

Exemptions to School Immunization Requirements: The Role of School-Level Requirements, Policies, and Procedures

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Laws requiring that children be immunized before they begin school have contributed to a 98% to 100% reduction in the incidence of most vaccine-preventable diseases (VPDs).¹ Schools have been sites of transmission for measles, pertussis, varicella, and other VPDs. State immunization laws provide a safety net for immunization programs, ensuring that nearly all school-aged children are vaccinated. These laws demonstrate a public commitment to vaccination. As noted by Dr Walter Orenstein, former director of the National Immunization Program, "school laws establish a system for immunization, a system that works year in and year out regardless of political interest, media coverage, changing budget situations, and the absence of vaccine-preventable disease outbreaks to spur interest."^{2(pS23)}

Currently, all states require documentation of vaccination for school entry, and many states have laws requiring vaccination for licensed child care and college entry. Some state laws specify which vaccines and how many doses are required, while other states authorize the state health officer or health board to determine the details of vaccination requirements.³

All states permit exemptions for individuals who have medical contraindications to vaccination. To qualify for medical exemptions, parents or guardians usually obtain a letter or other documentation from a physician. Some states also allow nonmedical exemptions, generally categorized as religious or philosophical. The distinctions between these exemptions have been controversial, and some groups have attempted in recent years to broaden state religious exemptions to include philosophical exemptions.^{3,4} At present, 48 states permit religious exemptions (all but Mississippi and West Virginia),

Objectives. Our goal was to determine whether school-level variability in implementation of immunization requirements is associated with the likelihood of a child having received an exemption to school immunization requirements.

Methods. We surveyed 1000 school immunization personnel in Colorado, Massachusetts, Missouri, and Washington. We explored associations between school implementation of immunization requirements and the likelihood of a child having an exemption using logistic regression models.

Results. School policies associated with an increased likelihood of children having exemptions included lack of provision of written instructions for completing the school immunization requirement before enrollment, administrative procedures making it easier to claim an exemption, and granting of philosophical exemptions. In the 2 states we surveyed where philosophical exemptions are not authorized (Massachusetts and Missouri), 17.0% and 18.1% of schools reported permitting philosophical exemptions.

Conclusions. Inconsistencies in the interpretation and implementation of school immunization laws contribute to variability in rates of exemptions. School policies should be reviewed to ensure consistency with the intent of state laws. (*Am J Public Health.* 2005;95:436–440. doi:10.2105/AJPH.2004.046201)

and 19 permit philosophical or personal exemptions.^{5,6}

Two earlier studies documented the relationship between exemptions and increased risk of VPDs during the 1980s and 1990s. One of these studies showed that exempt children in Colorado were 22 times more likely to contract measles and about 6 times more likely to contract pertussis than vaccinated children.⁷ The other, a national study, showed that exempt children were 35 times more likely to contract measles than vaccinated children.⁸ Children who cannot be immunized for medical reasons, children who are too young to be vaccinated, and the few who do not respond to vaccines are at risk of contracting VPDs from unimmunized children with exemptions. In the Colorado study, schools that had pertussis outbreaks had a higher percentage of exempted children than schools without outbreaks (4.7% vs 1.3%; $P < .001$).⁷ At least 11% of children who developed measles after having received 1 dose of vaccine were

infected through contact with an exempted child.⁷

A study conducted by Rota et al. explored state variability in implementation of immunization requirements and associations between state policies and procedures and state exemption rates.⁹ This study revealed that the complexity of paperwork or effort required to complete the exemption process was inversely related to the proportion of exemptions filed. In the present study, we sought to determine (1) within-state variability in implementation of immunization requirements and (2) associations between school policies or procedures and the likelihood of a child having an exemption.

METHODS

We selected for our survey 1000 public and private elementary school officials in 2 states that allow philosophical exemptions (Colorado and Washington) and 2 states that

do not allow such exemptions (Massachusetts and Missouri). These states were selected because they reported medium to high exemption rates in relation to other states and varied in their procedures in regard to granting exemptions.⁹ In each state, the 150 schools with the highest proportions of exemptions, the 50 schools with the lowest proportions of exemptions, and 50 schools randomly selected from the remaining schools (i.e., $n=250$ schools per state) were sampled. School proportions of exemptions were based on 3 to 5 years of school entry data submitted from schools to health departments.

As a means of avoiding oversampling small schools with unstable proportions of exemptions, schools' proportions of exemptions were stabilized by calculating a weighted average of the overall exemption proportion across all schools in the state and a given school's observed proportion of exemptions. These weighted averages depended on the variability (variance) of the observed proportion of exemptions. Elementary schools were eligible if the respondent in the school had not already been selected for the study. Respondents were eligible if they worked directly with parents to meet school immunization requirements.

Survey Procedures

We requested that schools have the person who worked most directly with parents on immunization issues complete the study survey. Surveys were mailed from The Johns Hopkins Bloomberg School of Public Health. Respondents were requested to mail a preaddressed postcard to an independent party indicating their willingness to participate, and anonymous surveys were mailed back to Johns Hopkins. Written and telephone follow-ups were conducted by the third party so that the investigators would not have knowledge of who had completed or refused to complete a survey. These procedures were designed to reduce information bias stemming from self-reports. Surveys were mailed to Massachusetts schools in May 2001 and to schools in the remaining states in October 2001. Telephone and mail follow-up continued in all states until June 2002.

Survey Content

Respondents were asked to report the number of exempted children (for 1 or more vaccines) and the number of fully vaccinated children in kindergarten through grade 4 during the current school year; how the school ensures that students have met the immunization requirement; the types of exemptions permitted by the school; the process required for claiming an exemption; how parents are made aware of the exemption option; if exemptions are ever denied and, if so, for what reasons; the time period for which exemptions are valid; and other procedures used to ensure that immunization requirements are met. The survey required approximately 30 minutes to complete, and a sample is available online.¹⁰ Among the 908 eligible schools, the response rate was 65.4%.

Data Analysis

We explored associations between schools' implementation of immunization requirements and the likelihood of a child having an exemption using logistic regression models. The number of exempt children in each school was divided by the total number of students in the school (as the dependent variable); adjustments for within-school correlations were made via generalized estimating equations through the Stata *blogit* procedure (Stata Corp, College Station, Tex). Models also were adjusted for state, type of school (public vs private), and whether the respondent had been trained as a nurse. A general administrative difficulty construct (range: 0–4; 1 point for each policy) was developed on the basis of school requirements in regard to (1) annual renewals; (2) letters from parents requesting religious exemptions; (3) signatures from religious leaders, school officials, or physicians; and (4) provision of information about the risks of not vaccinating to parents requesting exemptions. We assessed the assumption of a linear relationship between administrative difficulty and the log odds ratio of exemptions by fitting the model with dummy variables. We calculated odds ratios (ORs) from these analyses separately for states that do and do not authorize philosophical exemptions.

Assessment of Nonresponse Bias

We assessed selection bias due to refusal to participate or loss to follow-up by examining

the differences among 3 groups of schools: those that participated, those lost to follow-up, and those that refused to participate. These groups were compared in terms of size of school and proportion of exemptions. In addition, we compared community-level characteristics by linking the zip code of each school to US Census Bureau demographic data, including racial makeup, average household income, education level, and population density. We assessed selection bias stemming from questions being left blank using the same methods (i.e., comparing respondents who completed key questions and those who left them blank). Satterthwaite *t* tests were used in making comparisons in means between groups.

RESULTS

Among the 1000 selected participants, there were 908 eligible schools. Eight hundred fifty-four schools had identifiable persons responsible for vaccines; 594 of these (65.4%) completed surveys. Among the 260 eligible respondents who did not complete surveys, 243 actively refused and 17 passively refused by stating in a follow-up telephone call that they would complete a survey but never doing so.

In comparison with schools that declined to respond, responding schools had a higher mean number of students (319.5 vs 263.8; $P=.05$) and were located in zip code areas where more people had a high school education or less (51.7% vs 44.6%; $P<.01$). Respondents who did not report the number of students enrolled in their schools ($n=39$) were more likely to report that their schools permitted philosophical exemptions than respondents who did report the number of students enrolled ($n=555$; 71.8% vs 52.1%; $P=.02$). There were no associations between not reporting number of exemptions ($n=40$) and school policies. Schools not reporting numbers of exemptions or students or both ($n=59$), could not be included in analyses focusing on likelihood of exemptions.

As a result of the sampling methodology, in all of the states included, the mean proportion of exemptions for participating schools was higher than the overall state proportion of exemptions. State median proportions of exemptions, by quartile, and mean proportions of

TABLE 1—Study Populations, by State, and Proportions of Exemptions

State	Respondents, No. (%)	Proportion of Exemptions in Participating Schools			State-Reported Proportion of Exemptions ^a
		Lower Quartile	Median Quartile	Upper Quartile	
State does not permit philosophical exemption					
Massachusetts	161 (27.0)	0.1	1.0	2.6	0.6
Missouri	153 (25.8)	0.0	0.6	1.7	0.4
State permits philosophical exemption					
Colorado	137 (23.0)	1.0	4.5	9.7	2.05
Washington	135 (22.8)	1.3	6.6	13.2	2.55
Not identified	8 (1.4)	1.5	3.0	8.1	...
Total	594 (100.0)	0.3	1.7	6.0	1.4

^aData were derived from school reports submitted to state health departments and were determined by summing the exemptions for all schools and dividing by the total school population.

TABLE 2—Study Populations and School Proportions of Exemptions, by Type of School

Type of School	State Distribution, %	Study Population Frequency	Study Distribution, %	Study Proportion of Exemptions
Public	77.5	421	71.0	4.8
Private	22.5	167	28.2	8.2
Not identified	...	6	0.8	1.0
Total	100	594	100.0	5.8

exemptions are reported in Table 1. Private schools had a higher proportion of exemptions than public schools, and, because of the sampling methodology, the study population included a higher proportion of private schools than the state averages (Table 2).

Approximately 67% of the respondents (n=400) reported some degree of formal training in health care; 97% of these individuals were nurses (n=388). A child attending a school whose respondent was a nurse was significantly less likely to have an exemption than a child attending a school whose respondent was not a nurse (OR=0.32; 95% CI=0.23, 0.44). All respondents reported talking directly with some parents regarding fulfillment of the school immunization requirements; the percentage of parents with whom the respondent spoke was not associated with the likelihood of a child having an exemption.

In Massachusetts and Missouri, where state laws do not authorize philosophical exemp-

tions, 18.1% and 17.0% of schools, respectively, reported permitting philosophical exemptions (Table 3). In comparison with schools in states that permit philosophical exemptions, schools in states that do not permit philosophical exemptions were more likely to (1) believe they had the authority to deny an exemption request; (2) have ever denied an exemption request; (3) require annual renewal for an exemption; and (4) require a signature from a religious leader, school official, or physician for nonmedical exemptions. Schools in Massachusetts were more likely to require a letter from a parent for exemptions than schools in other states (the statutory language in Massachusetts stipulates that parents must state in writing that immunizations conflict with their sincere religious beliefs).

After adjustment for confounders, pre-enrollment provision of written instructions for completing the school immunization requirement was associated with a decreased likelihood of a child having an exemption

(Table 4). In states without philosophical exemptions, also after adjustment for confounders, factors associated with an increased likelihood of exemptions included attending a school permitting philosophical exemptions and administrative procedures that made it easier to claim an exemption. The 4 procedures that made up the administrative difficulty construct were evaluated individually to determine their effects on the likelihood of a child having an exemption. Each procedure had a similar effect on likelihood of exemptions: an approximately 30% reduction in likelihood of exemptions. A dose-response relationship was observed, with more procedures translating to lower odds of exemptions.

Less than 60% of the schools in all 4 states reported that parents requesting an exemption were provided with information explaining the risks of not vaccinating. In schools at which parents were provided information, 44.2% provided written information, 42.2% provided verbal information, and 13.6% referred parents to health services for counseling.

Reasons for denials of requests for non-medical exemptions included the basis for or nature of the request (84.4%), improperly completed forms (77.8%), previous vaccine administration (40.0%), and other vaccinated children in the family (13.3%; these values are not mutually exclusive). Only 5.3% (n=57) of respondents who reported having denied exemption requests reported that previous reactions of parents who were denied exemption requests affected their decision to grant or deny requests.

DISCUSSION

Recent data suggest that the rates at which parents claim nonmedical exemptions for their children are increasing. In Colorado, for example, the rate of exemptions among schoolchildren increased from 1.25% in 1987 to 2.05% in 1998.⁷ This increase was entirely accounted for by philosophical exemptions. In Massachusetts, the rate of exemptions increased from 0.3% in 1986 to 0.9% in 1999 (Massachusetts Department of Public Health, unpublished data, 1999); this increase occurred among both medical and religious exemptions. The Massachusetts law

TABLE 3—Frequencies of School Immunization and Exemption Policies, by State

Policy	Schools, %				Total
	Colorado	Massachusetts	Missouri	Washington	
School has authority to deny exemption request	6.4	58.1	50.9	11.9	26.1
School has ever denied exemption request	1.5	14.7	15.8	6.2	9.2
Exemption must be renewed annually	8.0	17.5	31.4	6.7	17.0
Nonmedical exemption requires signature from religious leader, school, or physician	10.3	21.9	20.3	5.9	15.0
Religious exemption requires letter from parent	41.2	81.3	29.4	37.0	48.1
School permits philosophical exemptions	95.6	18.1	17.0	95.1	53.4
Among schools that permit philosophical exemptions, philosophical exemption requires letter from parent	39.5	89.7	26.9	39.4	42.7
School has written policy to inform parents of exemption option	27.4	19.9	14.2	20.0	18.2
School informs parents requesting exemptions of risks of not vaccinating	52.9	60.9	59.3	56.8	57.1
Instructions on how to complete school requirement mailed to parents before enrollment ^a	45.6	... ^b	47.8	17.8	37.2

^aOther schools provide information to parents when they are enrolling child in school.

^bQuestion not asked in Massachusetts.

TABLE 4—Adjusted Odds Ratios of Children Having Exemptions Associated With School Immunization and Exemption Policies

Respondent Report of School Policy	State Authorizes Philosophical Exemptions (Colorado and Washington)		State Does Not Authorize Philosophical Exemptions (Massachusetts and Missouri)	
	OR	95% CI	OR	95% CI
School has authority to deny exemption request	1.06	0.51, 2.17	0.87	0.45, 1.67
School has ever denied exemption request	1.60	0.65, 3.95	1.09	0.63, 1.89
Increased administrative difficulty ^a to claim an exemption	0.90	0.68, 1.18	0.74*	0.59, 0.94
School permits philosophical exemptions	1.13	0.52, 2.45	1.64*	1.01, 2.69
Among schools that permit philosophical exemptions, philosophical exemption requires letter from parent	0.85	0.55, 1.32	0.25	0.04, 1.85
School has written policy to inform parents of exemption option	0.86	0.49, 1.50	1.37	0.84, 2.24
Instructions on how to complete school requirement mailed to parents before enrollment ^b	0.53*	0.34, 0.81	0.48*	0.33, 0.70

Note. ORs adjusted for type of school, whether respondent was trained as a nurse, and state. OR = odds ratio; CI = confidence interval.

^aAdministrative difficulty construct ranged from 0–4, based on (1) requirements for annual renewal; (2) letter from parent for religious exemption; (3) signature from religious leader, school, or physician; and (4) informing parents requesting exemption of risks of not vaccinating.

^bQuestion not asked in Massachusetts.

(K.R. Elliott, JD, coordinator of the Oregon Partnership to Immunize Children; oral communication, September 2002). In the 2003–2004 school year, 5.7% of school entrants in Michigan claimed an exemption, and 6 other states reported exemption rates of 3% or higher.¹¹

Increasing exemption rates are of concern because exempt children are at greater risk of disease and pose a risk of disease transmission to others. American society stresses individual freedoms and parental autonomy, but these freedoms may be limited when they directly affect the health of others. States are not constitutionally obligated to offer non-medical exemptions⁴; removal of such exemptions, as recommended by the American Medical Association, may be justified by the increased individual and community risk associated with exemptions.¹² Removing non-medical exemptions may reduce the proportion of exempt children in the short term, but forcing vaccination on families with strong convictions against this practice may create backlash and ultimately jeopardize school immunization laws. School immunization requirements must involve a careful balance between parental autonomy and the individual and societal benefits of vaccination.

Our study suggests several strategies that can be used to reduce the amount of exemptions claimed each year. One simple approach is to inform parents about immunization requirements before school entry. We found that mailing instructions for completing immunization requirements reduced the likelihood of a child having an exemption. Educating parents before school entry will allow them enough time to obtain vaccines for their children, if necessary, or obtain documentation of fulfillment of the immunization requirements. Parents who do not have ready access to immunization records may opt for nonmedical exemptions.

A second approach is to review school immunization policies to ensure that they are consistent with state laws. Two states we studied did not allow philosophical exemptions, but approximately one fifth of the schools surveyed in these states reported permitting such exemptions. Because such practices were significantly associated with the likelihood of a child having an exemption, states should edu-

does not offer a philosophical exemption, so these rates may include those among people whose beliefs are primarily philosophical in nature (as in Colorado) but who opted for

medical or religious exemptions because these options were the only ones available to them. In Oregon, the rate of exemptions increased from 0.9% in 1996 to 2.7% in 2001

cate school officials regarding the laws for exemptions in their state.

A third approach is for schools to use administrative procedures that have been associated with a decreased likelihood of a child having an exemption. We found that, in states that do not authorize philosophical exemptions, more detailed administrative procedures were associated with a decreased likelihood of a child having an exemption. The within-state association between administrative difficulty and the likelihood of a child having an exemption was consistent with the findings of Rota et al.⁹ While this association was not statistically significant in states authorizing philosophical exemptions, our study may have lacked the power necessary to adequately explore this relationship in these states, because these policies were not common in Colorado and Washington.

Only 57% of schools surveyed informed parents requesting an exemption of the risks of not vaccinating. State immunization programs should encourage schools to have a nurse or qualified person talk directly with parents seeking nonmedical exemptions to communicate the risks and benefits of vaccination.¹³ Health care providers or health department personnel also should talk with parents either in addition to school personnel or in lieu of school personnel when school personnel are not adequately trained. Although we did not survey parents to determine their reasons for obtaining an exemption for their child, parents should be informed about the potential impact their decision may have on the health of their child and that of other schoolchildren.

Our study involved several limitations. For example, parents requesting exemptions and perhaps sharing their concerns about vaccines could affect school policies, or the association could be due to unrecognized confounding. Our response rate was similar to rates in other surveys of this nature, but there could have been selection bias among respondents. Responding schools were similar to nonresponding schools with the exception that smaller schools were less likely to respond, possibly as a result of limited resources. However, this was unlikely to have biased our findings. Finally, because of the cross-sectional nature of the present study, it is not

possible to determine whether the relationship between school policies and exemption rates is causal.

Although we have identified factors at the school level that are associated with the likelihood of children having exemptions, we did not assess reasons why parents claim exemptions. Further research is needed to provide an understanding of why parents claim exemptions for their children. ■

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Contributors

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Human Participant Protection

This study was approved by the Johns Hopkins Bloomberg School of Public Health committee on human research. Informed consent was obtained via a disclosure letter.

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