water, sanitation, provision of basic medical care
- Measles vaccination was incorporated early into the response effort for various reasons:
- Measles *virus* is (i) deadly (ii) highly infectious (iii) easy to diagnosis without expensive testing
- Measles *vaccine* (i) cheap (ii) highly effective
- Measles immunization was particularly successful in CHEs because of application to expanded age groups and reduced dosing requirements.
- Since that time, multiple effective vaccines have been developed but none have been incorporated a priori into CHE response efforts as measles vaccine had been.

Epidemiology of Disease in CHE

- Expansion of vaccine delivery has been delayed due to a reported lack of pathogen specific data available in complex emergencies.
- However, Acute Respiratory Infections (ARI) and Diarrheal Disease (DD) are the two most cited causes of mortality in children < 5, worldwide, as well as in CHE.
- Streptococcal pneumonia*, *Haemophilus influenzae type B*, and rotavirus collectively make up ~ 60% of all vaccine-preventable deaths world wide.

FIG 3: Distribution of U5 deaths - worldwide

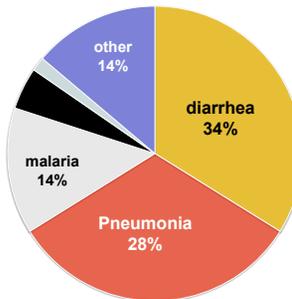
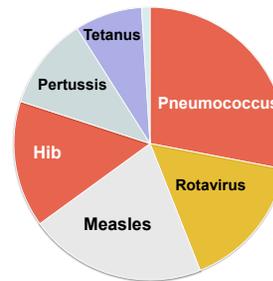


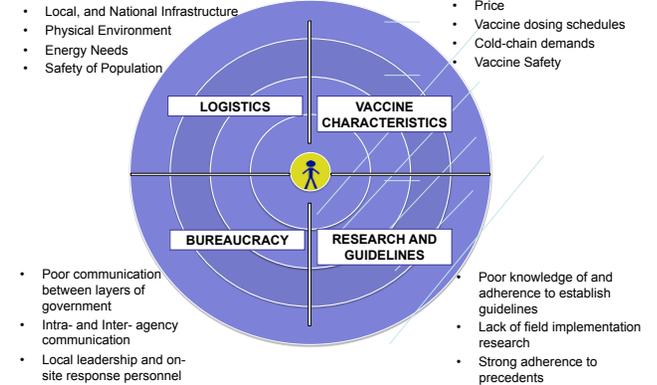
FIG 4: VPD deaths among U5 children - worldwide



Expanding Use of PCV, Hib, and Rota Vaccines

- The epidemiological evidence strongly supports the expanded use of vaccines – in particular pneumococcal conjugate vaccines (PCV), Hib, and rotavirus vaccines.
- PCV, Hib, and rotavirus vaccines have established safety and efficacy:
- PCV13 has been found to have a vaccine effectiveness (VE) of 77% in young children after just 1-dose
- A single dose PRP-OMP Hib Conjugate vaccine produces a antibody titers associated with immunity in infants.
- WHO models predict that in regions of high child mortality, increasing the age limit of rotavirus vaccination to 3 years would prevent ~160 diarrhea-related deaths per 1 death from vaccine-related intussusception.

Barriers to Vaccination in CHE



Discussion and Recommendations

- VPDs are responsible for significant morbidity and mortality in CHEs. However, vaccines continue to be an underutilized resource.
- S. pneumoniae*, *H. influenzae* type-B, and rotavirus have a consistent contribution to VPD-related deaths across diverse settings.
- Universal application of PCV, Hib, and rota vaccines should be considered in emergency response efforts.
- Efforts should be made at local and international levels to minimize barriers to vaccine distribution in high-risk and resource-limited settings, including expanded target age groups, and reduced dose schedules.

Table 1: Authors Recommendations for Expansion of Select Vaccines from Current WHO Guidelines

Vaccine	Current Dose Schedule	Recommended Minimum Dose	Current Target Age Range	Recommended Target Age Range
HIB	2-3	1	6 wk – 2 yr	6 wk – 5 yr
PCV 13	2-3	1	6 wk – 5 yr	6 wk – 14 yr
RV 5 / RV 1	3 / 2	1	6 wk – 2 yr	6 wk – 3 yr

References:

UNHCR Global Trends: Forced Displacement in 2014 – Lancet 2003; 361(9376): 2226-34 – MMWR report 2006; 55(18): 511-5 – WHO. Vaccine preventable diseases cause specific deaths, children under age 5, by WHO region, 2008. Geneva: WHO, 2008 – Vaccine 2011; 29(49): 9127-31 – J Pediatr 1992; 120(2 Pt 1): 184-9 – PLoS medicine 2012; 9(10): e1001330.