Vaccine Policy and Arkansas Childhood Immunization Exemptions

A Multi-Year Review

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Background: An increase in total vaccine exemptions (medical, philosophic, and religious) occurred in Arkansas after a 2003 legislation added a philosophic category and used a new process for vaccine exemptions. By legislative requirement, the Arkansas Department of Health monitored exemptions through the 2009–2010 school year.

Purpose: The goal of the study was to determine the prevalence of vaccine exemption in 2003–2010 compared to the number of requests prior to the legislation enacted in 2003.

Methods: Exemptions were calculated by school-age category using raw numbers of exemptions, total estimates of the population by age level, enrollment numbers for students in public and private schools, and in enrolled college students born after 1957. Exemptions also were analyzed by school district, grade level, type of exemption, and particular vaccine exemption requested.

Results: Overall exemptions continued to rise each year, with an average increase of 23.1% annually. Medical exemptions declined from an average of 21.3% of all exemptions before to an average of 4.8% thereafter. The greatest increase in number of exemptions was observed among college students. The highest total rate of exemptions per precollegiate student population was <1.3%. When exemption requests were categorized, most (79%) were for exemptions from "all vaccines." The most common single exempted vaccine was MMR (measles, mumps, rubella).

Conclusions: Since philosophic exemptions were codified in 2003 in Arkansas, the number and rate of vaccine exemptions continue to progressively increase. However, vaccine-preventable disease clusters have not yet been linked to or identified in any population with a high rate of vaccine exemptions.

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Introduction

Immunization exemptions have been associated with outbreaks of communicable diseases.[1–4] The U.S. Supreme Court and lower courts consistently have held that states that institute immunization mandates must provide medical exemptions[5] and may provide exemptions for other beliefs. The immunization exemption law in Arkansas was revised in 2003 with the intent of managing opposition to vaccination and achieving politically acceptable rules for childhood vaccine exemption. The result, Arkansas Act 999,[6] created a process that allowed children to be exempted from the school immunization requirement for (1) standard medical exemptions and (2) parent-defined philosophic or religious reasons only after annual notarized application and a parental educational component. This paper employs an additional 5 years of data (2005–2010), providing an update of these previously reported analyses of vaccine exemptions in Arkansas (2001–2005).[7]

Methods

A full description of data sources and methods is provided in Appendix A (available online at www.ajpmonline.org). The Arkansas Department of Health maintains an exemption registry

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which includes all students (1) enrolled in a public or private school; (2) home-schooled but attending activities in a formal school setting; (3) in daycare and preschool; and (4) born after 1957, and enrolled in college. Exemption prevalence was calculated based on publically reported census data for preschool through college by dividing the number of exempted children by the total enrollment reported. Geo-mapping was used to determine density of exemption. Significance testing was done using ANOVA, and a regression model was developed to project trends.

Results

Exemptions by Type

Exemptions for all Arkansas students (preschool through college) increased steadily from 2003 when the change in regulation allowed parents to request an exemption based on philosophic or personal objections to vaccination. The department reported that essentially all exemptions were granted if the required processes were completed. Exemptions increased from 651 in the 2002–2003 school year to 2714 in 2009–2010, with an average increase of 23.1% annually (range: 12.0%–50.7%) (Appendix B, available online at www.ajpmonline.org).

Medical exemptions declined by 55% (from 0.22 to 0.10/1000 students) during the first year the regulations were in effect and generally remained at an average level of 0.10/1000 students for the subsequent years. Religious exemptions declined by 43% (from 0.80/1000 students to 0.46/1000 students) for the first year after the allowance for philosophic exemption but gradually increased to levels within 20% of their original level. Philosophic exemptions continued to be the highest among all exemption types. Since this category was allowed, total numbers and prevalence increased from 403 (0.62/1000 students) in 2003–2004 to 1964 (2.82/1000 students) in 2009–2010 (Appendix C, available online at www.ajpmonline.org). In the most recently completed school year, philosophic exemptions accounted for 72.4% of vaccine exemptions.

Analysis of exemptions by vaccine type revealed that in the 2009–2010 school year, 70.8% (1922) of exemptions were requested for all vaccines, 9.2% (249) were requested for two or more vaccines, and 20% (543) were requested for a single vaccine. A similar pattern also was seen for previous years. More than 92.8% of single-vaccine exemptions requested were for the measles, mumps, and rubella (MMR) vaccine and 4.6% were for both hepatitis B and varicella. Of 504 single MMR vaccine exemptions, 436 (86.5%) were requested for college students. MMR vaccine is the only required immunization for college enrollment in Arkansas.

Exemptions by Grade Categories

The exemption prevalence for all grade groups increased over time but varied widely (Figure 1). Kindergarten students exhibited the steepest increase in exemptions; starting with 0.5/1000 students in 2002–2003 and increasing to 8.21/1000 students for the 2009–2010 school year. The slopes of the increases in exemption rate for the preschool, Grades 1–5, Grades 6–9, Grades 10–12, and college populations for the most recent year of study were 5.6, 4.73, 2.59, 2.07, and 3.21/1000 students, respectively. The overall exemption rate increased yearly from 0.84/1000 students enrolled in all types of schools during the 2001–2002 school year to 3.9/1000 students in the 2009–2010 school year (Appendix B, available online at www.ajpmonline.org).

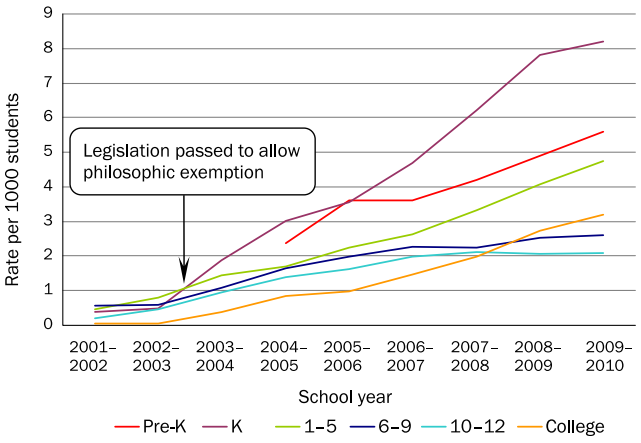

Figure 1. Immunization exemptions per 1000 students by grade categories, Arkansas
K, kindergarten; Pre-K, pre-kindergarten

Results by School District

Geographic distribution of philosophic exemptions tended to cluster in the northwestern and central parts of the state, whereas religious exemption rates tended to be greatest in the southeastern part (Appendix D, available at www.ajpmonline.org).

Eighteen school districts had >10/1000 students exempted, 31 school districts had 5 to <10/1000 students and 99 school districts had an exemption rate of <5/1000 students. One hundred sixteen school districts had no exemptions. The highest rate of exemptions per student in the K–12 population in any district was 22.79/1000 students. The rate of exemption was higher for white students (8.01/1000) than for African-American and Hispanic students (1.19/1000 and 1.20/1000, respectively; $p<0.0001$).

Exemption Trends

A steady increase in exemptions requested and granted was observed over the past 7 school years (Figure 2), resulting primarily from philosophic exemptions. Although a steady reduction in the number of requested medical exemptions was observed since the first year of

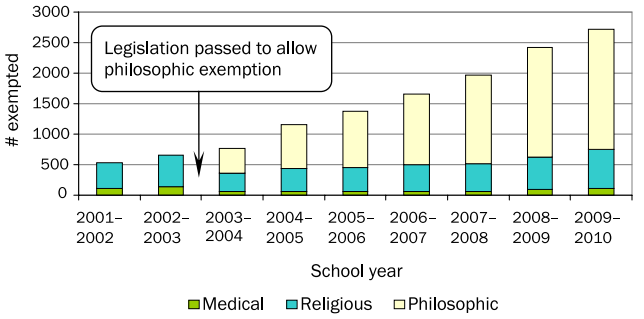

Figure 2. Arkansas immunization exemptions by type and by year

availability of the philosophic exemption, the rate has begun to level off in the past few years. In all, 50%–75% of exempted students re-applied for exemptions the following year, suggesting some cohort effect. However, the absolute number of new applicants has climbed each year from 2002–2003 (385) to 2009–2010 (1495) (Appendix E, available online at www.ajpmonline.org).

Discussion

From 2003 to 2010, there were some clusters of vaccine-preventable disease in Arkansas. Few cases occurred in exempted students, and there was no direct evidence that the index case or the source of the cluster was an exempted student. This report provides an additional 5 years of data to a previous study[7] and shows the increasing trend in nonmedical exemptions continuing with rates from 0 to 23/1000 students in some school districts, confirming the findings of others.[8] High rates also were found in kindergarten and colleges. The prevalence of children in home schools, not involved in any public school activities, who are undervaccinated is not known, nor of foreign children residing in Arkansas. Even though vaccine exemption–associated outbreaks have not yet been identified during this study period (2001–2010), the increasing trend of exemption in specific colleges in Arkansas raises particular concern because of previous links of infected (symptomatic or asymptomatic) exempted students with mumps and measles outbreaks.[4,9–12]

The validity of the present study is based on the fidelity of vaccine records reported by administrative personnel. There were no audits or exemption interviews to evaluate socioeconomic factors or to understand how parents determined philosophic versus religious exemption choices. Such information might have provided insights regarding how to better address exemptions.

Data reported as part of school vaccination surveys for the 2009–2010 school year by the CDC offer some indirect comparisons with the data presented here.[13] Several states contiguous to Arkansas reported both philosophic and religious vaccine exemptions in the public school kindergarten population. The reported exemption percentages were 0.45% (Louisiana); 0.89% (Oklahoma); and 0.45% (Tennessee) compared to 0.45% for Arkansas. National data for the 2002–2003 school year, before the Arkansas law was enacted, show an exemption rate for kindergarten and/or first-grade students of approximately 1% for states with religious-only exemptions[8] compared to Arkansas' rate of 1% (Appendix B, available online at www.ajpmonline.org). A follow-up national state-by-state report from the CDC shows some states have considerably higher nonmedical exemption rates (e.g., 5.7% in Washington) but that southern states in general have low rates (≤1.0 %).[14] The impact of the model Arkansas law does not, therefore, appear to have increased or retarded the increase in exemptions compared to other states in the region.

In Arkansas, the rate of complete vaccination (diphtheria, pertussis, tetanus, HiB, Hep B, varicella, PCV) for children aged 19–35 months was 60.9% based on the National Immunization Survey data set for 2009 with individual vaccine rates of 69%–90%.[15] This indicates there are many more undervaccinated children in Arkansas than are exempted (i.e., 37% undervaccinated at age 2 years vs 0.50% exempted for daycare and preschool children) (Appendix B, available online at www.ajpmonlin.org). Thus, although educational efforts directed toward parents who seek vaccination exemptions for their children should continue, efforts toward improving complete immunization rates in those aged 2 years must be at the forefront of efforts to prevent vaccine-preventable disease outbreaks.[16]

Act 999 required a parent education process and an annual application process. The current study's results raise the question of whether educational efforts could be improved and reduce the upward trends in exemptions. The procedure employed by the Arkansas Department of Health to educate individuals and families seeking vaccine exemption has been to distribute the CDC Vaccine Information Statement at the time of application.[17] More-intensive educational modalities might reduce the prevalence of exemptions but some have argued otherwise.[18,19]

As observed by others,[20,21] the historic success of public health vaccine programs has led to a public shift in awareness of the potential risks, rather than benefits, of vaccination. The increases in philosophic exemptions in Arkansas raise concerns that outbreaks of vaccine-preventable diseases may occur in the future. To reduce these concerns, research and more-intensive efforts are needed to persuade families claiming philosophic and

religious exemptions to, instead, fully participate in vaccine programs.

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Appendix

Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.amepre.2012.02.022.