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Texas Preventable Disease NEWS

contents:

BUREAU OF EPIDEMIOLOGY 1100 West 49th Street, Austin, Texas 78756 (512-458-7207)

PERTUSSIS PROJECTIONS WITH AND WITHOUT PUBLIC VACCINATION PROGRAMS IN TEXAS

Recent cost increases in pertussis vaccine make it necessary to reevaluate the cost-effectiveness of pertussis vaccination. The Centers for Disease Control have developed a mathematical model for projecting disease incidence at varying immunization levels.[1] This model, applied to Texas, confirms the common-sense idea that any decline in immunization levels of Texas infants will result in serious morbidity and mortality from whooping cough.

The 1983 incidence of pertussis in Texas will be compared with the mathematically expected incidence at 40% and 60% vaccine coverage. These levels were chosen because even if no public vaccination programs were in place, it is expected that between 40% and 60% of the population would obtain pertussis vaccine from private physicians.

The mathematical models make the following assumptions (all of which are referenced by Hinman):

1. Vaccine efficacy is 80% after the third dose.

2. The age distribution of pertussis cases is such that 14% of cases are under one year of age, 81% are between 1 and 4 years, and 5% of cases occur in 5-year-olds. No older children or adult cases are included in this model.

3. Expected rates of complications and death are derived from studies in Britain that show:

AGE GROUP	% HOSPITALIZED	% MORTALITY	% ENCEPHALITIS
< 6 mo	60	1.3	.025
6-11 mo	28	.04	.025
1- 4 yrs	6	.04	.025
5 yrs	1.7	.04	.025

4. The Texas 1984 estimated populations are 127,867 under age 6 months, 127,867 age 6 to 11 months, 1,076,744 age 1 to 4 years, and 270,700 5-year-olds, for a total susceptible population of 1,603,178.

Table 1 shows the 1983 estimates of the number of cases of pertussis in Texas given that about 91.6% of the 0- to 5-year-olds were appropriately vaccinated for age. The figures in the table assume that only one third of pertussis cases in Texas are in fact reported to the health department, but that all deaths due to pertussis are reported. Thus, among 0- to 5-year-olds, it estimates only 249 cases of pertussis occurring per year, most of them under 6 months of age. Pertussis in this group is

not preventable because these children are too young to have received three doses of pertussis vaccine. Using the percentages requiring hospitalization quoted by Hinman, it is estimated that 92 of these cases were hospitalized. The Bureau of Epidemiology is aware of only one death and no cases of encephalitis due to pertussis in Texas during 1983.

Table 2 shows similar data based on a logistic model assuming that only 60% of the children <6 years of age in Texas received three doses of pertussis vaccine. Even if the private sector managed to adequately vaccinate 60% of the population, the model suggests that there would be 5,754 cases of pertussis, with 627 of these requiring hospitalization. At that level, the model predicts at least seven deaths and one case of encephalitis due to pertussis. As seen in Table 3, if the private sector were only able to adequately vaccinate 40% of the children, then the model predicts 9,707 cases of pertussis of which 1,058 would require hospitalization. At that level, the model predicts 12 deaths and at least two cases of encephalitis each year.

It is also useful to examine Table 2 with attention to the age groups that are most affected. Even if there were only a one-year lapse in public funding for immunizations, followed by a return to current levels, the cost in morbidity and mortality would be high. Among children less than 1 year of age, the model predicts 805 cases of pertussis, of which 352 would require hospitalization, and five would die. For this reason, even a short-term lapse in monies to provide vaccinations to the children of Texas would take a heavy toll.

This article was written by Tracy L. Gustafson, MD, Director, Infectious Diseases Division, Bureau of Epidemiology, Texas Department of Health.

REFERENCE:

1. Hinman AR, Koplan JP. Pertussis and pertussis vaccine: reanalysis of benefits, risks, and costs. J Am Med Assoc 1984;251:3109-13.

TABLE 1

ESTIMATED PERTUSSIS MORBIDITY AND ACTUAL MORTALITY - TEXAS, 1983*

AGE	CASES	HOSPITALIZED	DEATHS	ENCEPHALITIS
<6 mo	129	77	1	0
6-11 mo	39	11	0	0
1- 4 yrs	70	4	0	0
5 yrs	11	0	0	0
TOTAL	249	92	1	0

*33% reporting assumed
ESTIMATED INCIDENCE IN 1- TO 4-YR-OLDS = 6.5 PER 100,000

TABLE 2

MATHEMATICALLY PROJECTED PERTUSSIS MORBIDITY AND MORTALITY
IN TEXAS AT A 60% IMMUNIZATION LEVEL

AGE	CASES	HOSPITALIZED	DEATHS	ENCEPHALITIS
< 6 mo	402.8	240.1	5.2	0.1
6–11 mo	402.8	111.6	0.2	0.1
1– 4 yrs	4660.7	270.3	1.9	1.2
5 yrs	287.7	4.9	0.1	0.1
TOTAL	5753.9	626.8	7.4	1.4

EXPECTED INCIDENCE IN 1– TO 4–YR–OLDS = 432.8 PER 100,000

TABLE 3

MATHEMATICALLY PROJECTED PERTUSSIS MORBIDITY AND MORTALITY
IN TEXAS AT A 40% IMMUNIZATION LEVEL

AGE	CASES	HOSPITALIZED	DEATHS	ENCEPHALITIS
< 6 mo	679.5	405.0	8.8	0.2
6–11 mo	679.5	188.2	0.3	0.2
1– 4 yrs	7863.0	456.1	3.1	2.0
5 yrs	485.4	8.3	0.2	0.1
TOTAL	9707.4	1057.5	12.4	2.4

EXPECTED INCIDENCE IN 1– TO 4–YR–OLDS = 730.3 PER 100,000

* * *

NOTICE TO READERS

The Editor of Texas Preventable Disease News (PDN) welcomes written accounts of communicable disease and other public health problems encountered and investigated by local health professionals throughout the state. During 1983, numerous articles published in PDN were contributed by individual health care workers in Texas. The Bureau of Epidemiology encourages public health workers to share their experiences and information relating to matters of professional public health interest or concern. Previously published accounts of this nature have been favorably received by the readership. Interested authors are requested to contact the Editor of PDN for additonal information pertaining to general guidelines for publication at (512) 458-7207 or STS 824-9207.

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CAT RABIES

The incidence of rabies in cats continues to exceed the incidence in dogs by four to one. From January through July, 1984, twelve (12) cats and three (3) dogs were demonstrated to have been rabid by testing at the Bureau of Laboratories. Public health personnel and health practitioners should continue to remind the public of the danger of rabies in cats and the need for immunization of cats, as well as dogs, against rabies.

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