



The Vicar of Vicarious Vaccine-Preventable Diseases

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On this spring day, you have seen your fourth patient younger than age 24 months with a fever of 103.5°F for the past day or so, including your own granddaughter (**Figure 1**), who was being examined by your partner. Each child was without other symptoms except for being cranky, anorexic, non-toxic appearing, and totally unappreciative of any physician examination.

In the “old days,” many of these children would likely have been the unwelcome recipient of a venipuncture for both a complete blood count and possibly a blood culture to ascertain whether they had become occultly infected with either *Haemophilus influenzae* or pneumococcus in the blood stream. You may have also obtained a catheterized urine sample if you stumbled upon a leukocy-

tosis in your patient or if the patient had persistent fevers.

In today’s world, during the first few days of these symptoms you can usually cavalierly administer calm reassurances and instructions for ibuprofen for most of these children with one notable exception—the unvaccinated or undervaccinated toddler. Why? The terrifying specter of vaccine-preventable diseases (VPDs) may be resurrecting.

As a young pediatrician, you may

not be old enough to have experienced first-hand the morbidity and mortality of these VPDs for which we now have effective and safe vaccines. Thus, you may approach the vaccine schedule with an inkling of trepidation and with some “empathy” for the stressed and worried mother who has read somewhere or been told by some “mommy blog” or by an outspoken celebrity that vaccines are unnecessary and perhaps unsafe. After all, the child will likely cry when the



Figure 1. A fully vaccinated 18-month-old child with fever to 103.5°F, anorexia, and crankiness. Does she warrant a complete blood count and blood culture? What if she were not vaccinated?

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injections are administered, and who wants to see their baby cry, even if your intentions are good. You might even think it may be satisfactory to avoid the “entire mess” along with the time-consuming “messy” discussion about routine infant vaccines.

You are a busy professional. You know you can wait these non-vaccinators out (possibly for years), and you seem to even have the approval of your own medical society. Somehow, you apparently have forgotten your infectious disease training, in which you learned that these diseases mostly occur in and are most devastating in infants and young children. You think that you can be lackadaisical about vaccines and the oft-forgotten monster of VPDs. But this monster is lurking, as the following examples show.

CAN HISTORY REPEAT ITSELF?

Let me become your real-time historian, albeit as a vicarious vicar. Not to imply that I am saintly in any way, but I am still going to proselytize about vaccines. I feel the need to do so because if population vaccine levels in your community fall low enough (< 90%), most experts predict that we will see a resurgence of most of these VPDs.^{1,2}

In the May 11, 2014, issue of *The New York Times*, headlines declared: “Disease of Pakistan’s Poor Now Worries the Affluent; Polio Immunization Confronts Travelers.”³ The Taliban’s anti-vaccine efforts are aggressive in Pakistan’s northwest and tribal belts, where wild polio is actively circulating and where the vaccine is lacking. And similar to many high socio-economic communities in the United States, high rates of vaccine refusal are also found in wealthier and highly internationally mobile areas of Karachi, Pakistan. Subsequently, the World Health Organization has recommended that no traveler be allowed out of Pakistan without certification of polio vaccination.⁴ This should



Figure 2. Varicella vaccine is a vital toddler vaccine that prevents a very common viral childhood illness that can occasionally lead to severe or even fatal illness in some unprotected children. Two doses are important to provide the highest level of protection in the population.

serve as a reminder that the introduction of highly contagious and crippling polio into your community is just an airplane ride away.

(In the polio era, my mother would attempt to prevent us from socializing with any of our neighborhood children for the entire summer, because of the known highly contagious nature of polio—think summertime widespread picorna viruses such as enterovirus/herpangina. Think reverse- or self-quarantine. Then, think sneaky bratty kids.)

The April 7, 2014, issue of *USA Today* reported the following: “Killer Diseases Creeping Back: Outbreaks Point to Anti-vaccine Trends.”⁵ The author furthermore postulates that “The anti-vaccine movement aided by religious and philosophical exemptions to state vaccination requirements is growing, and the results could be deadly.” In another full-page column in this same issue, a headline states: “Diseases Get Second Life, and Many Fingers Are Pointing to the Anti-vaccine Movement.”⁶ As one defiant mother was quoted after her three children had contracted pertussis that went untreated by a physician, “I wasn’t scared by it.” The mother was correct in that she had little reason to worry about her older, healthy children. However, every classmate,

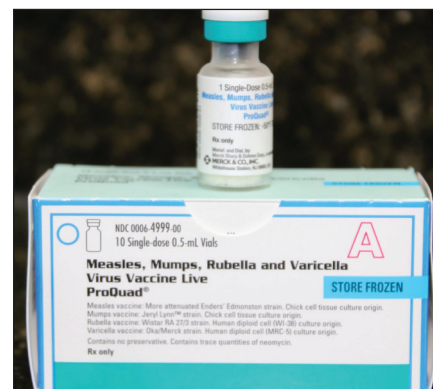


Figure 3. This is an important toddler and pre-school combination vaccine that protects against not only varicella, but also the highly contagious, often epidemic, and occasionally deadly measles virus.

play-friend, and especially any exposed immune-compromised child or infant at church, the store, or the supermarket should have been terrified by the sheer presence of her children for at least 3 months because pertussis is extremely contagious via aerosol spread (ie, any sneeze or cough).

An article in the Centers for Disease Control’s (CDC) *Morbidity and Mortality Weekly Report* reported 222 confirmed cases of measles in 2011.⁷ Most cases were imported from other countries, including the fact that approximately 25% of cases were observed in U.S. residents returning from abroad. Also, approximately 75% of the highly contagious and potentially lethal measles cases were unvaccinated or of unknown vaccine status. This is the obvious hotbed for measles propagation in the United States.

According to a report by Jonel Alecia on the May 12, 2014 broadcast of NBC News,⁸ the CDC states that major outbreaks of measles have already occurred in Ohio (66 cases), California (59 cases), and New York (26 cases), and we are only midway through the calendar year. In a familiar theme, the recent outbreak of measles among unvaccinated (**Figures 2-3**) Amish people in Ohio was fomented by the return of

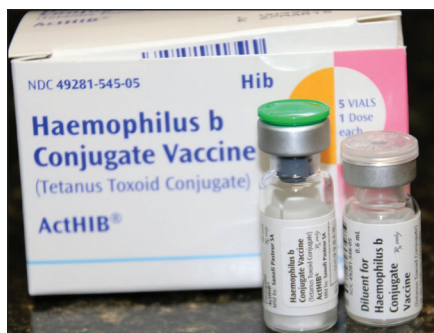


Figure 4. *Haemophilus influenzae* type B vaccine is another vital infant vaccine for prevention of a once common (1 in 200 children) cause of severe invasive bacterial disease, such as meningitis, epiglottitis, and septic arthritis. Rejecting or delaying the vaccine in infants can be risky for the child.

their relief aid workers from the Philippines (who were there to help in the aftermath of Typhoon Haiyan), where measles is common. In its heyday, measles killed 500 people and sickened 48,000 in the United States on an annual basis. Measles is now just an airplane ride away, and as close as a single cough from a nearby infected person.

The May 2014 issue of *The Pediatric Infectious Disease Journal* reported that even in a fairly highly vaccinated population such as Israel, during the past decade 103 cases of invasive *Haemophilus influenzae* type B (HIB) were reported.⁹ Their reported incidence was 1 case per 20,000 in children younger than age 1 year. Lest you have forgotten, the incident rate of HIB in the United States was 1 case per 200 children in the pre-HIB vaccine era² (Figure 4). A full septic workup several times per week or spinal tap once per month was the norm in your practice during the “good old days” of pediatrics. Furthermore, in the report from Israel, 42% of HIB cases presented with meningitis, and the overall case fatality rate was 4%, despite some of the best medical care available. Thus, any loss of sufficient vaccination rates to provide “herd protection” within an unvaccinated (and undervaccinated) population will eventually and inevitably cause multiple hospitalized

cases of brain-damaged children, along with several deaths among infected children².

The May 2014 issue of *The Pediatric Infectious Disease Journal* also reported the epidemiology of *Bordetella pertussis* in San Luis Potosi, Mexico during a 12-month interval from 2011 to 2012.¹⁰ The observed incidence rate in children younger than age 12 months was 1 case per 10,000, with six deaths among those younger than age 4 months. Five of the children were unvaccinated, and one had received a single dose of vaccine. Thus, just across the border (and within our California/Texas borders, and even within my own bordering Meade and Marion Counties, Kentucky), highly contagious and devastating cases of pertussis are hunting for an unprotected host. The pediatrician must remember that pertussis still remains only an airplane or even a car ride away from your community.

YOUR VICARIOUS VICAR'S EXPERIENCE WITH VPDs

I do not need to be reminded why these infant and preschool vaccines are critically important for infants and children. I have seen the malevolent monster of these infections up close and personal, and it is a scary picture. I have lived the pre-vaccine nightmare scenarios while fully awake, and, unfortunately, most of the details are indelibly etched in my memory.

I therefore think it is important for my somewhat forgetful or younger colleagues to vicariously experience the sheer terror of some of the worst days of my life as a private practitioner, lest you become complacent about the pathogenic barbarians that are still lurking and occasionally banging at your doors.

During the course of a 30+-year career in pediatrics in a rural area, you have probably saved at least one to two children/teens per month (perhaps close to 500 patients) from all sorts of obvious

and not-so-obvious catastrophes and illnesses. These would include meningitis,¹¹ septicemia, Rocky Mountain spotted fever, tularemia, cancers, asthma, prematurity, antifreeze ingestion (anion gap), suicide, depression, and so on.

Thus, parents may think they can count on us pediatricians to always be able to save their children from these devastating VPDs if the illness should strike their child. That is a very dangerous gamble with any child. The mother who said she was not scared of pertussis has not seen the pertussis-induced brain-damaged infant or death that I saw two decades ago, despite all the marvelous medical technical skills of our pediatric intensive care units. She is also gambling with the lives of other infants and toddlers who are unwittingly exposed to her own unprotected vectors (ie, children).

CASES

The specifics in each of the following cases have been changed for privacy reasons.

Case 1

As a recent graduate of the top-notch Wake Forest University pediatric training program, you had been enjoying your autonomous private pediatric practice for a few years here in rural Kentucky. The busy practice was comprised of two pediatricians at the time, and seeing 30 to 35 patients per doctor during a 9-hour day was the norm during the winter.

One dank and frigid February afternoon, your office had received a phone call from the emergency department (ED). These time-consuming disruptions were not uncommon back then. At that time, there was no in-house ED doctor covering the small, 35-bed hospital.

The highly experienced and trustworthy ED nurse seemed frantic and said there was no time for the patient



Figure 5. An example of early chickenpox (24 hours) that has not yet developed crusts and multi-stages, making the diagnosis much more difficult. This 20-year-old woman had received only one dose of varicella vaccine and subsequently developed an extensive acute chickenpox rash over her entire body, most notably over her torso. Her maculo-papular-vesicular and even slightly pustular rash showed mostly one stage on the chest (A), back (B), and buttocks (C). Her symptoms included 101°F fever, marked pruritus, and malaise.

to come over to your office, which was only about a block away. The patient, a 2-year-old white boy, had a fever to 104°F and seemed lethargic. Which one of you was going to traipse on over there? By default, seniority won out. He stayed in the office. You were designated for the septic workup.

You quickly run over (young and without bad knees then) to the ED to encounter the dreaded predicament: a lethargic, pink, and minimally moving male toddler.

Your rapid but complete physical examination revealed one of the pediatrician's greatest professional fears—a lethargic, highly febrile but stable child who had a few bruises on his trunk. Petechiae and/or ecchymoses in a febrile child may be ominous. However, his vital signs were stable with only moderate tachycardia and a normal blood pressure; his neck was supple. It was time for the “full court press”—better known as the complete septic workup.

In your training during the heyday of pneumococcal and HIB disease, old-

time (and hopefully still in the “New Age”) pediatricians were generally taught that if the diagnosis of meningitis seriously enters your differential diagnosis, then one best act on this hunch and perform a spinal tap. In your 3-year residency stint, you would have likely performed probably at least 80 or more spinal taps, and about one per month in private practice since then. Spinal taps were an automatic reflex performed on infants who looked very ill, or who had a full fontanelle, or at any age in the presence of meningismus. The procedure is relatively easy to perform in young children and infants, and success is actually highly dependent on the person holding the patient. A child had to be in shock or critically unstable before one would ever consider delaying this procedure.

Thus, within minutes the obligatory blood culture, complete blood count, and urinalysis/urine culture were obtained. These were nearly always performed prior to the prompt requisite infusion of broad-spectrum antibiotics,

lest one obscure the bacterial growth. Thus, intravenous access was also critical for both the antibiotics and fluid resuscitation. This is a highly technical and challenging skill rarely taught to or practiced by your current pediatric trainees.

The alert but lethargic child was rolled on his side, restrained, and positioned as usual for a spinal tap while he received blow-by oxygen. Several cubic centimeters of clear colorless fluid were obtained without difficulty. The intravenous line was started and the ampicillin and ceftriaxone infusions were initiated.

And similar to the Israeli experience of a 4% HIB fatality,⁹ within perhaps 30 minutes the patient developed apnea and went into asystole before you were able to load him on the ambulance. He could not be resuscitated despite all your heroic efforts. One will always be affected by and never forget this type of tragedy. A gut-wrenching and horrific discussion with the family was the next step.



Figure 6. Prevnar 13 is a vital infant vaccine to protect against the 13 most common and resistant serotypes of pneumococcus. This bacteria is a major cause of invasive diseases such as meningitis, pneumonia, and bacteremia. Rejecting or delaying the vaccine in infants can be risky for the child.

Case 2

Sound asleep at 3 a.m. on an icy January night, the local ED physician called you with some bad news: “I think your 2-year-old patient with 102°F fever may have epiglottitis.” This was a true medical emergency. When you arrived, the patient was struggling to breathe, was drooling, and maintained a forward-lurching tripod sitting position. He had a distinctly different non-croup stridor. His lateral neck X-ray showed a positive thumb sign.

The tertiary care hospital intensive care unit (ICU) was 45 minutes away. The emergency medical technicians, who were an additional 20 minutes away, would not be able to handle an obstructed airway on the road. The urgency was palpable. He was having some mild desaturation spells manifested by slight cyanosis of the lips and dropping oximetry readings. In his unstable condition, transporting him by ambulance could be lethal. Children with this condition used to frequently die of an occluded airway in the past. This was all occurring in a 35-bed rural hospital where all responsibility rested on you.

The local general surgeon was called in for potential backup tracheotomy in case the intubation went awry. Children with epiglottitis are among the most difficult intubation procedures to per-

form due to the obscured landmarks and marked swelling of the epiglottis portal for your endotracheal (ET) tube. The experienced nurse anesthetist provided some blow-by inhaled anesthetic (if you remember correctly during all the commotion). Under pressure, you chose a 3.5-mm French ET tube, the size normally used in a smaller full-term infant.

As you suspected, the cherry red epiglottis was swollen and the opening was obscured as he inspired. (Your heart almost *expired* at that moment.) All those newborn intubations during your neonatal training at the local county hospital were about to pay off. With the straight laryngoscope and tube stylette, you were able to firmly force the ET tube past the tight swollen epiglottis. As expected, HIB was recovered from the blood culture a few days later.

With the airway stabilized, you could now perform blood cultures and deliver intravenous antibiotics and fluids. The stress of performing these invasive procedures before the airway was stabilized could have triggered an airway collapse and a nightmarish medical emergency like the one you were trying to avoid by keeping the boy off the road. Even the lateral neck radiograph in the ED could have been perilous.

He did well and survived without any sequelae. Yes, we can save most of these deathly ill children, but not all.

Case 3

About a decade into your practice, a 14-year-old boy was seen in the office in the past week with a relatively mild case of chickenpox for 48 hours (see **Figure 5** for an example of early chickenpox). He was alert, febrile to 101°F, drinking well, but itching furiously. His family was reassured about the self-limited nature of varicella. They were told to administer diphenhydramine and acetaminophen, and to use oatmeal baths daily for his itching and hygiene in an

attempt to prevent the increasingly common secondary *Streptococcus pyogenes* necrotizing fasciitis witnessed in the past decade.

He was apparently doing well, but you heard over the weekend that he had been seen in the ED and then admitted to the hospital for altered mental status. You knew what that meant. You find out that he is now comatose and on a ventilator, and an intracranial pressure monitor has been inserted into his skull. You found out that his liver function tests were 10- to 20-fold above the normal range, his prothrombin time was twice normal, and his serum ammonia was markedly elevated too.

At your earlier office visit, you had warned the family not to administer any aspirin to him. Earlier reports in the 1980s had noted some occasional association of Reye syndrome with aspirin use during either influenza or varicella infections. But were other sources of salicylate still available to the unsuspecting family?

After a week-long battle with his Reye syndrome, the patient died from his unrelentingly high brain pressure. During his hospitalization, the family asked you questions as to why he became afflicted by this deadly condition. He had taken no aspirin. However, he had developed some vomiting during his early illness that they treated with Pep-to-Bismol (Procter & Gamble, Cincinnati, OH), otherwise known as bismuth salicylate. (You had just uncovered one of the few cases of Reye syndrome likely precipitated by ingestion of bismuth salicylate during a bout of varicella.) You also suspected that Reye syndrome could possibly be triggered by topical applications of wintergreen, or salicylate liniments, for muscle aches.

An additional lesson to be learned here is that any type of salicylate compound should be avoided during an unknown febrile illness, or during known chickenpox or influenza-like illnesses.

Yes, we can save most of these deathly ill children, but not all.

Case 4

In a hypothetical medico-legal situation, a 4-year-old child from an urban area in Kentucky is confined to a wheelchair; he cannot speak, cannot feed himself, and has spastic hemiplegia. His disability is due to partially treated pneumococcal meningitis that he developed at age 9 weeks.

One of the major medico-legal complaints from the plaintiffs is the lack of administration of the first dose of then-available pneumococcal conjugate vaccine (PCV7) (**Figure 6**). But, the parent had cancelled a well visit at age 8 weeks and had subsequently rescheduled the visit at age 10 weeks, which was 2 days after the boy developed meningitis. The office schedule was busy, and this was your “earliest available” appointment.

Is the defendant physician responsible for the unfortunate delay? Will this parent’s allegations be similar to any family who chooses to delay infant vaccines and whose child subsequently develops a VPD?

The other critical legal unknowns are as follows: Would one dose of PCV7 have made any difference in preventing invasive disease? Would you not need to know the serotype of the pneumococcal strain, which was not assessed, to make any case of this?

CONCLUSION

I do not fully profess to be saintly, or an actual vicarious vicar of VPDs and afflictions; for this, read your pediatric infectious disease textbooks. But I have personally felt the sting of death and devastation from VPDs, which can almost always be prevented by the “sting” of some particularly safe shots.

As stated previously, we can save most children who become infected with many VPDs, but not all of them.

Pediatricians must also realize that continuing to provide care for children whose parents are willfully either keeping them non-vaccinated or in a state of delayed vaccinations is fraught with multiple problems. These include the following:

- A presumptive sanctioning of substandard pediatric care;
- A child who continues to be at significant risk for a devastating VPD, especially when population vaccine levels drop a little too low;
- Becoming enmeshed in a deadly gamble for your patient, and the terrible personal anxiety about the course and outcome if one of your patients should become afflicted with a VPD;
- A profound and very expensive change in the way you approach patient encounters for fevers, rashes and bad coughs, both on the phone and in the office;
- Eventual likelihood of medico-legal conundrums and lawsuits.

With the increasing rates of nonvaccination and undervaccination in your practice, these are each examples of the many potential VPD infections and possible legal crossroads that many pediatricians will likely face in their career. Remember that in your career, your odds of being dragged into court as a defendant are already somewhere between 30% and 40%. That means at least 30,000 of the nearly 100,000 currently practicing pediatricians will have to spend about 5 years of their active 35 career years in a state of shock, high anxiety, depression, insomnia, and self-doubt. Despite the unavoidable bad outcome in most legal cases, your personal

and professional integrity will still be completely smeared.¹²

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