

We Have Met the Enemy, and He is Us: Falling Childhood Immunization Rates

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Significant outbreaks of vaccine-preventable disease have occurred in communities, schools, and populations that share at least one characteristic: a lower than expected immunization rate for age. This cannot be attributed simply to vaccine refusal, hesitancy, deferral, cost, or access, but to a combination of these factors. In the words of the comic strip character Pogo, “we have met the enemy, and he is us.”

What is a Recommended Immunization and Why is it Given When it is?

The Advisory Committee on Immunization Practices (ACIP)—a committee of the Centers for Disease Control and Prevention (CDC)—and the American Academy of Pediatrics agree that more must be done to improve our country’s immunization rate, highlighting vaccine hesitancy as an increasing issue. They provide colorful charts, including catch-up immunization schedules for a child or adolescent who might have fallen behind the recommend timing and schedule [1]. The timing and spacing of vaccinations is not arbitrary. Vaccination schedules are based on the age at which a child is most at risk for a vaccine-preventable disease and when the vaccine can best be expected to produce protective antibodies against the infectious agent.

This risk and the need for protection are, of course, the reasons vaccines are given: a particular microbe—sometimes a bacterium, sometimes a virus, sometimes a bacillus—is apt to infect an infant, child, or adolescent due to an exposure. The mother, hopefully immunized, first shares her protective antibody with the child in utero, but that antibody fades with time since it is passively acquired. The vaccine is administered to awaken the infant’s immune system to recognize the pathogen by exposing it to a harmless part of the pathogen’s immunogenic profile. Through this exposure, the immune system can make a protective antibody. Then, if the infant or child is exposed to the real pathogen, they can immediately start producing their own protective antibody and defend themselves against the disease.

But how can we measure our success in vaccinating infants, children, and adolescents?

It is true that all children must, by school age, be immunized against whichever diseases a state declares necessary for school entry. North Carolina requires fewer vaccinations than ACIP recommends: initial and booster doses of vac-

cines against diphtheria, pertussis, and tetanus (DTP); polio; measles, mumps, and rubella (German measles); hepatitis B; Hib (haemophilus influenzae B, a once-frequent cause of ear infections, “deep” skin and joint infections, and meningitis); varicella (chickenpox); and pneumococcus (another cause of ear infection, blood infection, and meningitis) [2]. It is also true that those diseases are dangerous to the child before school entry, so a complete vaccination record at kindergarten or first grade is “late” if our goal is to protect our children from disabling disease.

North Carolina uses an immunization registry and also looks at insurance data to see when physician offices bill for the administration of vaccines. These data reveal our worry about childhood immunization rates.

A panel of childhood, adolescent, and adult immunizations is reviewed and recommended only after discussion, debate, and vote by the ACIP after consideration of the safety, efficacy, and effectiveness of the vaccines. Efficacy refers to the success of the vaccine in preventing the disease in vaccine trials; effectiveness refers to the success of the vaccine in less controlled, real-world use.

Vaccinations have fared well in the trade-offs all biologics and pharmaceuticals face between intended protections and side effects. When science has claimed or proven unacceptable side effects, vaccines have died in the laboratory, not received FDA approval, or been withdrawn from use. When this happens, rarely, production methods have been changed, improved vaccines developed, “bad” science refuted, and the risk-benefit measures have prevailed. Such has been the fate of vaccines for the pertussis component of the DTP; the measles, mumps, rubella vaccine; thimerosal-preserved multidose vaccines; and the oral polio vaccine [3-7]. The ACIP also began calculating the societal costs of missed work, wages, hospitalizations, and convenience in evaluating the cost-benefit equation of vaccination well before social determinants of health were widely discussed [8].

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Have Vaccination Rates Dropped?

Yes, they have. Or no, they haven't. It depends on when and what you measure.

By statute, all students must be fully immunized within 30 days of entering kindergarten or first grade on penalty of being excluded from school until receiving the necessary immunizations or being required to catch up to the state-mandated schedule. There are medical and religious, but not philosophical, exemptions that apply equally to public, parochial, and charter schools [9, 10]. Immunizations are also required—and therefore compliance can be measured—at entry to child care, 7th grade, and college or university [11].

The 6.1% of children under age 5 and 23% of children under age 18 who attend regulated child care centers or family child care homes must present an up-to-date immunization record for age, but casual, in-home, and unlicensed preschool or after-school arrangements are not monitored for compliance, and not all students advance to college or university [12].

In 2020, in response to the COVID-19 pandemic and in deference to the difficulties families faced seeking both the required vaccinations and health assessments required for school entry, Governor Roy Cooper issued two Executive Orders and the state health director two memos extending the requirements for certification of immunization [13, 14].

The gold standard for when to administer which vaccines has also changed over time as more vaccines have been added. The CDC chooses certain ages at which to measure vaccination rates and chooses different methodologies with which to do so. The most reproducible of these is the National Immunization Survey (NIS), which looks at ACIP-recommended vaccines in over 25,000 children aged < 24 months, with a special survey for influenza vaccine of children aged 6-59 months [15].

Only 70.5% of the children born from 2017 to 2019 received the entire combined seven-vaccine series by 24 months [15]. Importantly, only 58.1% of the children surveyed had received two or more influenza vaccines by 60 months [15]. The influenza vaccine is not required for school attendance; it is likely that the COVID-19 vaccine will not be required. Adherence to the recommendation dropped if the vaccine was not required or if multiple boosters were required [15].

But to believe school entry data, except for this extraordinary COVID-19 year, “all” children are appropriately vaccinated, receiving, or on their way to receiving vaccines with the catch-up schedule for state-required vaccines.

What Does it Mean and What Should We Do?

According to the CDC, immunization has been described as a ‘global health and development success story,’ and worldwide, immunization is estimated to prevent 2-3 million deaths annually” [15]. The most recent survey reveals more information and compares rates to previous years. Its

complex tables show mostly increased rates from previous years, none statistically significant.

The rates of vaccination are worse for the uninsured and for children with Medicaid, and disparities in coverage also are consistently observed by race and ethnicity and location—cities worse than suburbs—though the differences are smaller than those attributed to insurance status [15].

The latest survey was completed pre-COVID-19. Still, and perhaps because of these results, the authors imply that access, related to income and vaccine hesitancy, might explain the lower-than-hoped-for rates of immunization [15]. They encourage providers to administer all vaccines to children during any and all clinic visits while promoting the importance of well-child visits even during the pandemic [15]. They join a common call to improve vaccination rates by protecting communities, empowering families, and stopping myths about vaccines [16].

The Association of State and Territorial Health Officers (ASTHO) offers strong exhortations—and a game plan—for public health to improve disease surveillance, employ evidence-based strategies to harness social media and community advocacy, and decrease barriers to accessing vaccines. But most importantly, it encourages communication and equips public health to furnish health professionals with resources for difficult conversations with parents, providing materials to address families’ concerns in order to foster a culture of immunization in their practices and to debunk myths with diverse partnerships, social media, and countering of misinformation to the public and policymakers [17].

ASTHO does not say that vaccine hesitancy or avoidance exists on the part of practitioners as well. Yet the NIS suggests that practitioners “bend” vaccine guidelines to administer fewer than those recommended and scheduled at each visit, often at the request of parents, and with the intent to “catch-up” at another scheduled visit. The recommendations suggest that “missed opportunities” continue to add up each time a child is seen for any office visit [17]. Despite much talk of addressing social determinants of health like access to food, social benefits, and health insurance, few medical practices give more than lip service to connecting families to what they need. When this happens, the child and family suffer and miss visits; vaccinations, WIC, and SNAP enrollment drop; and patients “fall” off the immunization schedule [18]. If the data speak, these children and families often remain behind on vaccinations until a day of reckoning comes at day care, school entry, sports participation, physical, or some other need for certification.

We Don't Hear Each Other

Well before the recent political crisis and cries of misinformation, there was an emerging distrust of science, or perhaps a mistrust of any expertise that disregarded lived experience or disrespected any questioning of authority. The internet brought information to the fingertips of anyone with a smartphone. Information generally needs interpreta-

tion to become knowledge. But if it is true that, as Jerome Groopman, chair of medicine at Harvard Medical School, noted in his 2007 book *How Doctors Think*, doctors begin interrupting their patients within 13 seconds to start forming their own diagnostic pathway, many doctors only listen to hear what they choose to hear [19].

In the first 50 years of the ACIP, vaccine recommendations increased from 6 to 16 for children aged 0 to 18 [20, 21]. Parents are seeking answers, reassurance, and knowledge, and have found lies, misinformation, and out-of-context data; the overwhelming majority expect respectful interpretation. Doctors, who knew the horrors of polio, chickenpox, measles, pneumonia, encephalitis, haemophilus influenzae, pneumococcal meningitis, joint infections, or sepsis, tend to be more authoritarian than authoritative, the reassurance more pro forma. Doctors trained since the vaccines were introduced for these diseases have seldom seen the natural disease and could speak to growth and development fluently, as well as to the regulation and procedure, but not necessarily with experience when it came to vaccines.

Why were famed pediatricians Benjamin Spock and T. Berry Brazelton, and now immunologist Anthony Fauci, considered “America’s doctors” during the baby boom, the developmental pediatrics “enlightenment,” and now the coronavirus pandemic? They listened, heard, and rarely spoke the language of science. They listened and spoke to people in language they could hear.

Beyond Behavior to Cost

Then there is the cost of health care.

We live in a state that did not expand Medicaid, leaving hundreds of thousands of people—mostly adults—without health insurance. In North Carolina, we did expand Medicaid for children and the Children’s Health Insurance Program (CHIP) to ensure all children in families with incomes less than 200% of the federal poverty level could be insured. We ignored the data that said that when parents are insured, their children use preventive health services more frequently.

The Affordable Care Act (ACA) includes options for addressing this problem, but is more difficult to navigate since federal support for advertising enrollment and navigation was decreased. ACA plans can be expensive despite subsidies, and tend toward higher deductibles and copays, though well-child care is free of copays and the Vaccines for Children program offers immunizations to participating physician practices at no cost.

The lagging effects of the Great Recession, the fluctuations of the economy, and the COVID-19 recession have not had much effect on the total number of persons insured in North Carolina [22]. The perceived threat that receipt of public benefits endangers immigrants’ application for citizenship may have contributed to the 15% drop off of children enrolled in WIC in our state [18]. Though by all accounts children should be well insured in North Carolina and receiving health care when they need it, we are witness-

ing the first drops in childhood insurance coverage in North Carolina since 2016 [23].

Re-thinking our Mission?

We’ve loaded up well-child care with lots of well-intentioned screenings and messaging over the years, some of it evidence-based, some of it promising practice [24]. As a practicing pediatrician, I would cringe just a bit when a mother said she brought her child in for “shots.” I’d go on to check her baby’s language and motor skills, maybe caution that his weight was a bit greater than his height for percentile, do a developmental screen that might show a language lag, and suggest a hearing test. Only after all of that would I bring on the “shots.”

Now, though, we approach a public health crisis: the return of vaccine-preventable diseases. We need to double down, to listen well, to hear, to explain, and not just in the exam room. To use our websites and our videos and our webcasts to project ourselves as providers to be trusted. Providers who hear the difficulties of decision-making in a world overflowing with data that need to be pieced together into information and interpreted as knowledge.

We need to take the time to be part of the solution to this increasing crisis as providers, as neighbors, and as advocates. NCMJ

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