

## Public Health Risks of Not Vaccinating Children

To the Editor: The article on vaccine “exemptors” by Dr Feikin and colleagues<sup>1</sup> concludes that 11% of the vaccinated children who contracted measles (11% of 137 during a 12-year period, or about 1.25 per year) were infected by an exemptor. The annual risk that a vaccinated child would contract measles from an exemptor would thus be about 1 in 1 million if the incidence were equal in all years. It isn't. There were 55622 cases of measles reported nationwide from 1989-1991, and 326 from 1997-1999. Is the reason the authors chose to use the years 1987-1998 for measles, when the period 1996-1998 was used for pertussis, to include the 1989-1991 measles epidemic?

In 67% of the cases of measles in vaccinated children, the exposure source was unknown. It seems likely that many of these cases were related to importation, since most cases of measles are now traced to importation, according to the Centers for Disease Control and Prevention's *Pink Book*.<sup>2</sup>

The article implies that exemptors are causing injury to vaccinated individuals. In fact, the risk of serious permanent harm from contact with exemptors is minuscule (less than 1 in 1 billion, if the incidence of serious complications of measles is about 1 in 1000) and is not even estimated by the authors. Moreover, any risk imposed by exemptors on others is at least 2 orders of magnitude less than the risk they willingly assume themselves. Everyone imposes much greater risk on others in many other ways, such as by driving a car rather than using public transportation. Should society therefore forbid automobiles?

The final decision concerning children's medical care should be made by parents with the advice of their own physicians. This article provides no justification for abridging the right of parents and patients to decline giving informed consent to measles-mumps-rubella or pertussis vaccines.

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1. Feikin DR, Lezotte DC, Hamman RF, Salmon DA, Chen RT, Hoffman RE. Individual and community risks of measles and pertussis associated with personal exemptions to immunization. *JAMA*. 2000;284:3145-3150.

2. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 6th ed. Washington, DC: Public Health Foundation; 2000:124.

To the Editor: I was dismayed at the recommendation by Dr Feikin and colleagues<sup>1</sup> that legislators require evidence of the strength of parents' religious convictions for obtaining exemptions from immunizations. Such a policy, in my view, will intensify resentment and hostility to immunization programs. It treats Christian Scientists and some other religious groups as privileged elites, while parents who would like to claim a “philo-

sophical” exemption because of their fears of adverse reactions to vaccination are not allowed the exemption.

A far better policy would be to repeal all religious and philosophical exemptions from immunizations and also for state legislatures to “use the criteria of severity, contagion, and effectiveness prior to mandating [a] vaccine for all children,” as Edwards<sup>2</sup> recommends. Immunization programs will be more appreciated by the public if they are based on science that is explained to the public and not on religion.

The courts have never held that the First Amendment guarantee of freedom of religion includes a right to deprive a child of preventive or therapeutic health care. Indeed, in 1979 the Mississippi Supreme Court ruled the state's religious exemption to immunizations unconstitutional because it discriminated against both unvaccinated and vaccinated children.<sup>3</sup> “Innocent children, too young to decide for themselves,” the Supreme Court wrote, should not “be denied the protection against crippling and death that immunization provides because of a religious belief adhered to by a parent or parents.” It further ruled that the exemption discriminated “against the great majority of children whose parents have no such religious convictions.”

Salmon et al<sup>4</sup> estimated that children with a religious or philosophical exemption to immunizations are 35 times more likely to contract measles than are vaccinated children. Feikin et al<sup>1</sup> found that exemptors were 22.2 times more likely to contract measles.

Why should society have laws that place one group of children at a 3500% higher risk of contracting a dangerous disease? Children have Fourteenth Amendment rights to equal protection of the laws and no child should be deprived of the protection afforded by immunizations mandated by law, unless they are medically contraindicated.

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1. Feikin DR, Lezotte DC, Hamman RF, Salmon DA, Chen RT, Hoffman RE. Individual and community risks of measles and pertussis associated with personal exemptions to immunization. *JAMA*. 2000;284:3145-3150.

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**Letters Section Editors:** Stephen J. Lurie, MD, PhD, Senior Editor; Jody W. Zylke, MD, Contributing Editor.

**In Reply:** Parents should be informed of the risks and benefits of immunization, including both the risks of severe adverse events related to vaccination (which have been shown in multiple studies to be rare) and the risks of not vaccinating. Pertussis and even measles infections still occur in the United States and pose risks both to the individual and to the community, especially in the setting of reduced frequencies of vaccination against these diseases. We chose to use the years 1987-1998 for the measles analysis because we had data from those years. Moreover, the relative risk of measles among vaccinated and unvaccinated children would not be affected by the outbreak period. In mentioning the 55 622 cases of measles that occurred during 1989-1991, Dr Orient highlights the threat of measles in the absence of an effective vaccination program. She incorrectly suggests that most of the 67% of vaccinated children in measles outbreaks who had an unknown exposure source were not exposed to eximptors but rather to internationally imported cases. In fact, few of these individuals were likely exposed to imported cases since these only accounted for 5% of measles cases among children in Colorado during 1987-1998 while eximptors accounted for 22% of cases. Orient also points out that the risk of disease among eximptors in our study was several times higher than that imposed by eximptors on vaccinated children. Although she asserts that the risk of measles in a vaccinated child exposed to an eximptor is small, this does not mean that it is acceptable. This risk would most likely be greater for other vaccine-preventable diseases that are more common than measles, such as pertussis, varicella, and pneumococcal diseases.

We concur with Dr Swan that "immunization programs will be more appreciated by the public if they are based on science that is explained to the public. . . ." We hope our results will contribute to this. When we referred to strength of conviction in claiming personal exemptions, we did not intend to legitimize religious exemptions over philosophical exemptions. We meant that parents should not be making decisions about vaccination based on convenience but, rather, should be given adequate information and counseling before deciding to withhold vaccination from their children.

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**To the Editor:** In their Research Letter describing treatment for rabies in a patient with lymphoma, Dr Hay and colleagues<sup>1</sup> recommended doubling the dose of rabies vaccine and postponing chemotherapy. However, we believe that several issues surrounding rabies postexposure prophylaxis (PEP) require clarification.

First, an assay for antibodies is used to detect an immune response against rabies virus, not to define protection.<sup>2</sup> Therefore, "acceptable" response is a more preferred term than "protective" response. The rapid fluorescent focus inhibition test is the current viral neutralization test of choice for human sera.<sup>3,4</sup> The Advisory Committee on Immunization Practices (ACIP) has recommended that complete neutralization of virus at a serum dilution of 1:5 is acceptable.<sup>3</sup> The World Health Organization recommends a more conservative level of 0.5 IU/mL (a titer of approximately 1:50 by serum dilution).<sup>4</sup> Both of these values are arbitrary laboratory standards and neither equates with protection.

Second, when needed, serum should be collected 2 to 4 weeks after PEP is completed to correspond with a peak titer.<sup>5</sup> The patient described by Hay et al had a titer of 0.2 IU/mL (a titer of approximately 1:20 by serum dilution) 2 days after completing PEP. This titer provides evidence of an antibody response (assuming no prior rabies vaccination) acceptable by ACIP recommendations. If titers had been determined using serum drawn 2 to 4 weeks later, they may have been even higher.

Third, although the authors suggest using a double dose of vaccine for immunosuppressed patients, there is no evidence that this dosage will increase the likelihood of successfully mounting an adequate antibody response.

Fourth, even if it was thought that this patient needed a titer of 0.5 IU/mL, once such a level was demonstrated further serologic testing was unnecessary, and additional vaccination driven by such testing would not be recommended. Unless a person is at continuous or frequent risk for rabies exposure, serologic testing for titer maintenance is unnecessary.<sup>3</sup>

Finally, rabies immune globulin (RIG) is given only once, preferably at the same time (day 0) as PEP initiation. The RIG injection provides a passive source of immediate virus-neutralizing antibody until active immunity ensues and can be given within 7 days of the initial vaccine dose. Administration of RIG beyond 7 days after the initial vaccination, or RIG in higher-than-recommended doses, may suppress antibody response.<sup>3</sup> For this reason, RIG is not given to those who have had preexposure vaccination or prior PEP, or to those patients beyond 7 days of initiating PEP.

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