GALVESTON COUNTY HEALTH DISTRICT

4C's Clinics, Public Health Programs, Galveston E.M.S.

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Retrospective Assessment of Preschool Vaccination Status In Galveston County, Texas, 2003

Prepared by GCHD Epidemiology Department, 2/2004

Summary

Vaccination coverage of Galveston County preschool children was assessed through a retrospective sample survey of students enrolled in kindergarten during the fall of 2003. These children were age 5 or 6 at the time of the survey and were two years of age in 1999-2000. Records were reviewed for 875 children in 26 schools.

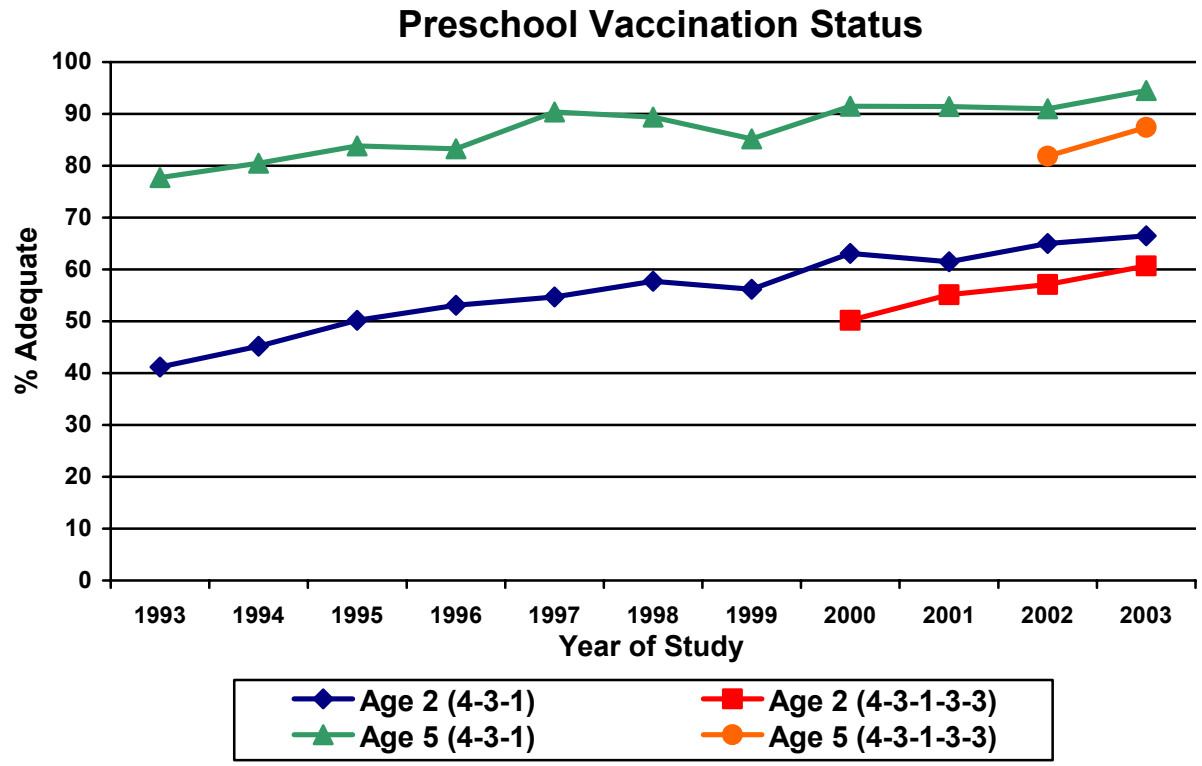
Using the Healthy People 2010 objective, the proportion of county children appropriately vaccinated by age 2 was 3.9% higher in 1999-2000 than in the previous year but substantially lower than the national goal of 80%. Survey results indicate that 60.7% of the children were adequately immunized with DTP4, polio3, MMR1, Hib3 and HB3 (4-3-1-3-3) by age 2. Compared to last year, increases in vaccination coverage were seen at all ages from 3 months through 5 years. This survey found 87.4% of students adequately immunized (4-3-1-3-3) at age 5. Using the previous (Healthy People 2000) standard, the 2003 survey would show 66.5% of 2-year-old and 94.5% of 5-year-old children adequately immunized with DTP4, polio3 and MMR1 (4-3-1). These results reflect improvement of 25.3% for 2-year-old children and 16.8% for 5-year-olds since 1993.

Substantial decreases were observed from the proportion adequately vaccinated at age 3 months (80%) to that at age 7 months (58.2%), and from age 12 months (77.7%) to age 19 months (49%). This is evidence of the need for effective vaccination tracking systems that can generate reminders to parents and providers.

The percentages of children at various ages who received certain specific single vaccine doses were higher than the percentages of children who had received the complete recommended schedule of vaccinations. If every appropriate vaccination had been given during vaccination visits, an additional 2.7% of surveyed children would have been up to date at 2 years. This may indicate that medical providers do not always provide all age-appropriate vaccinations simultaneously as recommended.

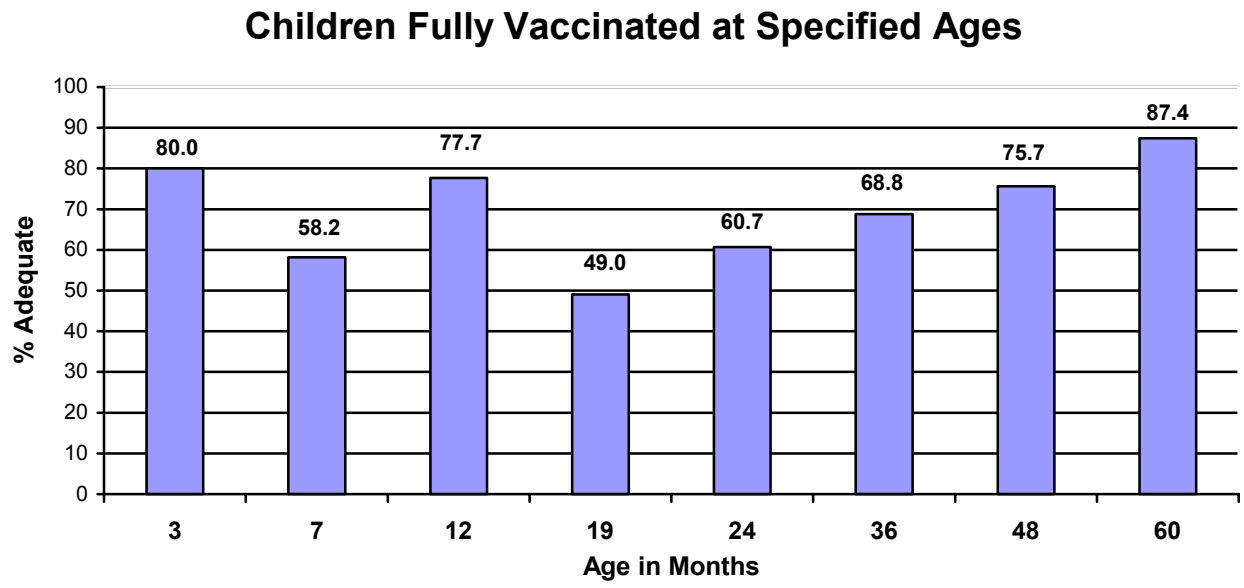
The results of this survey can be used to select target areas for special vaccination efforts. The 10 schools with the lowest rates of adequate vaccination for 2-year-olds (all below 54%) serve the following areas: Bacliff, Dickinson, Galveston (east, central and west), League City (east and west), Santa Fe, and Texas City (east).

Figure 1



NOTE: 4-3-1 Refers to 4 DTP/ 3 polio/ 1 MMR
4-3-1-3-3 Refers to 4 DTP/ 3 polio/ 1 MMR/ 3 Hib/ 3 HB

Figure 2



NOTES: Adequate vaccination status was defined as follows:
Age 3 months: DTP1, polio1, Hib1, and HB1
Age 7 months -12 months: DTP3, polio2, Hib2, and HB2
Age 19 months - 60 months: DTP4, polio3, MMR1, Hib3, and HB3

Introduction

Vaccinations are among the most cost-effective health care services available. Young children are among the population segments most susceptible to vaccine-preventable diseases. Most currently-recommended vaccinations should be received before age 2. The Healthy People 2000 objective was that 90% of children would have the basic series of vaccinations including four doses of diphtheria-tetanus-pertussis (DTP or DTaP) vaccine, three doses of polio vaccine, and one dose of measles-mumps-rubella (MMR) vaccine by age 2(1). In recent years a single dose of varicella vaccine (VZV) given after the first birthday, three doses of *Haemophilus influenzae* type b (Hib) vaccine, and three doses of hepatitis B (HB) vaccine have been added to the Recommended Childhood Immunization Schedule as recommendations or requirements (2). The Healthy People 2010 objective 14-24a is to increase the proportion of young children who receive all vaccines that have been recommended for universal administration for at least 5 years. The target for this objective is that 80% of children aged 19-35 months will have 4DTP/3polio/ 1MMR/3Hib/3HB, also known as the 4-3-1-3-3-series (3). Other combinations are also reported.

The Texas Department of Health (TDH) vaccination registry (ImmTrac) is used by the Galveston County Health District (GCHD) and other Galveston County health care providers, but this system is not yet comprehensive for the entire county. The Galveston County Immunization Coalition is promoting use of ImmTrac among additional healthcare providers. In the absence of a universal vaccination data system, the best available method of reviewing the vaccination status of young children is to conduct sample surveys.

Public and private schools are required by law to maintain vaccination records on their students. Because almost all children attend kindergarten, records of students enrolled in kindergarten provide the most complete set of data available with which to review the vaccination status of our youngest residents. A carefully selected random sample of the records of all children enrolled in kindergarten can provide useful information that is representative of the entire population of kindergarteners. This method is called retrospective assessment because it reviews records of children who are 5 years old and documents their vaccination status not only at the present time but also in the past, particularly at age 2. Software available from the U.S. Centers for Disease Control (CDC) greatly facilitates the process (4,5).

During fall, 2003, for the eleventh consecutive year, the GCHD Epidemiology Department conducted a retrospective sample survey of Galveston County kindergarten students in order to assess their vaccination status. CDC retrospective survey sampling software was used. Enrollment data were obtained for the 46 known county schools with kindergarten programs. These included 30 public and 16 private schools. Total kindergarten enrollment in these schools was 3,778 or slightly more than the U.S. Census Count (3,611) of total county residents 2 years of age in 2000 (6). The random sample selected through use of the CDC software included 875 specific records from 26 schools. None of the selected records were missing a vaccination history (compared to 12 in 2002 and 11 in 2001). This is the first time in 11 surveys that no vaccination histories were missing. Only three of the 875 records selected included an exemption for religious reasons. Essential information from the records included birth dates and the dates on which the following vaccinations were received: DTP (or DTaP), polio, MMR, Hib, HB and VZV. The software evaluates entered data in accordance with recommended age-specific vaccination schedules (2). Through use of the software, numbers and percentages of records in compliance with recommended schedules were tabulated for various ages.

Varicella vaccination (VZV) is not required if the child has had chickenpox disease. A history of chickenpox can be reported by the parent and does not require a doctor's verification. Furthermore, because the varicella vaccination requirement went into effect in 2000, it is not yet included in the Healthy People 2010 goal, which applies only to vaccines that have been recommended for universal administration for 5 years or more.

School administrative and nursing personnel were very cooperative and few problems were encountered in obtaining the necessary data. Printouts were requested from the schools that maintain computerized vaccination records. Ten schools chose to send printouts rather than have GCHD staff come to the premises to copy records. This system is convenient for both Health District staff and school nurses.

Minimum Texas vaccination requirements for children at school enrollment (5 years of age) have included, since 8/1/97, 4 doses of DTP (or DTaP) with one dose after the fourth birthday, 3 doses of polio vaccine with one dose after the fourth birthday, one MMR received on or after the first birthday, three doses of hepatitis B vaccine, and a second measles vaccination (usually a second MMR). A single dose of varicella given after the first birthday became a requirement on 8/1/2000 (7). A child who has received all recommended vaccinations would have received 4 DTP, 3 polio, 1 MMR, 3 Hib, 3 HB and 1 varicella by age 2 plus one more DTP, one more polio, and one more MMR by age 5. The combination considered adequate by Healthy People 2010 in Objective 14-24a (also a "Leading Health Indicator") for assessing

immunization coverage in children ages 19-35 months is 4 DTP, 3 polio, 1 MMR, 3 Hib, and 3 HB (3).

Results

TABLE 1. Percentages of Galveston County kindergarten children receiving specified vaccinations ("coverage dosages") by specified ages. Note that the surveyed children became 2 years of age about 3 years before each survey (e.g. in 1999-2000 for the 2003 survey).

Year of Survey-->	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
3 Months											
DTP1 & polio 1	64.6	66.6	72.8	72.0	77.9	77.3	80.3	82.9	83.8	85.0	85.5
DTP1/polio1/Hib1/HB1								66.9	74.6	75.8	80.0
7 Months											
DTP3 & polio 2	38.1	35.6	41.1	42.0	46.5	46.2	51.5	57.3	59.2	62.5	63.0
DTP3/polio2/Hib2/HB2								46.7	53.1	55.7	58.2
1 Year											
DTP3 & polio 2	62.8	60.8	67.8	67.4	71.8	72.5	77.2	79.7	82.3	82.9	83.4
DTP3/polio2/Hib2/HB2								64.3	74.0	74.2	77.7
DTP3	62.8	61.0	67.9	67.7	72.1	72.9	77.7	80.1	82.5	83.6	84.0
Polio2	81.9	78.8	84.7	83.6	87.8	86.8	89.6	90.9	92.6	96.3	93.0
19 Months											
DTP4/polio3/MMR1	25.8	30.7	33.9	36.2	38.9	42.7	45.9	52.4	50.5	55.2	53.5
DTP4/polio3/MMR1/Hib3/HB3								42.1	45.0	48.5	49.0
Age 2											
DTP4/polio3/MMR1	41.2	45.2	50.2	53.1	54.7	57.7	56.2	63.1	61.5	65.0	66.5
DTP4/polio3/MMR1/Hib3/HB3							46.3	50.2	55.1	56.8	60.7
DTP4/polio3/MMR1/Hib3/HB3/VZV								12.2	32.4	39.4	53.8
DTP4	43.1	47.0	53.0	55.6	58.3	61.7	63.7	66.8	67.7	71.1	72.9
Polio3	77.2	78.2	83.4	76.3	78.1	80.4	84.7	88.8	89.0	87.6	85.4
MMR1	77.7	78.0	77.4	76.0	77.5	81.7	77.4	84.1	81.5	82.9	84.9
HepB3							78.3	83.8	86.1	84.8	87.1
VZV								19.5	46.9	57.6	76.6
Age 3											
DTP4/polio3/MMR1	53.8	58.7	63.0	64.3	69.2	66.2	65.9	73.4	70.5	74.5	75.5
DTP4/polio3/MMR1/Hib3/HB3										63.6	68.8
Age 4											
DTP4/polio3/MMR1	59.5	65.6	70.2	70.0	75.4	74.2	70.0	78.6	77.0	79.2	82.2
DTP4/polio3/MMR1/Hib3/HB3										68.1	75.7
Age 5											
DTP4/polio3/MMR1	77.7	80.5	83.8	83.3	90.4	89.4	85.2	91.5	91.4	91.0	94.5
DTP4/polio3/MMR1/HB3							79.1	87.5	87.6	86.4	93.5
DTP4/polio3/MMR1/HB3/VZV								63.5	69.9	80.1	91.4
DTP4/polio3/MMR1/Hib3/HB3										81.9	87.4
DTP4/polio3/MMR1/Hib3/HB3/VZV											85.5

TABLE 2. Percentages of students attending 26 surveyed Galveston County schools receiving specified vaccinations by age 2 and age 5. These children became 2 years of age in 1999 or 2000.

School	City	Age 2 Years		Age 5 Years		Missing Records
		DTP4/Polio3/ MMR1	DTP4/Polio3/ MMR1 /Hib3/HB3	DTP4/Polio3/ MMR1	DTP4/Polio3/ MMR1/HB3/Hib3	
K.E. Little	Bacliff	54.00	52.00	94.00	88.00	0
Bay Colony	Dickinson	60.00	52.00	96.00	88.00	0
Hughes Road	Dickinson	40.00	36.00	92.00	80.00	0
Silbernagle	Dickinson	80.00	76.00	98.00	94.00	0
C.W. Cline	Friendswood	68.00	68.00	90.00	90.00	0
Westwood	Friendswood	72.00	66.00	94.00	90.00	0
Burnett	Galveston (central)	64.00	64.00	92.00	84.00	0
Morgan	Galveston (central)	68.00	68.00	96.00	96.00	0
Oppe	Galveston (west)	84.00	68.00	100.00	96.00	0
Parker	Galveston (westl)	76.00	44.00	100.00	60.00	0
Rosenberg	Galveston (east)	52.00	44.00	84.00	76.00	0
Scott	Galveston (central)	64.00	52.00	100.00	80.00	0
Stewart	Hitchcock	60.00	56.00	80.00	76.00	0
Lavace Stewart	Kemah	88.00	72.00	100.00	84.00	0
Early Childhood	La Marque	57.33	56.00	93.33	90.33	0
Mainland Prep.	La Marque	76.00	76.00	100.00	100.00	0
Ferguson	League City (west)	80.00	68.00	100.00	88.00	0
Hall	League City (west)	78.00	72.00	100.00	90.00	0
Hyde	League City (west)	84.00	84.00	92.00	92.00	0
League City	League City (east)	52.00	52.00	88.00	80.00	0
Ross	League City (west)	56.00	52.00	96.00	92.00	0
R.J. Wollam	Santa Fe	61.33	53.33	93.33	82.67	0
Heights	Texas City (east)	72.00	68.00	100.00	92.00	0
Kohlfeldt	Texas City (east)	64.00	56.00	96.00	92.00	0
Northside	Texas City (east)	72.00	64.00	96.00	92.00	0
Roosevelt-Wilson	Texas City (east)	56.00	52.00	88.00	88.00	0

Discussion

Texas Department of Health has not released statewide retrospective survey results since 1999; therefore, direct comparison to recent statewide data is not possible. The National Immunization Survey provides data on immunization status of the nation, states, and certain large metropolitan areas. The methods used in this survey (random sampling by telephone) are different so results are not directly comparable to a survey of actual records. However in the absence of more appropriate comparisons, results from the national survey are provided. In 2000, when most of the children currently enrolled in kindergarten were 2 years of age, 72.8% (+/- 0.9%) of children in the national sample were vaccinated with the 4-3-1-3-3 series by age 2, and 63.5% (+/- 4.0%) of 2-year-olds in the Texas sample had completed this series (8). In the 2003 Galveston County survey, 60.7% of the children currently enrolled in kindergarten had received the 4-3-1-3-3 series by 2 years of age. These data imply that Galveston County 2-year-old children were immunized at a rate lower than that for the State of Texas (although this is not a statistically significant difference) and lower than the national average, but remember the differences in survey methods. The county survey shows that there was still a substantial gap between the vaccination levels of Galveston County children who were age 2 in 1999-2000 and the national goal of 80% adequately vaccinated. These survey results may reflect some omissions of vaccinations on records, but Texas regulations state that exact dates for all vaccinations should be on file (7).

In comparison to survey results from the previous year, for all combinations of vaccinations there were increases in vaccination coverage at all ages from 3 months to 5 years. Single antigen coverage dropped slightly only for the second dose of polio vaccine at age 1 year and the third polio at age 2 years. While changes from one year to the next are often insignificant, the trend over time is much more

impressive. The 2003 survey results reflect improvement of 25.3% for 4-3-1 series coverage of 2-year-old children and 16.8% for 5-year-olds compared to 1993 (see Table 1). The coverage of 4-3-1-3-3 for 2-year-olds has increased by 14.4% since 1999, the first year that combination was tracked by this survey.

This is the fifth year varicella vaccination and history of chickenpox disease data have been collected. Varicella (VZV) vaccination is not required if a child has had chickenpox disease. We have seen a substantial increase in the number of children immunized with VZV at age 2 (76.6% in 2003 compared to 57.6% in 2002, 46.9% in 2001 and 19.5% in 2000).

Table 1 and Figure 2 show that 80.0% of county children were adequately vaccinated at age 3 months (with DTP1/polio1/Hib1/HB1). This percentage dropped to 58.2% by age 7 months (DTP3/polio2/Hib2/HB2), rose to 77.7% by age 1 year (DTP3/polio2/Hib2/HB2), dropped 49.0% at age 19 months (DTP4/polio3/MMR1/Hib3/HB3), and rose to 60.7% at age 2 (DTP4/polio3/MMR1/Hib3/HB3). The declines to low proportions adequately vaccinated at ages 7 months and 19 months, plus the observation that the relatively high proportion adequately vaccinated at age 3 months is not achieved again until after 4 years of age, are evidence of the need for effective vaccination tracking systems which will follow all children as they grow older and generate reminders to parents and/or providers as necessary. GCHD Immunization Clinics have implemented follow-up protocols including autodialed telephone reminders, postcard mail outs and home visits for the children who receive vaccination in the GCHD Immunization Clinics and the 4Cs Clinics. This has improved the rates for these children, but has not yet shown much impact on the countywide rates as assessed by retrospective survey. The Galveston County Immunization Coalition promotes the use of ImmTrac, which includes a recall and reminder function, among other health care providers.

The survey results show that vaccination levels for most specific single vaccine doses (such as polio2 or MMR1) were better at any age than the levels for completion of the recommended schedule of vaccinations. For example, 84.9% of surveyed children had received an MMR by age 2 but only 60.7% also had their DTP4, polio3, Hib3 and HB3. Such data indicate that medical providers sometimes fail to provide all appropriate vaccinations on particular office visits. One of the Standards for Pediatric Immunization Practices is: "Providers administer simultaneously all vaccine doses for which a child is eligible at the time of each visit"(9). Eliminating missed opportunities would have allowed 24 (2.7%) more of the surveyed children to be up-to-date at 2 years of age with the recommended 4-3-1-3-3 series.

The results of this survey can be used to identify target areas for special vaccination efforts. Since most childhood vaccinations should be received by age 2, vaccination levels at that particular age are appropriate for this purpose. The 10 schools with the lowest vaccination coverage rates, all below 54% for the 4-3-1-3-3 series at age 2, serve the following areas: Bacliff, Dickinson, Galveston (east, central, and west), League City (east and west) and Texas City (east).

References

1. National Center for Health Statistics. Healthy People 2000 Final Review. Hyattsville, MD: Public Health Service. 2001.
2. CDC. Recommended Childhood Immunization Schedule, United States, 2003 (http://www.cdc.gov/nip/recs/child-schedule.pdf).
3. U.S. Department of Health and Human Services. Healthy People 2010. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: U.S. Government Printing Office, November 2000. Vol 1, p 42.
4. Centers for Disease Control and Prevention. Retrospective Evaluation of Immunization Histories (software and user's guide). Atlanta, GA: National Center for Prevention Services, Division of Immunization, Data Management Branch, Sept. 1, 1992.
5. Centers for Disease Control and Prevention. Clinic/Provider Assessment Software Application for Windows (WinCASA) Version 1.2 (software and user's guide). Atlanta, GA: National Immunization Program, Data Management Division, Assessment Branch, February 21, 1999.
6. U.S. Census Bureau, Census 2000. http://factfinder.census.gov
7. Texas Department of Health Immunization Division. Immunization Requirements for Children and Students. Austin, TX: Texas Department of Health, stock # 6-103 (Rev. May 2002).
8. CDC. National, State, and Urban-Area Vaccination Coverage Levels Among Children Aged 19-35 Months – United States, 2000. MMWR 2001; 50:637-641.
9. CDC. Standards for Pediatric Immunization Practices. Atlanta, GA: National Center for Prevention Services, 1993.