

# Anti-Vaccinationists and Their Impact on Vaccination Coverage in Wisconsin

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## BACKGROUND

For 300 years, vaccination against serious disease has been a cornerstone of Western medicine, saving lives and preventing disabilities beyond measure.<sup>1,2</sup> In the United States, childhood vaccinations against smallpox, diphtheria, pertussis, tetanus, poliomyelitis, measles, mumps, rubella, and haemophilus influenzae have reduced disease from hundreds of thousands of cases per year to nearly zero.<sup>3,4</sup> The vaccines in use are effective, safe, relatively inexpensive and constantly improving. Nevertheless, public enthusiasm for and acceptance of them is inconstant. On occasion, apathy and opposition to childhood vaccination have risen to levels that hurt children and endanger public health.

In 1989, because of poor vaccination coverage among preschool age children, measles broke out in cities across the country, resulting in more than 50,000 cases and 140 deaths.<sup>5</sup> Milwaukee, where only 64% of 2 year olds were vaccinated, suffered 1095 cases, 233 hospitalizations, and 3 deaths.<sup>6,7</sup> The size and seriousness of the epidemic caught the attention of physicians and the US public health service who, working together in the years that followed, rebuilt the US immunization system. By 2002, 2-year-old MMR coverage in Milwaukee reached 88%.<sup>8</sup> Nationally, measles became a rare disease.<sup>9</sup>

Reminding us of our not-too-distant problems, Britain has recently suffered a decline in MMR coverage. Similar to the United States during the 1980s, up to one third of 2 year olds are unvaccinated. As a result, London experienced ongoing measles transmission during most of 2003.<sup>10</sup> Still, many British parents refuse to allow their children to be vaccinated. This opposition to MMR vaccination, termed a national "collapse of confidence," was largely instigated by Dr Anthony Wakefield, who published a small study in *Lancet* in 1998 suggesting that MMR was causally linked to autism.<sup>11,12</sup> Wakefield's claim

has since been repudiated by his co-authors, and he, personally, is accused of having concealed a significant financial conflict of interest that may have influenced his work. Nevertheless, Dr Wakefield continues to actively promote the MMR/autism hypothesis<sup>13-15</sup> and is joined in the United States by others who have taken up a similar crusade linking autism to vaccines containing thimerosal/mercury.<sup>16,17</sup> As a relative constant, by way of popular magazines, books, and the Internet, a wide variety of alternative medicine providers discourage childhood vaccination in general.<sup>18-21</sup> To address whether these dissenting voices significantly influence Wisconsin parents, this study examines trends in vaccination coverage in Wisconsin over the past 14 years and reports the results of a survey of the views of state primary care pediatricians.

## METHODS

Student compliance with immunization requirements extracted by the Wisconsin Division of Public Health from statewide public and private school reporting, for the years 1989-1990 through 2002-2003, was examined for trends over time.<sup>22</sup> Also analyzed and compared for trends were stated reasons for non-compliance including "in process," medical waiver, religious waiver, personal waiver, "behind schedule," and "no record."

Data for first MMR vaccination by 24 months of age, extracted from the Center for Disease Control and Prevention's (CDC) National Immunization Survey, a random digit dialing telephone survey of households with age-eligible children followed by a mail survey to the children's vaccination providers to validate immunization information, were trended for years 1995 through 2003.<sup>8</sup> ANOVA techniques were applied to test for significance of trend.<sup>23</sup>

To determine the recent experience of vaccine provider physicians, a survey focusing on vaccination refusals was sent in the fall of 2003 to 299 primary care pediatricians associated with the Children's Hospital of Wisconsin System, Fox Valley, Milwaukee and Kenosha metro areas. Results were compiled and quantified using Microsoft Excel software.

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**Table 1.** Wisconsin Student Immunization Law Compliance Results,\* Public and Private Schools, Kindergarten (and Pre-K) through 12th Grade

	School Year													
	89-90	90-91 <sup>†</sup>	91-92	92-93	93-94	94-95	95-96	96-97	97-98 <sup>‡</sup>	98-99	99-00	00-01	01-02 <sup>§</sup>	02-03
Meet Minimum	95.9%	94.6%	95.0%	94.6%	94.7%	94.6%	94.7%	96.3%	92.2%	92.4%	92.5%	92.4%	92.0%	91.5%
In Process <sup>¶</sup>	0.5%	1.9%	1.5%	1.8%	1.6%	1.6%	1.7%	0.8%	4.1%	2.4%	1.9%	1.7%	1.5%	1.5%
Medical Waiver	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%
Religious Waiver	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Personal Conviction Waiver	0.7%	0.7%	0.8%	0.8%	0.9%	0.9%	1.0%	1.0%	1.2%	1.4%	1.7%	1.9%	2.3%	2.6%
Behind Schedule <sup>¶¶</sup>	1.5%	1.5%	1.4%	1.5%	1.5%	1.6%	1.4%	0.8%	1.3%	2.6%	2.7%	2.7%	2.8%	2.8%
No Record	1.0%	0.9%	0.6%	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%	0.6%	0.6%	0.7%

\* Compliant students include the rows labeled "Meet Minimum," "In Process," "Medical Waiver," "Religious Waiver," and "Personal Conviction Waiver". Non-compliant students include the rows labeled "Behind Schedule" and "No Record".

<sup>†</sup> Second doses of MMR vaccine added as a requirement for kindergartners, 6th and 12th graders.

<sup>‡</sup> Hepatitis B vaccine added as a requirement for kindergarten and 7th grade.

<sup>§</sup> Varicella vaccine added as a requirement for kindergarten.

<sup>¶</sup> "In Process" means the student received the first dose of required vaccines within 30 school days, the second dose within 90 school days, and the third dose (and fourth dose if required) within 30 school days the following school year.

<sup>¶¶</sup> "Behind Schedule" means the student missed the deadline for the first, second, or final doses of vaccine.

## RESULTS

The proportion of Wisconsin students in compliance with minimum immunization requirements and the reasons cited for non-compliance are tracked for school years ending 1990 through 2003 (see Table 1). The average compliance rate from 1998 to 2003, 92.2%, was down 2.9% from the 1990-1997 average of 95.1%—a small but sustained decrease beginning in the same year that hepatitis B vaccine was added as a requirement for kindergarten and 7th grade. Receipt of the first MMR vaccination by 24 months of age for the years 1995-2003 for all children in Wisconsin averages 91.3% and trends significantly upward over time:  $P=0.001$  ( $y=46.78+0.45x$ ,  $R^2=0.75$ ). Trends for compliance for all required vaccinations for all grades kindergarten through 12th and receipt of 1 MMR by 24 months of age are compared in Figure 1.

Among reasons cited for non-compliance, religious waiver made the smallest contribution at 0.1%, a rate unchanged over 14 years. Students with no records decreased to 0.7%. For 2003, "behind schedule" (2.8%), "in process" (1.5%), medical waiver (0.4%) and personal conviction waiver (2.6%) had all increased. Personal conviction waivers registered the greatest change: 0.7% to 2.6% over 14 years, an increase of 371%. Relative to other reasons for non-compliance, personal conviction waivers increased in proportion, comprising 32% of all non-compliance in 2003. Waiver trends are represented in Figure 2.

Of the 299 vaccine safety surveys sent to primary care pediatricians, 197 (66%) were returned. Most physicians (58%) reported a less than 1% refusal rate

for 1 or more immunizations, with up to 10% of their patients' parents requiring extra convincing.

Smaller numbers (7%) reported refusal rates of up to 10% with up to 25% of parents requiring extra convincing. For 94% of physicians responding, refusal rates among their patients were less than 5%, similar to statewide data reported by the Wisconsin Department of Health and Family Services. Among those parents who expressed concerns about immunizations, their most commonly cited sources of information were family and friends (28%), the Internet (21%), and alternative medicine providers (most often chiropractors) (14%). The average pediatrician dealt with parental concerns linking autism to MMR vaccination about 15 times per year; 10% reported that such an interaction occurred once a week or more. Autism linked to thimerosal/mercury containing vaccines, the next most common concern, was reported approximately half as often. For all vaccination refusals, varicella (46%) and MMR (34%) were most commonly refused, followed by hepatitis B (10%) and DTaP (10%).

## DISCUSSION

Excellent rates of vaccination coverage among preschool and school-age children were recaptured in Wisconsin in the wake of the 1989-1990 measles epidemic and have been sustained to the present. As shown by the CDC's National Immunization Survey, 2-year-old coverage for MMR has been sustained at high levels and has significantly increased over recent years, despite the furor over the vaccine's alleged link to autism. Pediatricians, other physicians who provide

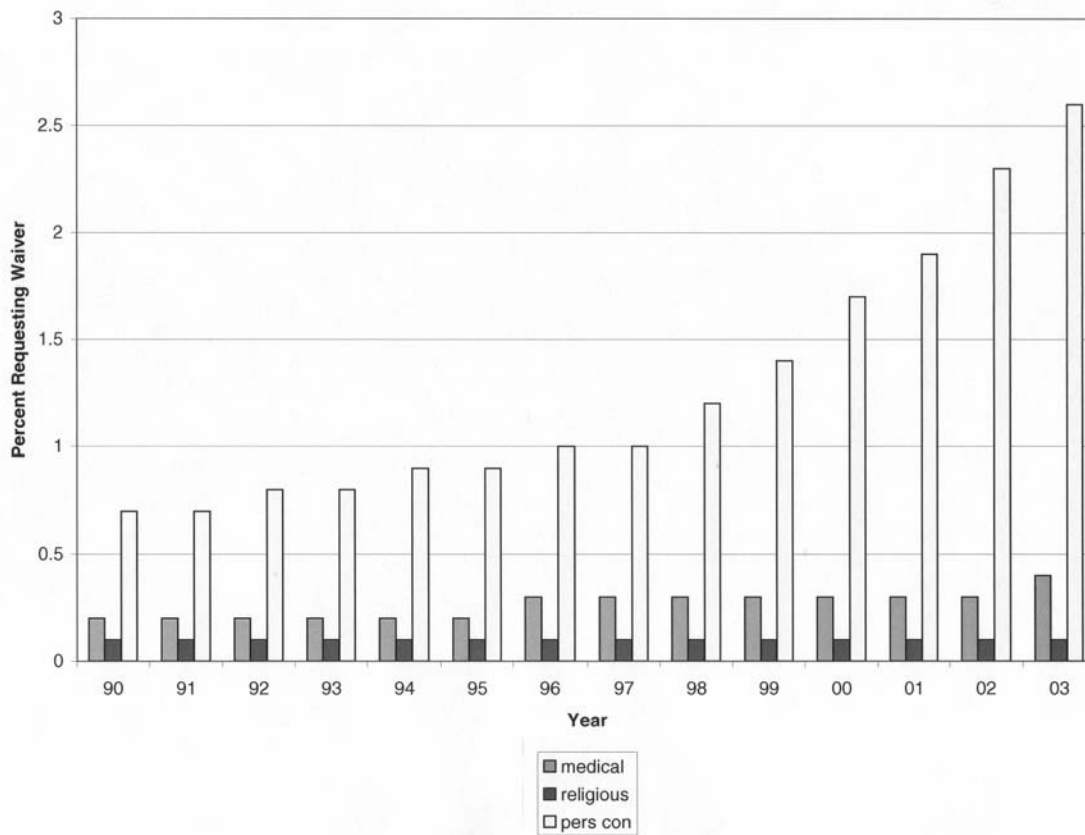


Figure 2. Vaccination waivers in Wisconsin, 1990-2003.

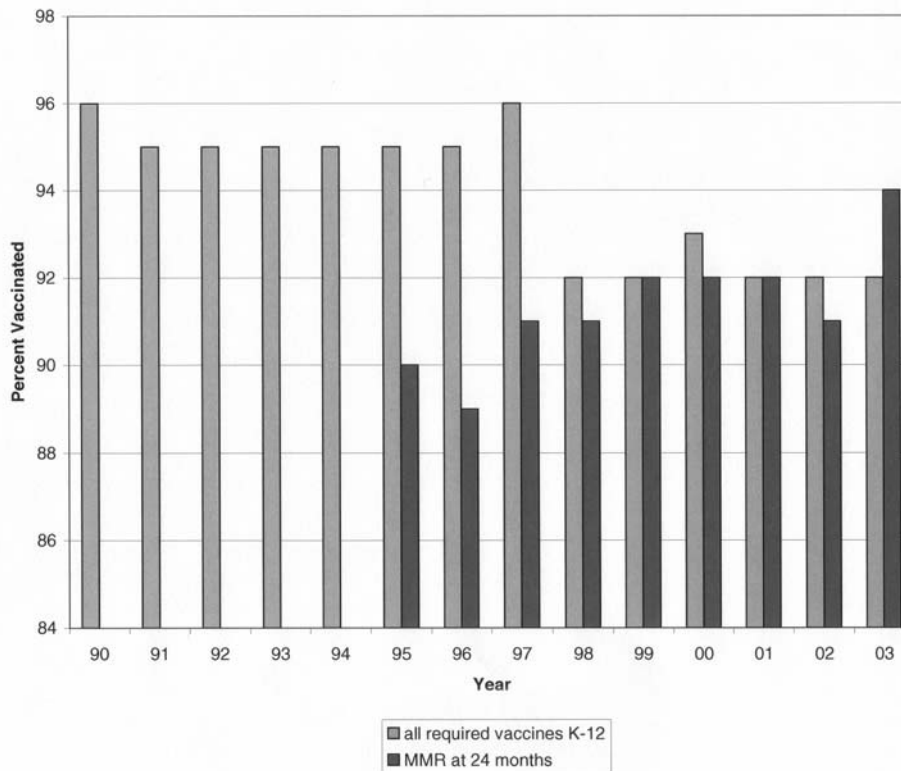


Figure 1. Vaccination coverage in Wisconsin, 1990-2003.

childhood vaccinations, and the Wisconsin public health system are clearly doing a fine job. The 95% to 92% decline in overall coverage among school-age children beginning in 1998 coincides with the addition of the hepatitis B vaccination as a requirement for school entry and 7th grade. Most likely this small decrease in coverage represents the increased difficulty of vaccinating 12 and 13 year olds rather than opposition to this particular vaccine and would be expected to disappear after 2005 when all grades will have been vaccinated.

In view of this data, it appears that anti-vaccinationists have not significantly influenced coverage rates in Wisconsin. Yet their chorus of voices grow louder; ranging from Barbara Loe Fisher of the National Vaccine Information Center (NVIC): "Vaccinations shouldn't hurt a child but sometimes they do. Before your child takes the risk, find out what it is,"<sup>21</sup> to Mark Sircus, OMD, featured on the same NVIC Web page under the heading 'Medical Terrorism': "Someday it will be realized that pediatricians, who are poisoning newborn babies with mercury, foreign viruses and other chemical preservatives are perpetuating the largest and most terrible terrorist program in history."<sup>21</sup>

By way of the Internet, print publications, radio, and television, worried parents are presented with an ever-expanding critique of childhood vaccination. Statistics and skillful use of scientific jargon may give the anti-vaccinationists an air of authenticity. In *Mothering* magazine, research journalist Neil Z. Miller presents a deceptive graph to show that, "Although polio is virtually nonexistent in the United States today, no credible scientific evidence indicates that the vaccine caused the disease to disappear."<sup>18</sup> Herbalist Aviva Jill Romm writes, "The most striking features of the association between MMR and autism are that the prevalence of the disorder has increased significantly coincident with the introduction of the trivalent vaccine..."<sup>24</sup> Homeopathist Randall Neustaedter writes, "The vaccination campaign has traded infectious diseases of childhood for chronic autoimmune diseases that afflict both children and adults."<sup>20</sup> Physician Mark Geier states, "Our data show that the more mercury children received in their childhood vaccines the more neurodevelopment disorders there are."<sup>16,25</sup>

Based on a review of recent medical literature,<sup>226-29</sup> the Internet,<sup>30-33</sup> and the results of the Wisconsin primary care pediatrician survey, the alleged link to autism is currently the most prevalent concern among parents questioning childhood vaccinations. For some, their concerns persist despite overwhelming evidence to the contrary. Doctor Wakefield's work, in which 12 autistic children with gastrointestinal problems and small bowel lymphoid tissue

that contained measles virus particles were used to hypothesize a causal connection between the MMR vaccination and their disease, continues to spark controversy despite the fact that it has been refuted by several large and well-done epidemiological studies from Britain, Denmark, and the United States.<sup>34-36</sup> Advocates who claim that autism is a form of vaccine-induced mercury poisoning<sup>16,17</sup> have instigated a class action suit against the US Department of Health where, although scientific evidence<sup>37-39</sup> overwhelmingly contradicts the hypothesis, the final verdict will rest with a federal court judge.

As has always been the case, physicians are called to wade through the claims and counterclaims to advise parents on their children's health. Hopefully, parents will continue to listen. The fact that only 3% in Wisconsin waive vaccinations is reassuring.

On the other hand, the steady rise of personal conviction waivers demonstrates the increasing inclination of parents to go against medical advice. Multimedia access to pseudo-scientific "authorities" and the use of litigation to settle scientific controversies encourage non-compliance. To date, the data show that the anti-vaccinationists have not made a significant impact on vaccination coverage in Wisconsin. Nevertheless, physicians and others who care for children need to stay current on the risk/benefit profiles of the vaccines they administer and activists who militate against them.

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