

Vaccination in emergencies

Christophe Paquet*

Epicentre and Médecins Sans Frontières, 8 rue Saint Sabin, 75011 Paris, France

Abstract

Nongovernmental organisations (NGOs) are the main actors of vaccine delivery during complex humanitarian emergencies such as large population displacements. This paper discusses the use of vaccinations against measles, cholera and meningitis in this context. The role of NGOs in the advocacy for making new and more effective vaccines available to the most vulnerable populations is also emphasised. © 1999 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Nongovernmental organisations (NGOs) are often the main, if not the only, actors of vaccine delivery during complex humanitarian emergencies. This paper intends to illustrate how specific these interventions are and to document some of the limits we face with currently available vaccines.

War, civil strife, persecution, environmental deterioration and/or economic hardship are responsible for more than 40 million refugees and internally displaced persons in the world today [1]. From a public health point of view, these ‘complex humanitarian emergencies’ are always associated with an excess mortality [2]. The major causes of death during the emergency phase of population displacements are measles, diarrhoeal diseases, malaria and ARI [3]. These accounted for 50% to 95% of all recorded refugee deaths in Thailand, Sudan, Malawi and more recently Congo (ex-Zaire) (Table 1). Sophisticated medical care is of little use for the prevention and control of these diseases, and the priorities of relief intervention include the provision of safe water, appropriate shelter and sanitation, site planning, sufficient food ration, immunisation programmes and basic health services [3].

2. Measles vaccination: the number one priority

Measles has been reported as the leading cause of death in children in several complex emergencies. In Wad Kowli, Sudan (1985) a severe epidemic resulted in over 2000 deaths over a 4-month period. In Malawi (1987–1988), more than 7000 measles cases were reported over a one-year period among the refugee population [4]. Because of poor nutritional status, vitamin A deficiency and intensive exposure to virus due to overcrowding, the measles case fatality ratio (CFR) can be particularly high in refugee settings, sometimes exceeding 20%. Complications such as secondary pulmonary infection and malnutrition are frequent [5].

However, the high mortality due to measles is preventable and mass immunisation coupled with vitamin A distribution is one of the top priorities at the initial phase of the intervention [3]. Because of the high attack rates and measles-specific mortality rates among infants, WHO recommends that, in refugee situations, all children above 6 months of age be vaccinated against measles [6]. Children vaccinated between 6 and 9 months must receive a second dose of measles vaccine as soon as possible after the age of 9 months in order to obtain a sufficient level of immunity. A mass immunisation strategy should also target children up to 12–15 years of age since a shift in age-specific incidence from younger to older groups has been

* Tel.: +33-1-40-21-28-48; fax: +33-1-40-21-28-48.

E-mail address: cpaquet@epicentre.msf.org (C. Paquet)

Table 1

Major causes of death in selected refugee populations during emergency phases, 1979–1997

Year	Host country	Causes of death	Proportion of reported deaths
1979	Thailand	malaria, ARI, diarrhoea	51–92%
1980	Somalia	measles, diarrhoea, ARI	60–95%
1985	Sudan	measles, diarrhoea	82%
1987	Malawi	measles, diarrhoea, malaria	70%
1991	Turkey	ARI, diarrhoea	75%
1994	Congo-Zaire (Goma)	diarrhoea (cholera and dysentery)	90%
1997	Congo-Zaire (Tingi–Tingi)	malaria, ARI, diarrhoea	68%

observed, and cases of measles among children up to 14 years have been on the rise [5].

Prevention of measles outbreaks in refugee settings can only be achieved if almost all susceptible individuals have been protected. Given the 85% efficacy of the measles vaccine when administered at 9 months of age, it is necessary to aim for a vaccination coverage level close to 100% in the age group 6 months to 15 years. This objective must be reached during the very first weeks following the population displacement and maintained over the duration of the crisis through routine immunisation and vitamin A supplementation of all newcomers as they arrive [3]. To achieve this, large logistics operations are often required.

3. New oral cholera vaccines: progress and controversy

Cholera is another major health risk during complex emergencies. Probably the most dramatic epidemic affecting refugees happened in Zaire (now Democratic Republic of Congo) in 1994. On July that year, some 700,000 people from neighbouring Rwanda sought refuge in and around the town of Goma, on the shores of Lake Kivu. The first cases of cholera were reported a week after the arrival of the refugees, and the outbreak was responsible for some eighty thousand 80,000 cases within one month [7]. Forty five thousand deaths were also reported in this population over the same period, the vast majority being due to cholera.

Cholera in refugees does not always follow this dramatic pattern, and more stable communities are also affected. Between 1988 and 1993, more than 21 outbreaks of cholera were reported from 10 Mozambican refugee camps in Malawi, representing a total of 17,300 cases [8]. Median attack rate was 1.9% and case fatality ratio was 1.6%. In fact, whatever the epidemiological pattern, cholera outbreaks pose serious problems to relief workers, because they overload, if not overwhelm, often very fragile relief capacities.

The classical approach of cholera control combining

water and sanitation with outbreak preparedness and case-management could be improved by the recent development of effective cholera vaccines administered orally. The most advanced of these vaccines is the killed Whole Cell B-Subunit (WC-BS) which has a field-demonstrated effectiveness of 85% for 6 months in adult [9]. This vaccines requires two doses a week apart and protection is obtained a week after the second dose.

A cost-effectiveness analysis of various cholera control strategies in refugee settings, including strategies based on the use of WC-BS vaccine, was carried out recently [10]. This study concluded that a strategy combining preemptive treatment (outbreak preparedness and case-management) with preemptive vaccination has the best impact on cholera mortality. Furthermore, adding preemptive vaccination to preemptive treatment not only saves more lives, but is also cost-effective when the price of the vaccine falls below 20 cents per dose.

WC/rBS vaccine is given with a buffer and preparation of the solution has to be made on the spot prior to its administration. In order to assess the feasibility of a mass campaign with this type of vaccine in a large refugee population, a field study was conducted in 1997 in Uganda [11]. Some 47,000 Sudanese refugees were immunised with two doses of WC/BS vaccine. Total duration of the campaign was 5 weeks. Vaccine coverage after the second round was 87%, and drop out proportion between the two rounds was 8%. Vaccine was well accepted by beneficiaries, except in very young children who often had difficulties to swallow the rather large quantity of vaccine plus buffer which was offered to them.

These two studies, commissioned by WHO, have confirmed that refugee population could benefit from new cholera vaccines. However the current price of these vaccines has been set for the traveler's market and is not affordable for large scale use in developing countries. Furthermore, at present, there is no sufficient stockpile of any oral cholera vaccine readily available to quickly cover the needs of any large preventive operation.

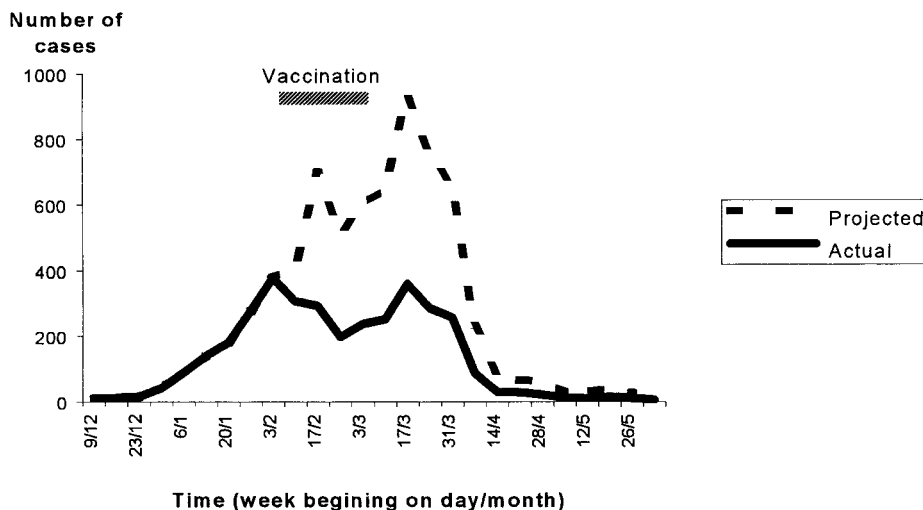


Fig. 1. Actual (with vaccination) and projected (without vaccination) number of cases of meningitis, Région des Savanes, Togo, 1996–1997.

4. Meningitis: limits of polysaccharide vaccine

Massive epidemics do not always occur in displaced populations and NGOs also intervene to help developing countries facing disrupting outbreaks of vaccine preventable diseases. Meningitis caused by *Neisseria meningitidis* in Sahelian Africa is a good example of this type of interventions. The control of these epidemics is based on reactive mass vaccination triggered by the crossing of an alert incidence threshold of 15 cases/100,000 population/week averaged over 2 weeks [12]. In our experience however, interventions based on this strategy are often launched too late and have only a limited impact on in the course of the epidemic itself. The campaign conducted by Médecins Sans Frontières in Togo in 1997 illustrates these limits. This country has a good surveillance system and alert was given quickly after the threshold was crossed. Furthermore, Togo is a small place where population to immunise could be reached rather easily. The outbreak was responsible for a total of 2992 cases and 440 deaths (Fig. 1). The vaccination campaign allowed to immunise 60,700 persons and a coverage of 79.1% was achieved. A study using a mathematical model first described by Pinner [13] was carried out in order to assess the impact of the vaccination campaign. In spite of these favourable context, mass immunisation carried out after the beginning of the outbreak only prevented 50% of the cases (Fig. 1).

This shows the limits of meningitis control strategies using the current polysaccharide vaccine, which does not procure a long lasting immunity and cannot be given preventively. This also advocate for accelerating the development of the more immunogenic conjugate vaccine which should rapidly be made available to developing countries who would benefit from it [14].

5. Conclusion

These examples show that NGOs are not only key players in the delivery of vaccine in emergency situation, but are also involved in designing and improving immunisation strategies through operational research. Meningitis and cholera situations illustrate the limits of current vaccination strategies. New and more effective vaccines are being developed who could greatly improve our capacity to effectively respond to emergencies, providing that they can be made available to the poorest countries. In this regards, NGOs such as Médecins Sans Frontières have an increasing role to play, because they defend the basic human rights of vulnerable populations. That new vaccines are unavailable to such populations because of their price is both from a humanitarian and a medical ethical perspective completely unacceptable.

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