

DPT IMMUNIZATION FOLLOWING RADIO ANNOUNCEMENT OF A DIPHTHERIA DEATH IN BELIZE

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The radio announcement of a diphtheria death in Belize City in 1982 prompted a sharp increase in the public demand for DPT immunizations. This article examines the pattern of immunizations provided and assesses the effectiveness of the vaccination effort.

Introduction

On 8 February 1982 an unimmunized male child five years of age was diagnosed as having the first case of pharyngeal diphtheria detected in Belize City, Belize, in over five years. The child died on the second day of illness. *Corynebacterium diphtheriae* was isolated from the child and was sent to the U.S. Centers for Disease Control, where subsequent tests showed the isolate to be toxigenic. Later in the same week an unimmunized child 14 years of age (an uncle of the first child) developed diphtheria, and a sibling of the index case who had been immunized with three doses of DPT vaccine was identified as a carrier.² The fourteen-year-old recovered without problems.

Following investigation of the affected household, the members of the index case's school class were all given one-time booster DPT immunizations, regardless of their immunization status. Partly to explain the reason for these school immunizations, and also to encourage vaccination of unimmunized children, a public radio announcement of the diphtheria death was broadcast. This announcement requested that

children up to the age of nine years with fever, a sore throat, or a runny nose, as well as all those requiring immunization, should be brought to either of the two public health centers in Belize City.

At the time, over 90% of all Belize City children in the 0-4 year age range had already completed their primary DPT series. Nevertheless, the ensuing increased demand for immunization services required extra staffing and hours at the public health clinics. The patterns of the resulting DPT immunizations and the implications for immunization programs are the subject of this study.

Materials and Methods

Daily immunization records were collected from the two public health centers serving Belize City. (All immunization services in the city are provided at these public health centers.) The data for each child were grouped according to whether the child was already registered at one of the child health clinics or represented a new entrant who came in response to the immunization campaign and did not routinely receive health care at the public health clinics. The data were then further grouped into age categories and the type of DPT vaccination (primary series or booster) provided. All new entrants had their addresses recorded, and a sequential 20% sample of these entrants was assigned to the appropriate census districts. (Every fifth child was selected from the register of children seen.)

Baseline immunization information was obtained from two sources: the 1981 annual report

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²Antitoxic diphtheria immunity obtained from natural sublethal exposure to the agent from diphtheria toxoid injections (usually administered in combination with pertussis vaccine and tetanus toxoid in "DPT" vaccine) protects against the disease but does not preclude colonization with *Corynebacterium diphtheriae*.

of the Expanded Program on Immunization in Belize and a 10% random sample of all child health registrants in Belize City during the period 1976-1980 inclusive (1).

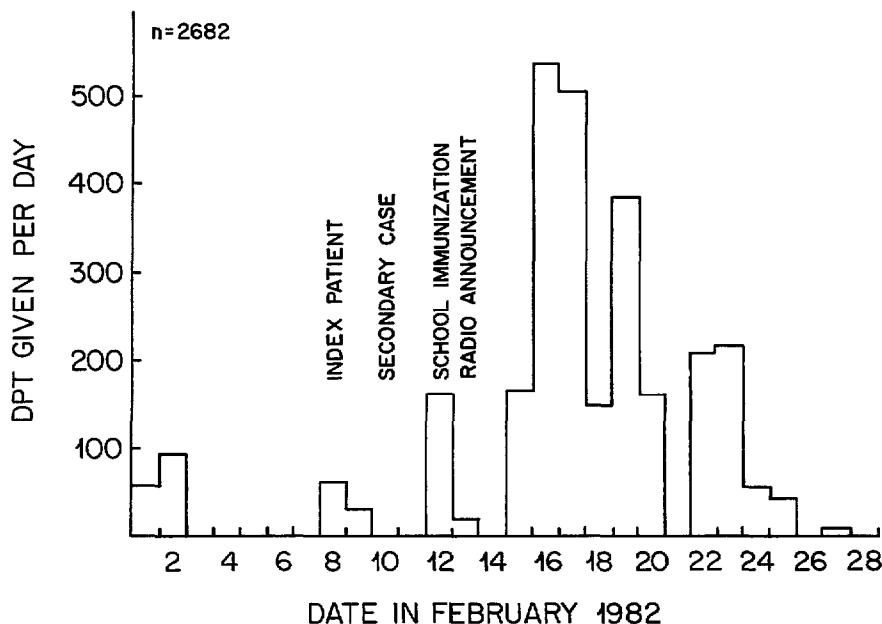
Figures from the 1980 census were used for each of the 58 districts in Belize City. Dependent variables analyzed by district were as follows: (1) immunization coverage (defined as the percentage of children under five years of age who had received their series of three DPT injections) and (2) DPT immunizations per thousand children 0-9 years of age that were administered during the February 1982 campaign. Independent variables used in the analysis (included by district) were the percentage of the population less than five years of age, the total population, the population density per square mile, the average years of education reported for adults, the average number of months worked per year by adults, the relative quality of water and sewage facilities, and the number of acute hemorrhagic conjunctivitis cases reported per thousand inhabitants during a 1981 epidemic (2).

Results

The daily distribution of DPT immunizations administered in Belize City during February 1982 is shown in Figure 1. Examination of the figure indicates a sudden increase in immunizations following the radio announcement. Gaps in the graph (showing days when no immunizations were given) reflect days on which there were no immunization clinic sessions.

Districts in Belize City that were accustomed to using the government health services received more DPT immunizations than usual during February 1982. Indeed, districts with already high levels of primary DPT completion responded most strongly to the DPT campaign ($R = .328$; $p < .014$). Also, when the rates of people presenting to the public health clinic with acute hemorrhagic conjunctivitis during the epidemic of 1981 were compared to the DPT campaign response, it was found that particular districts tended to respond similarly to both public health events ($R = .320$; $p < .016$).

Figure 1. DPT immunizations given to children 0-9 years of age following diagnosis of two diphtheria cases in Belize City in February 1982.



In addition, analysis showed that districts whose inhabitants had a higher average socioeconomic status were less likely to respond to the immunization campaign. Specifically, there was a negative correlation between employment status (months worked per year) and DPT received during the campaign ($R = -.344$; $p < .010$). There was also a possible (marginal) negative correlation between the average years of education of adult subjects and response to the DPT campaign ($R = -.230$; $p < .089$). No other significant or marginal correlations were observed.

Table 1 shows the DPT immunizations administered to children in different age groups by vaccination status, and by whether or not the children were registered with the clinics. As may be seen, boosters represented 72% of the immunizations given. An estimate of the total number of children needing primary or booster DPT immunization was made and compared to the actual number of DPT immunizations re-

ceived in February 1982. The number of primary immunizations given in February amounted to 21% of the estimated total requiring primary immunization; the number of booster immunizations given that month to children under five years of age amounted to 19% of the estimated total in that age group requiring booster immunization; and the number of booster immunizations given to children five through nine amounted to 25% of the estimated total requiring immunization in that age group. Thus, despite the much larger numbers of children coming in for boosters, the percentages involved in each case were fairly similar.

Despite this demand for vaccinations, however, construction of a map showing the DPT immunization rate by census district revealed no increase in immunization rates in districts immediately surrounding the health centers or in the area near the household of the diphtheria cases.

Table 1. DPT immunizations administered at the two Belize City public health clinics during February 1982 to children 0-9 years of age, by clinic registration status, age group, and the nature of the DPT immunization given.

	Ages of children (in years)				All children in group	% of children in group
	<1	1-4	5-9	unknown		
<i>Children registered at child health clinics:</i>						
First DPT immunization	198	41	2	—	241	28
Second DPT immunization	98	35	—	—	133	15
Third DPT immunization	89	39	1	—	129	15
Booster DPT immunization	—	277	89	—	366	42
Subtotal	385	392	92	—	869	100
% of children	44	45	11	—	100	
<i>Children not registered at the child health clinics:</i>						
First DPT immunization	17	55	78	14	164	9
Second DPT immunization	6	30	5	5	46	3
Third DPT immunization	6	34	—	3	43	2
Booster DPT immunization	2	404	1,072	82	1,560	86
Subtotal	31	523	1,155	104	1,813	100
% of children	2	29	64	6	100	
<i>All children vaccinated during the campaign:</i>						
First DPT immunization	215	96	80	14	405	15
Second DPT immunization	104	65	5	5	179	7
Third DPT immunization	95	73	1	3	172	6
Booster DPT immunization	2	681	1,161	82	1,926	72
Total	416	915	1,247	104	2,682	100
% of children	16	34	46	4	100	

Discussion

This experience demonstrates the difficulty of dealing with public health emergencies via the mass media. Although the public needs authoritative information about health threats, it is often hard to create an atmosphere eliciting an appropriate and beneficial response. In this case, the radio announcement of a diphtheria fatality caused a great increase in the immediate demand for immunization against diphtheria, but most of the immunizations were given to children least likely to benefit from them.

Mass media announcements must be designed and used very carefully by the public health authorities in order to achieve the desired response from the at-risk group without causing public panic. This makes it necessary to define the problem and the most effective means of combating it before issuing any announcement.

It is also true, however, that this logical approach sometimes fails to compete effectively for the very limited public health resources available in most developing countries—resources for which the competition may be intense. Thus, in some cases creating a crisis atmosphere is the only way of enlisting sufficient support to induce action. In other words, it is hard to claim that better epidemiologic understanding of a public health problem will lead to better utilization of scarce resources if one cannot exceed the public threshold for action.

However, once public attention is gained, efforts must be made to turn it to the best possible use. In this regard, it is worth mentioning that while the children in Belize City were receiving DPT immunizations in the wake of the diphtheria outbreak, they were also being given oral poliomyelitis vaccine. This allowed the public health authorities to raise the population's immunity to poliomyelitis significantly—in the face of active polio transmission elsewhere in the Caribbean—by co-opting the public interest in vaccination that was generated by an entirely different matter.

The case at hand also demonstrates the desirability of targeting specific groups when dealing with breakthrough cases of vaccine-preventable disease that occur during an ongoing vaccination program. Of course, each such outbreak must be investigated to ensure that there is no fundamental problem with the immunization program—such as distribution of inactive vaccine. Many times, however, as in our case, the problem is one of coverage. For despite good public health services in Belize City, 100% vaccine coverage is only rarely achieved, and so some children are left unprotected. In these circumstances, although one never wants to consider cases of vaccine-preventable disease as inevitable, it is nevertheless important to focus on the priority group of the Expanded Program on Immunization and to give primary vaccinations to children less than one year of age before spreading a dragnet for the stragglers.

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SUMMARY

In February 1982 the first diphtheria death in over five years occurred in Belize City, Belize. Public radio announcement of this death was followed by a marked increase in the demand for DPT immunization at public health clinics, even though over 90% of the children in Belize City had completed their primary series of DPT vaccinations.

The pattern of the resulting immunizations was studied in order to evaluate the effect of the radio announcement. Analysis by census districts showed that the DPT immunizations were given mainly to

children in relatively well-immunized districts and were given to relatively few children from families with high socioeconomic status. Overall, the bulk of the DPT immunizations were given to low-priority groups, with 72% being given as boosters and over 50% being given to children over five years old. The findings thus serve to illustrate the fact that mass media announcements of public health events must be planned carefully in order to elicit a response that is appropriate, effective, and beneficial.

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