Medical Exemptions to School Immunization Requirements in the United States—Association of State Policies With Medical Exemption Rates (2004–2011)

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(See the editorial commentary by Salmon and Hasely, on pages 987–8.)

All 50 US states allow medical exemptions from school entry immunization requirements. The extent to which medical exemptions are granted and the relationship with ease of obtaining these exemptions has not previously been examined in detail. We evaluated counts and rates of state-level medical exemptions to kindergarten entry requirements over 7 school years (2004–2005 through 2010–2011). During this period, 0.26%–0.41% of enrolled children received medical exemptions. In states with easier medical exemption criteria, medical exemption rates were significantly higher (adjusted incidence rate ratio: 6.4 [95% confidence interval: 2.7–15.6]). Routine evaluation of medical exemption rates is needed to ensure their appropriate use.

School entry immunization requirements have resulted in low vaccine preventable disease levels and high vaccine coverage in the United States [1]. All 50 states allow medical exemptions from immunizations required for school entry (http://www.vaccinesafety.edu/cc-exem.htm). Improper medical exemption usage, such as granting a medical exemption when there is no diagnosed contraindication, can result in medical complications, including life-threatening illness [2]. Changes in nonmedical exemption rates and related increases in vaccine preventable disease incidence have been reported [3], but no similar examination of medical exemption rates or the impact of criteria required to obtain them has been done.

METHODS

We compared state-level kindergarten entry medical exemption rates across the 2004–2005 through 2010–2011 school years, inclusive. States were categorized by criteria required for medical exemptions and length of medical exemptions that could be granted (permanent only; temporary only; permanent and temporary). Medical exemption requirements were obtained through a systematic search of state health department websites. Inadequate data for 2 states were addressed by contacting these state health departments via email to obtain data for the final analysis. Medical exemption criteria were ranked based on the presence or absence of 6 administrative requirements: written physician statement, separate medical exemption form, health department approval, physician certified to practice in-state, annual approval, and notarization of medical exemption forms. States were assigned 1 point for each of the administrative criterion required, and all requirements were weighted equally. Requirement scores were summed by state, and categorized for analysis (0–1 = easy; 2 = medium; ≥3 = difficult). The list of requirements was based on prior research involving administrative requirements to obtain nonmedical exemptions [4]. Classification of states by both medical exemption criteria and length of medical exemptions that could be granted is presented in Figure 1.

Annual state-level counts of medical exemptions and enrolled students were obtained from School Entry Immunization Assessment Reports available from the Centers for Disease Control and Prevention (http://www2.cdc.gov/nip/schoolsurv/rptgmenu.asp). To address differences in the available data (eg, changes in sampling methods and data report format), we calculated standardized counts, relative to all children enrolled, of medical exemptions and kindergarten enrollment using the available data. For data prior to 2008, when data for public and private schools were not reported separately, standardized medical exemption counts were calculated by dividing the reported number of medical exemptions by the ratio of children surveyed to children enrolled. For data provided for 2008 and beyond, standardized counts of both public and private school medical exemptions were calculated by dividing the reported number of medical exemptions in each type of school by the ratio of children surveyed to children enrolled in the respective type of school. Standardized counts of medical exemptions for
public and private school students were summed to obtain the total standardized medical exemptions per state. Medical exemption rates were calculated by dividing the standardized medical exemption counts by the total number of students enrolled in that school year. Of 350 state–year combinations, 29 (8.3%) were excluded because of missing data. Enrollment and medical exemption data were analyzed for children recorded as enrolled in public and private schools in the states.

Medical exemption incidence rate ratios (IRRs) were calculated using multivariable negative binomial regression accounting for overdispersion, with the offset variable equal to the log of the number of children enrolled per school year and the cluster variable equal to the state. Separate models were created for 2 independent variables: the ease of obtaining a medical exemption and the length of time those medical exemptions can be granted. Additional covariates included income, education, race, proportion male [5], and population density; because state-level policies and exemption rates were analyzed, covariates were assessed at the state level [6]. Covariates were retained if there was at least a 10% change in the IRR after inclusion. All covariate data were obtained from the 2005–2007 American Community Survey 3-year estimates (http://www.census.gov/acs/www/).

Because aggregate state-level data were used, this was non-human subjects research not requiring institutional review board approval.

RESULTS

National medical exemption rates ranged from a low of 263 per 100 000 children (2006–2007 school year) to a high of 411 per 100 000 children (2008–2009 school year).
medical exemptions to kindergarten entry requirements increased from 11,277 in 2004–2005 to 13,952 in 2010–2011. Given that each of these cohorts of children entering kindergarten are comprised of different children, a total of 87,631 medical exemptions were granted over the 7 years of observation reported here.

Compared to states with difficult medical exemption criteria, medical exemption rates were significantly higher in states with easy or medium criteria (adjusted IRR: 6.4 [95% confidence interval (CI): 2.7–15.6] and 4.4 [95% CI: 1.8–11.1], respectively) (Table 1). Compared to states allowing only temporary medical exemptions, medical exemption rates were elevated in states allowing only permanent and combinations of permanent and temporary medical exemptions (adjusted IRR: 2.0 [95% CI: 1.7–5.5] and 2.5 [95% CI: 1.4–4.4], respectively) (Table 1).

When compared to the criteria for nonmedical exemptions using a similar 3-level categorization, medical exemption rates were higher in states with difficult or medium nonmedical exemption criteria (380.5 per 100,000 and 364.3 per 100,000, respectively) than in states with easy nonmedical exemption criteria (221.3 per 100,000). The highest rate of medical exemptions was found in states with difficult nonmedical exemption criteria and easy medical exemption criteria (see Supplementary Table).

**DISCUSSION AND CONCLUSIONS**

Although medical exemption rates are low, they exceed 1% of kindergarten children in some states [7]. Judicious use of the medical exemption option helps ensure that individual children and the broader community can benefit from high immunization coverage. More importantly, they add to existing pockets of susceptibility due to nonmedical exemptions to immunization; it is known that immunization exemptors cluster geographically, increasing the possibility for local areas of increased disease incidence [3].

There is some evidence in our study that parents in states with more stringent requirements for nonmedical exemptions may then seek medical exemptions, as medical exemption rates were higher in states with medium or difficult administrative requirements to nonmedical exemptions. Our findings suggest that administrative requirements requiring accountability of the physician and parent(s) for granting medical exemptions can be effective in ensuring they are used when there are valid contraindications, and not just as a replacement for nonmedical exemptions. With >13,000 kindergarten children who were granted medical exemptions in 2010–2011, and >87,000 children granted medical exemptions over the 7 school years examined here, there is a need to ensure sufficient community protection for these children.

There are some limitations to the available data. Data reported through the School Entry Immunization Assessment Reports are self-reported by each state, and reporting methods are not standardized (eg, some states assess all enrolled children, while others only assess a sample of children; if sampling is done, it is not always a random sample). Although the data span 7 school years, the administrative requirements for exemptions were only measured at one point in time, and temporal differences in requirements were not addressed. We could not differentiate if children were exempted from 1 vaccine or all vaccines. Moreover, exemptions were measured at a single time point during the school year, and some students may have had temporary exemptions but received the appropriate vaccines at a later time. Additionally, not all states

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**Table 1. Association of Ease of Obtaining a Medical Exemption and Types of Medical Exemptions Permitted on Medical Exemption Rates Over 7 School Years (2004–2005 Through 2010–2011)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>State-Yearsa, No.</th>
<th>Medical Exemption Rate, 2004–2005 Through 2010–2011 School Years, %</th>
<th>Unadjusted Incidence Rate Ratiob (95% Confidence Interval)</th>
<th>Adjusted Incidence Rate Ratiobc (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of obtaining a medical exemption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult (n = 3 states)</td>
<td>14</td>
<td>0.095</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Medium (n = 17 states)</td>
<td>112</td>
<td>0.299</td>
<td>2.86 (1.32–6.20)</td>
<td>4.40 (1.75–11.08)</td>
</tr>
<tr>
<td>Easy (n = 30 states)</td>
<td>195</td>
<td>0.344</td>
<td>2.46 (1.32–4.57)</td>
<td>6.43 (2.65–15.6)</td>
</tr>
<tr>
<td>Medical exemptions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary only (n = 5 states)</td>
<td>29</td>
<td>0.130</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Permanent and temporary (n = 38 states)</td>
<td>245</td>
<td>0.324</td>
<td>1.46 (0.82–2.59)</td>
<td>2.51 (1.44–4.37)</td>
</tr>
<tr>
<td>Permanent only (n = 7 states)</td>
<td>47</td>
<td>0.480</td>
<td>2.47 (0.99–6.17)</td>
<td>2.03 (0.74–5.54)</td>
</tr>
</tbody>
</table>

a State-Years indicate the sum of years and states in each category.
b Generalized estimating equation estimate, accounting for overdispersion, using state as the cluster variable.
c Models controlled for income (10 categories), education (5 categories), race (9 categories), and population density.
require immunization histories from home-schooled children if they participate in activities in the local school district, so these children may not routinely be assessed for immunization coverage and exemptions to immunization requirements.

The appropriate use of medical exemptions is important to maintaining sufficient herd immunity to protect those who require these medical exemptions and is critical to protecting children who should not be vaccinated because of medical conditions that can arise from adverse reactions to vaccination. Medical providers, parents, school officials, and state health officials are responsible for ensuring that medical exemptions are actually medically indicated. Medical exemption rates need to be monitored and continuously evaluated to ensure that medical exemptions are not granted solely because they are easier to obtain than other types of exemptions.

Supplementary Data

Supplementary materials are available at The Journal of Infectious Diseases online (http://www.oxfordjournals.org/our_journals/jid/). Supplementary materials consist of data provided by the author that are published to benefit the reader. The posted materials are not copyedited. The contents of all supplementary data are the sole responsibility of the authors. Questions or messages regarding errors should be addressed to the author.

Note

Potential conflicts of interest. All authors: No reported conflicts. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

References