Parental Vaccine Refusal: What can we Do?

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## Estimated Impact of Selected Vaccines in the U.S. since Introduction

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Year Introduced</th>
<th>Cases Averted with 95% Coverage</th>
<th>Deaths Averted with 95% Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polio</td>
<td>1963</td>
<td>2,547,045</td>
<td>413,692</td>
</tr>
<tr>
<td>Measles</td>
<td>1970</td>
<td>34,137,129</td>
<td>28,329</td>
</tr>
<tr>
<td>Mumps</td>
<td>1967</td>
<td>10,792,317</td>
<td>2,593</td>
</tr>
<tr>
<td>Rubella</td>
<td>1969</td>
<td>3,073,981</td>
<td>1,095,633,000 fetal deaths</td>
</tr>
<tr>
<td>Varicella</td>
<td>1996</td>
<td>133,691,807</td>
<td>3,436</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>1996</td>
<td>3,674,988</td>
<td>4,291</td>
</tr>
</tbody>
</table>

Yet the Problem of Vaccine-Hesitancy Remains

• Historically, there have always been individuals and groups that oppose vaccination for a variety of reasons

• Herd Immunity requires 90-95% of population vaccinated

• If this cannot be achieved willingly, either need to consider coercive measures or accept limited ability to contain disease spread
Under-Vaccination Cannot be Easily or Simply Characterized
Rate of Nonmedical Vaccine Exemptions By State
Percentage of kindergartners with nonmedical exemptions, 2012-13 school year

Note: Children with exemptions may still be vaccinated.
Source: Centers for Disease Control
The average percentage of all students in all grades (kindergarten-12th) who have one or more exemptions to school-entry required vaccines as reported by public and private schools in each county. WA State Department of Health Office of Immunization Child Profile, Created with ArcMap 10.0.
<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>MMR VACCINE EXEMPTION</th>
<th>TOTAL ENROLLMENT</th>
<th>SCHOOL DISTRICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrowhead Elementary</td>
<td>3.9%</td>
<td>413</td>
<td>Northshore School District</td>
</tr>
<tr>
<td>Kenmore Middle School</td>
<td>3.3%</td>
<td>708</td>
<td>Northshore School District</td>
</tr>
<tr>
<td>Inglemoor High School</td>
<td>2.6%</td>
<td>1,745</td>
<td>Northshore School District</td>
</tr>
<tr>
<td>Kenmore Elementary</td>
<td>1.6%</td>
<td>500</td>
<td>Northshore School District</td>
</tr>
<tr>
<td>Moorlands Elementary</td>
<td>1.0%</td>
<td>614</td>
<td>Northshore School District</td>
</tr>
</tbody>
</table>

Note: Schools with fewer than 10 students were excluded. Schools that hadn't reported their vaccination data to the Department of Health were also excluded.

EMILY M. ENG / THE SEATTLE TIMES
<table>
<thead>
<tr>
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<th>MMR VACCINE EXEMPTION</th>
<th>TOTAL ENROLLMENT</th>
<th>SCHOOL DISTRICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toppenish High School</td>
<td>0.5%</td>
<td>971</td>
<td>Toppenish School District</td>
</tr>
<tr>
<td>Garfield Elementary School</td>
<td>0.2%</td>
<td>415</td>
<td>Toppenish School District</td>
</tr>
<tr>
<td>Toppenish Middle School</td>
<td>0.2%</td>
<td>895</td>
<td>Toppenish School District</td>
</tr>
<tr>
<td>Kirkwood Elementary School</td>
<td>0.2%</td>
<td>549</td>
<td>Toppenish School District</td>
</tr>
<tr>
<td>Eagle High School</td>
<td>0%</td>
<td>145</td>
<td>Toppenish School District</td>
</tr>
<tr>
<td>Lincoln Elementary School</td>
<td>0%</td>
<td>398</td>
<td>Toppenish School District</td>
</tr>
<tr>
<td>Valley View Elementary School</td>
<td>0%</td>
<td>472</td>
<td>Toppenish School District</td>
</tr>
<tr>
<td>SCHOOL</td>
<td>MMR VACCINE EXEMPTION</td>
<td>TOTAL ENROLLMENT</td>
<td>SCHOOL DISTRICT</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------</td>
<td>------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Family Link</td>
<td>30.5%</td>
<td>59</td>
<td>Vashon Island School District</td>
</tr>
<tr>
<td>Student Link</td>
<td>20.6%</td>
<td>34</td>
<td>Vashon Island School District</td>
</tr>
<tr>
<td>Mcmurray Middle School</td>
<td>9.3%</td>
<td>387</td>
<td>Vashon Island School District</td>
</tr>
<tr>
<td>Chautauqua Elementary</td>
<td>8.5%</td>
<td>598</td>
<td>Vashon Island School District</td>
</tr>
<tr>
<td>Vashon Island High School</td>
<td>8.4%</td>
<td>547</td>
<td>Vashon Island School District</td>
</tr>
<tr>
<td>The Harbor School</td>
<td>6.1%</td>
<td>82</td>
<td>Private</td>
</tr>
<tr>
<td>Vashon Special Education School</td>
<td>0%</td>
<td>12</td>
<td>Vashon Island School District</td>
</tr>
</tbody>
</table>
The percentage of kindergartners complete for required immunizations was the same as last school year. Students with completed immunizations are better protected from getting and spreading vaccine-preventable diseases.
Kindergartners complete for required immunizations, 2010-2017

The percentage of kindergartners complete for required immunizations stayed the same as last school year. Students with completed immunizations are better protected from getting and spreading vaccine-preventable diseases.

[Graph showing the percentage of kindergartners who completed required immunizations for different vaccines and all vaccines over the years 2010-2017. The graph includes data for Hepatitis B, Pertussis, MMR, Polio, Varicella, and all vaccines. The HP2020 goal is indicated as 95%.]
Families who are reluctant to vaccinate their children are a heterogeneous group.
• 11.5% of parents had refused a vaccine

• Among those who refused a vaccine, the vaccines refused:
  • HPV 56.4%
  • Mening 31.8%
  • Varicella 32.3%
  • MMR 17.7%

Parental Hesitancy: Contributors

• Beliefs (not supported by reasonable evidence): Vaccine effects on immune system, opposition to injection of foreign material, concern about vaccine components
• Unsupported links between vaccines and harms: Autism and Measles Vaccine
• Lost memory of vaccine-preventable infectious diseases
• Flawed risk assessment and Scientific Illiteracy
• Internet and Media and Celebrities as source of “truth”
• Increasing number of vaccines
90% of parents feel vaccines are a good way to protect their children from disease.

88% generally follow their physicians recommendation.

54% are concerned about adverse effects.

23% believe vaccines cause autism in healthy children.

31% believe parents should have the right to refuse vaccines that are required for school for any reason.

11% don’t feel children need vaccines for diseases that are not common anymore.

Parental Vaccine Concerns 2009

- 90% of parents feel vaccines are a good way to protect their children from disease
- 88% generally follow their physicians recommendation
- 54% are concerned about adverse effects
- 23% believe vaccines cause autism in healthy children
- 31% believe parents should have the right to refuse vaccines that are required for school for any reason
- 11% don’t feel children need vaccines for diseases that are not common anymore.

An even bigger problem may exist

- Increasing Requests to Spread out or Alter the Recommended Vaccine Schedule
- 93% of physicians report at least one request to alter the vaccine schedule in a given month
- Younger children lose protection of vaccines
- Most of our data doesn’t capture this

## Who is Refusing Vaccines?

<table>
<thead>
<tr>
<th>Pro-vaccine</th>
<th>Vaccine-hesitant</th>
<th>Anti-vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptors</td>
<td>70%</td>
<td>Rejectors</td>
</tr>
<tr>
<td>Agree with or do not question vaccines</td>
<td>Are unsure about, delay, or choose only some vaccines</td>
<td>Completely reject vaccines</td>
</tr>
<tr>
<td>Children fully immunized</td>
<td>Children under-immunized</td>
<td>Children un-immunized</td>
</tr>
<tr>
<td>High trust in provider</td>
<td>Desire a trustworthy provider</td>
<td>Low trust in provider</td>
</tr>
<tr>
<td>Interest in vaccine information from child’s provider</td>
<td>Interest in vaccine information from child’s provider</td>
<td>No interest in vaccine information</td>
</tr>
<tr>
<td>30%</td>
<td>&lt;1%</td>
<td></td>
</tr>
</tbody>
</table>
Improving Childhood Vaccination

Remove obstacles to vaccination
Improving Childhood Vaccination

Rapidly and forcefully refute unsubstantiated claims made publicly
Social Media: The Epidemic of “Fake News”

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HORSEY

Mom, remind me why we didn’t get measles shots.

They’re bad for you...

I read that somewhere on Facebook.

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HOW THE CASE AGAINST THE MMR VACCINE WAS FIXED

In the first part of a special BMJ series, Brian Deer exposes the bogus data behind claims that launched a worldwide scare over the measles, mumps, and rubella vaccine, and reveals how the appearance of a link with autism was manufactured at a London medical school.

When I broke the news to the father of child 11, who he did not believe me, Wakefield told me my son was the 23rd child they saw," he said, facing for the first time at the now infamous research paper which linked a purported new syndrome with the measles, mumps, and rubella (MMR) vaccine. "There’s only 22 in this.

That paper was published in the Lancet on 28 February 1998. It was retracted on 29 February 2010. Authored by Andrew Wakefield, John Walker Smith and 11 others from the Royal Free Hospital and School of Medicine, London, it reported on 12 developmentally challenged children, and triggered a decade long public health scare.

"Most of the children were vaccinated against the measles, mumps, and rubella virus and vaccination in eight of the 12 children began at a very young age. The cases were thought to have appeared between 15 and 23 months old. But the children, who had been vaccinated, were found not to have autism.

Wakefield’s "syndrome"

Unknown to Mr 11, Wakefield was working on a lesson plan for which he sought a bowel-brain "syndrome" as its centerpiece. Claiming an undiagnosed £150 (€180; $230) an hour through a network solicitor named Richard Barr, he had been confidentially put on the payroll for two years before the paper was published, eventually pressing him £635 643, plus expenses.

However, Wakefield had already identified such a syndrome before the project that would reportedly discover it: "Children with encephalitis, autism, and anergy. The syndromes are not specific to autism and imply a wide range of possibilities."

Barr and his clients agreed. "If the evidence is inadequate to a specific vaccine-induced pathology," he wrote in a confidential grant application to the UK government’s Legal Aid Board, "there is no evidence in the medical literature to support the hypothesis that a specific pathogen was responsible for the patient’s condition.”

The two men also aimed to show a sudden onset of "temporal association" — strong evidence in product liability. "Dr Wakefield feels that if we can show a clear time link between the vaccination and onset of symptoms," Barr told the legal team, "we should be able to dispute the suggestion that it’s simply a chance coincidence.”

But child 11’s case must have proved a disappointment. Barr filed a medical report that the alleged bowel-brain"syndrome" was "consistent with the clinical presentation of autism and other behavioral problems following immunization” and that it was "not a specific vaccine-induced entity."
Improving Childhood Vaccination

Strengthen *and* Enforce School Vaccine Requirements
School Vaccine Requirements

- Wide variability between and within US states with regard to:
  - Which vaccinations required
  - Who qualifies for exemption
  - What is required to obtain exemption
  - Enforcement
- Easy exemption associated with high rates of exemption
- High rates of exemption associated with disease outbreaks
California, Maine & NY recently eliminated PBES

States That Had Bills to Make Exemptions Easier or Harder, 2009-2012

- Easier
- Harder
- No bills introduced between 2009-12

Note: Oregon's laws made exemptions harder to get in 2014.
Source: Saad Omer, Emory University
State Coercion and Vaccination

- Safety of children attending school and community interest must be balanced with individual freedom and avoidance of coercion

- Current requirements are not strictly coercive

- Personal belief exemptions remove any coercion

- Personal belief exemptions should require just as much effort and expense as vaccination does
How Hard Is It to Get a Vaccine Exemption in Your State?

- **Easy**: Parent’s signature required.
- **Medium**: Health care professional’s signature required.
- **Difficult**: Notarized form or both a form signed by a health care professional and a letter of explanation required.
- **No data available**

Note: States where new requirements were added after the study’s release have been adjusted accordingly.

Source: New England Journal of Medicine, 2012

Mother Jones
State Exemption Requirements Vary

- Sign an exemption form
- In person educational visit with Health Care Provider
- In person educational visit with health department official
- On-line training (print completion certificate)
• Past law: signature from medical professional only required when medical exemptions filed

• New law (signed May 10, 2011 by Gov. Gregoire):
  • “Modifications are made to the certification, that a parent or guardian must present, to exempt a child from school immunization requirements [for religious or philosophical reasons]… must include a statement, signed by a health care practitioner, that the parent or guardian has been informed of the benefits and risks of the immunization.”
Exemption rates increased slightly last year after remaining stable over the last five school years. Washington state has one of the highest exemption rates in the country. While most exemptions are for personal/philosophical and religious reasons, Washington’s medical exemption rate during 2015-16 was 5 times higher than the national median of 0.2%.
Michigan: The “Inconvenience” Strategy

• Changed rules Jan 1, 2015 to make it more inconvenient to obtain a waiver
• Parents of children entering kindergarten and middle school must be briefed *in person* by a county health education before a waiver will be granted
• Waivers issued dropped from 5.2% to 3.3% of those entering kindergarten
• Percent of children not getting four doses of DTaP dropped from 22% to 15%
California: Elimination of all NMEs

More kindergartners getting their shots
More kindergartners received all of their required vaccinations last year after a new law in California went into effect. But the number who avoided vaccinations by citing medical reasons also went up.

Statewide kindergarten vaccination rate

<table>
<thead>
<tr>
<th>Year</th>
<th>Vaccination Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>'14</td>
<td>90.2%</td>
</tr>
<tr>
<td>'15</td>
<td>91.2%</td>
</tr>
<tr>
<td>'16</td>
<td>95.6%</td>
</tr>
</tbody>
</table>

Number of kindergartners with medical exemptions

<table>
<thead>
<tr>
<th>Year</th>
<th>Exemptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>'14</td>
<td>991</td>
</tr>
<tr>
<td>'15</td>
<td>991</td>
</tr>
<tr>
<td>'16</td>
<td>2,850</td>
</tr>
<tr>
<td>'17</td>
<td></td>
</tr>
</tbody>
</table>

Source: California Department of Public Health

@latimesgraphics

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Replacement Effect and Exemption Type

- Elimination of Broad Personal Belief Exemption leads to increase in Religious Exemptions

- Elimination of Religious Exemptions leads to increase in Medical Exemptions

- In US, there is some question as to whether a meaningful distinction can be made between Religious and PB exemptions
Other Strategies

- Europe: Some countries use fines for non-compliant. Associated with increased vaccination rates

- Australia uses financial incentives (tax credit)

- Could argue that these strategies are more ethical than denial of school entry
Improving Childhood Vaccination

Communication Strategies need to be optimized
A trusted health care provider remains the best avenue for changing minds about vaccination. Asking families to find another provider because they will not vaccinate according to the provider’s recommendation does not improve communication and, when families leave, eliminates this as an option.
Aristotle’s Tools of Rhetoric (Persuasion)

- Character (Ethos): The speaker must be trustworthy

- Logic (Logos): The message must be factually correct and logical

- Emotion (Pathos): The message must resonate emotionally, eliciting an emotional response to inspire action

- Telos: Clear goal or end in mind
Fear: Basis of Decision for many Parents

Introduction
We noted several children who, after a period of apparent normality, lost acquired skills, including communication. They all had gastrointestinal symptoms, including abdominal pain, diarrhea, and bloating and, in some cases, food intolerance. We describe the clinical findings, and gastrointestinal features of these children.

Patients and methods
12 children, consecutively referred to the department of paediatric gastroenterology with a history of a pervasive developmental disorder with loss of acquired skills and attentional symptoms (diarrhoea, abdominal pain, bloating and food intolerance), were investigated. All children were admitted to the ward for 1 week, accompanied by their parents.

Clinical investigations
We took histories, including details of immunizations and exposure to infectious diseases, and assessed the children. In 11 cases the history was obtained by the senior clinician (JW-S).

Neurological and psychiatric assessments were done by consultant staff (PML, MRI with HMD-6 criteria). Developmental histories included a review of prospective developmental records from parents, health visitors, and general practitioners. Four children did not undergo psychiatric assessment in hospital; all had been assessed professionally elsewhere, so these assessments were used as the basis for their behavioural diagnosis.

After bowel preparation, biopsies were performed by shafting or tube insertion with melancholy and forbearance. Pared frozen and formalin-fixed mucosal biopsy samples were taken from the terminal ileum, ascending, transverse, descending, and sigmoid colon, and from the rectum. The procedure was recorded by video or still images, and were compared with images of the previous seven consecutive paediatric colonoscopies (four normal colonscopic and three on children with ulcerative colitis), in which the physician reported normal appearances in the terminal ileum. Barium follow-through radiography was possible in some cases.

Also under consideration, central magnetic-resonance imaging (MRI), electroencephalography (EEG) including visual, brain stem auditory, and sensory evoked potentials (where compliance made these possible), and lumbar puncture were done.

Laboratory investigations
Thyroid function, serum long-chain fatty acids, and cerebrospinal-fluid lactate were measured to include known causes of childhood neurodegenerative disease. Urinary methylmalonic acid was measured in random urine samples from eight of the 12 children and 14 age-matched and sex-matched normal controls, by a modification of a technique described previously. Chromosome analysis was performed on DNA isolated from blood samples from all children and controls.

Children were screened for antinuclear antibodies and boys were screened for fragile-X if this had not been done before treatment.

The 2010 Lancet Medical Journal Retracts Wakefield Autism Study

A statement from Jenny McCarthy and Jim Carrey

Los Angeles, February 5, 2010

Dr. Andrew Wakefield is being discredited to prevent an historic study from being published that for the first time looks at vaccinated versus unvaccinated primates and compares health outcomes, with potentially devastating consequences for vaccine makers and public health officials.

It is our most sincere belief that Dr. Wakefield and parents of children with autism around the world are being subjected to a remarkable media campaign engineered by vaccine manufacturers reporting on the retraction of a paper published in The Lancet in 1998 by Dr. Wakefield and his colleagues.

The retraction from The Lancet was a response to a ruling from England’s General Medical Council, a kangaroo court where public health officials in the pocket of vaccine makers served as judge and jury. Dr. Wakefield strenuously denies all the findings of the GMC and plans a vigorous appeal.
Strategies with Parents

• Seek first to understand: Diagnose the Resistance

• Respond to concerns

• Show respect, find common ground

• Be willing to compromise while educating: The goal is not to win, but to win them over

• Tell personal stories: Appeal to Emotion, Data rarely persuades
Improving Childhood Vaccination

We need to set an example