

Overcoming patient barriers to immunizations

Tami Hendriksz, DO, FACOP, FAAP
Philip Joseph Malouf, MD, FAAP
Stella Sarmiento, DO, FAAP
James E. Foy, DO, FACOP

Thousands of people get ill each year in the United States

from diseases that could have been prevented by routine immunizations.

The current immunization schedule that is recommended by the Centers for Disease Control (CDC) aims to protect children from 14 preventable diseases (see Figure on p. 6 and 7).¹

These diseases range from the increasingly rare (eg, polio and diphtheria) to the more prevalent (eg, chicken pox and whooping cough).

The CDC estimates that about 42,000 deaths and 20 million cases of disease are prevented by routine immunization in each birth cohort.² This results in a savings of about \$13.6 billion in direct costs.²

In the 1950s, nearly every child developed measles. Many lost their lives due to measles and its complications.³ Today, thanks to the help of safe and effective vaccinations throughout the United States, very few physicians graduating from medical school this year will ever see even a single case of measles throughout their career.

Unfortunately, our fight against these diseases is far from over. Due largely to unvaccinated populations, we continue to have outbreaks of some of these preventable diseases across the country. In 2012, the United States had about 60 documented cases of measles and more than 41,000 cases of whooping cough (pertussis).³ Most of the deaths associated with these outbreaks were in children younger than 1 year.³

The best way to protect children from 14 serious childhood diseases like these is to maintain the recommended immunization periodicity and administer all of the recommended immunizations by age.²

A number of barriers to immunization have been identified as the primary reasons

why the United States is falling short of its goal to fully eradicate these preventable diseases. The barriers can be classified into 3 broad categories: health care system barriers; health care provider barriers; and patient barriers.⁴ The former 2 barriers focus on the overall setup of the health care system, its economy, and the lack of clinician knowledge of vaccines and their contraindications. This article will focus on patient barriers to immunizations. The authors will discuss the miseducation and misconceptions of patients, fear and anxiety of immunization pain, and lack of access (perceived and real) to immunizations. The better we understand these barriers, the more likely we will be able to overcome them and further prevent disease burden and health care cost.

Miseducation and misconception of patients

Immunizations no doubt are one of the most effective preventive health measures and have saved countless numbers of lives. Despite all 50 states having some school-entry requirements, vaccine refusal and nonmedical exemption may be on the rise.^{5,6} In a survey by the American Academy of Pediatrics, 85% of pediatricians reported encountering parents who refuse vaccines.⁷ In surveys of parents of vaccine-exempt children, almost 70% stated that

the perceived safety of vaccines was the reason for refusal.⁸ One factor contributing to this is the miseducation and misconception of patients.

One of the most controversial and well-known topics of vaccine safety is that of autism. Although numerous scientific studies have shown no connection between autism and vaccines, celebrity opinion and mainstream media channels continue to fuel the myth that vaccines are unsafe or contaminated and might be the cause of long-term medical conditions. With the increasing number of parents and patients using the Internet as their source of medical information, it is inevitable that they will encounter antivaccine websites, many of which link vaccines to such chronic diseases as autism.^{9,10} Unfortunately, mainstream media seems to be less effective in communicating scientific data.

Overall, parents and caregivers believe that vaccines are necessary to prevent disease and are important to children's health, but a common misconception is that multiple vaccines can overwhelm the immune system, especially with the expanding immunization schedule.¹¹ One survey showed that up to one third of parents report concern that their child is receiving too many vaccines in 1 visit.¹¹ Another survey highlighted concern that multiple vaccines can have a negative effect or weaken the child's immune system.¹²

Current studies have refuted this misconception, and have shown that infants and young children have the ability to mount an immune response to multiple vaccines given simultaneously.¹³ Additionally, it is well known that children are exposed to many more antigens in their daily lives than they are exposed to during childhood immunization.¹⁴ Caregivers also may choose to forego administration of vaccines during minor acute illnesses, which can lead to missed opportunities to immunize and delayed or missed immunization.

Paradoxically, it is the success of immunizations in preventing disease that may be a reason for vaccine refusal. Because vaccine-preventable disease (VPD) rates are low, and the serious sequelae of VPD is not well known, parents may be unaware that their children are still at risk.¹⁵



© Shutterstock.com

This perpetuates the perception that vaccines are unnecessary. Parents may selectively choose certain vaccines to protect against diseases they believe to be more severe. For example, studies have shown that the varicella vaccine is most commonly refused.¹⁶ However, parents and guardians usually do not possess the awareness of varicella complications (eg, encephalitis and pneumonia) that increase morbidity and mortality even in normal, healthy children. Additionally, many also are unaware that an unvaccinated child can threaten the health of those in the community who are too young or unable to be vaccinated. For the vaccine-hesitant family, it is the provider's responsibility to provide an accurate description of vaccine risks and benefits in an effort to more fully educate the family and reduce disease transmission.

But, health care providers do have an influence on whether or not such misinformation and misconceptions are accepted. Surveys have shown that parents trust the vaccine advice from their child's health care provider, and more than 60% report asking questions about vaccines during routine office visits.¹¹ One barrier to providing adequate education and information to patients includes insufficient time to completely address parental concerns. Providers also are required to have the CDC Vaccine Information Statements (VIS) available to patients, but these VIS forms have their limitations. Typically, these forms are provided during the vaccine visit, which may not allow enough time to review the information. In 1 study, only approximately three fourths of private practice offices reported that they routinely provided VIS.¹⁷

Other studies have shown that parents trust their children's physician or other health care professionals most often for vaccine-safety information, highlighting the important role that health providers have in educating patients and dispelling vaccine-related myths and misconceptions.^{11,18} Thus, the primary care provider's ability and willingness to present valid information concerning the risks and benefits of immunization to parents and guardians is a powerful tool that can increase vaccine compliance and reduce disease.

Fear and anxiety of immunization pain

The benefits of vaccines and immunization schedules are great in quantity, and they remain 1 of the greatest public health achievements. However, even when parents, patients, and health care providers recognize and understand the far-reaching positive implications of vaccines, there still remains some anxiety in their delivery. Immunizations are the most frequently occurring painful procedures in pediatric settings.¹⁹ As mentioned above, the current childhood immunization schedule provides protection against 14 diseases.¹ Depending on the number of combination vaccines available, this translates into up to 28 separate injections before the age of 6 years, as well as multiple injections at many well-child visits.¹ According to the Institute of Medicine, the number of vaccines is estimated to triple by the year 2020.¹⁹ Research has shown that this pain is a cause of concern not only to the patients receiving the vaccine, but also to their family members and health care providers.²⁰



Studies have demonstrated that children have a pain memory and are able to anticipate procedures that cause pain.^{23,24,25} This occurs even at very young ages.

Children express their concern about immunizations openly and clearly. Research has shown that a large portion of pediatric patients (as many as 90% of 15- to 18-month-olds) exhibit high levels of distress during immunization procedures.²¹ Telephone survey results have further demonstrated that injections and needles were the things that children in the United States feared most about doctor visits.²² Often, their anxiety about receiving a vaccine dominates entire visits and preoccupies them and their family members. This may prevent both the children and their guardians from being able to listen to and comprehend some of the anticipatory guidance that is delivered during those immunization visits.

Studies have demonstrated that children have a pain memory and are able to anticipate procedures that cause pain.^{23,24,25} This occurs even at very young ages. Furthermore, those children who have had previous painful procedures with less than adequate analgesia tend to react more intensely.²⁶ There is some variability with how each child reacts to vaccines, and their reaction is likely due to features inherent to their temperament, as well as to extrinsic factors.

Arguably, one of the most influential extrinsic factors contributing to a child's response to, or anticipation and fear of, vaccines are their parents and caregivers. Multiple studies have demonstrated that parents are significantly concerned about the amount of discomfort that vaccines cause their children. When children have received inadequate pain control for their immunizations, caregivers who accompany the child during that visit often exhibit collateral anxiety.²⁷ Studies have demonstrated parental concern about vaccines by showing that some parents are willing to pay more money to avoid office visits that involve a higher number of injections.²⁸ The anxiety and discomfort of the parent may have a great impact on the child's reaction to the vaccine and whether the child is immunized on schedule. Further research suggests that for some parents, this may contribute to them being less compliant with medical recommendations and routine preventative care.²⁹ In 1 survey, 23% of parents reported that they had delayed or avoided a medical

procedure for their child in order to also avoid immunizations at that same visit.²²

The child's parents and caregivers are not the only ones who are being negatively affected by the child's stress during visits that involve immunizations. The discomfort of health care professionals adds to the possibility that a child may not receive all of their necessary vaccines on time. Multiple studies have shown that physicians and nurses are uncomfortable with ordering or delivering more than 3 injections at 1 time.^{30,31} This likely is related to the significant amount of distress that children show when they are given multiple injections at 1 visit. Without the use of combination vaccines, this would make it nearly impossible to keep a child up to date with the current recommended immunization schedule (see CDC schedule on pages 6-7).

The anxiety and fear of pain associated with immunizations has implications that reach beyond the childhood years of well-child visits with multiple injections. Inadequate pain management in pediatric patients has been shown to be associated with negative long-term outcomes. These include elevated fear and avoidance of medical procedures in adulthood, poorer health care attitudes, and negative impact on physiologic development.^{32,33}

A number of recommended strategies can help relieve some of the pain from immunizations and the associated fear and anxiety. Studies have shown that children report less pain and experience less local reactions when longer needles are used.²⁰ Topical anesthetics may help relieve some of the anxiety of the fearful child or the child who has had negative experiences with painful immunizations in the past.²⁰ Pressure applied at the site of the injection has also been shown to decrease pain.²⁰ Parents can get involved, too. Age-appropriate parental distraction techniques (eg, blowing bubbles, watching videos, or telling jokes) have shown to decrease the distress of the child and are preferable to the overly reassuring, critical, or apologetic parent.²⁰ The administration of sucrose to infants aged 6 months or younger has been proven to be a reliable distress reducer.²⁰ And, finally, the increase in the number of combination vaccines approved by the US Food and Drug Administration will help allow patients to receive all of the

recommended immunizations with fewer injections.

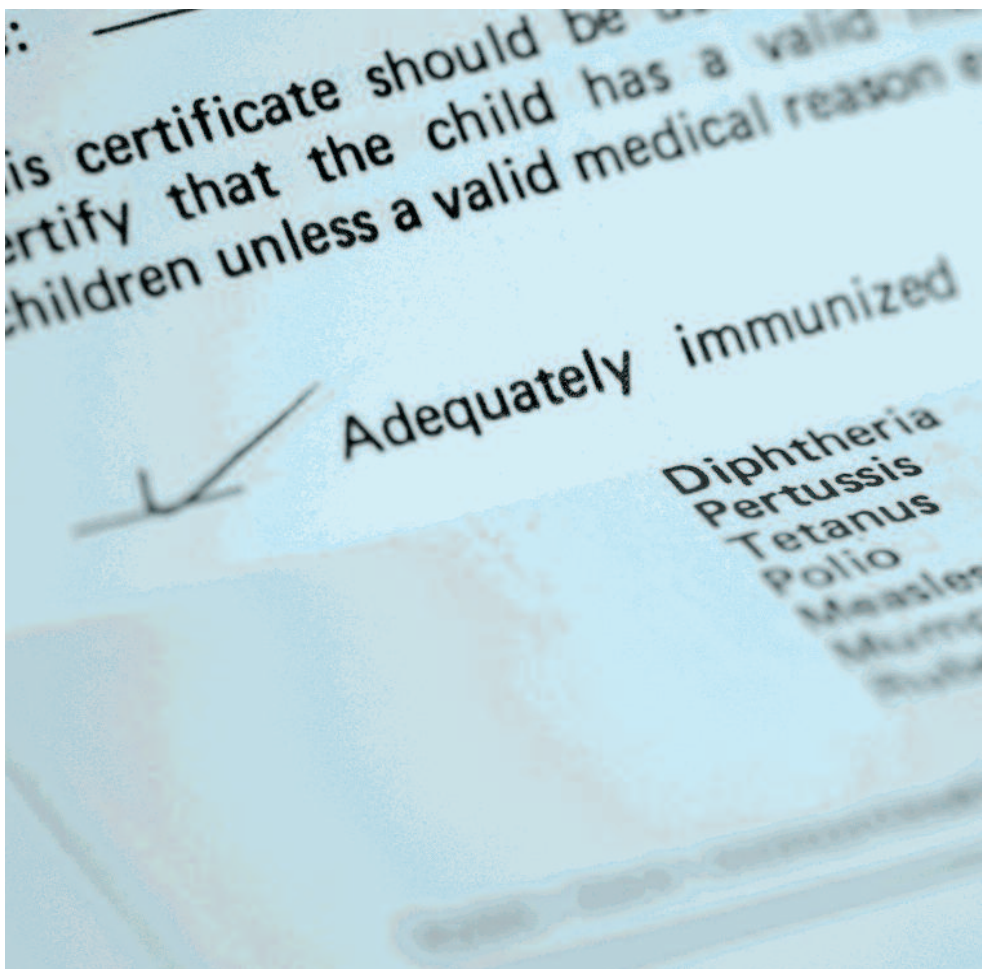
Lack of access: perceived and real

Although vaccination rates have risen, lack of access to immunizations can present a significant barrier to adequate immunization. Nowhere is this more apparent than the disparities in immunization rates between different geographical, economic, and ethnic groups. Low-income families are at greater risk than the general population for incomplete immunization.^{34,35} Among this population, black and Hispanic families and those in urban environments are at the greatest risk.^{36,37,38} A common factor among these patients is lack of access to a medical home. Utilization of a medical home for primary and coordinated care is associated with improved rates of vaccination.³⁹ A consistent source of primary care is essential in ensuring adequate vaccination rates.

These problems are not simply isolated to underserved communities either. A study

in 2000 revealed significant barriers in a relatively affluent community. Factors affecting the convenience of immunization, such as inconvenient office hours and long waits, were commonly reported, but delays caused by a sick child and not knowing when the next shot was due had the highest attributable risk for underimmunization.⁴⁰ Though not statistically significant, the convenience factors are very important when considering that many parents have a limited knowledge of vaccine effects and safety, and when making the decision to vaccinate, inconvenience may be the deciding factor. Consider also, when we transpose this finding onto lower income and impoverished families, who may be struggling to find stable employment. Leaving a tenuous job situation to take a child to an appointment for an indeterminate number of hours during an inconvenient time of day is not ideal.

Other systematic barriers to accessing vaccines include difficulties with transportation, incomplete immunization



records, and forgetting to show up for scheduled appointments. The latter has been addressed by some practices by using telephone reminders, text messages, and social media to provide reminders to patients.⁴¹ Ideally, patients should have access to primary care outside of routine business hours. Immunization-only visits have been utilized to some effect to decrease wait times and improve vaccination rates. Home visits, though resource intensive, have been shown to improve vaccination rates.⁴² Ultimately, free or low-cost vaccines should be available outside of the primary care office, such as in schools and pharmacies. If possible, immunization records should be kept up to date in regional or state immunization databases to prevent fragmenting vaccination records—and providers should be encouraged to participate in their local immunization registry.

Perceived barriers also can be a deterrent to immunization. One study revealed that infants of mothers who

In 1 survey, 23% of parents reported that they had delayed or avoided a medical procedure for their child in order to also avoid immunizations at that same visit.²²

had previously cared for another infant were significantly less likely to be adequately immunized if their mother perceived high or medium barriers to immunization.⁴³ Chief among these was the perception that health insurance would not cover vaccines. At this point in time, many commercial insurances cover routine infant and childhood vaccines. However, approximately 20% of adolescents have insurance that inadequately covers the cost of vaccination.⁴⁴ The Vaccines for Children (VFC) program provides free vaccination through registered health care providers to Medicaid eligible, uninsured, and underinsured children.⁴⁵ Children who are underinsured for vaccine coverage may have to visit a VFC provider that is different from their primary care provider (typically a federally qualified health center) in order to avoid out-of-pocket vaccine costs—yet another barrier to immunization.

Final notes

We approach an era where many vaccine-preventable illnesses have faded from memory. Such diseases as poliomyelitis and measles are no longer the focus of mass attention, replaced instead by fanatical depictions of the mystery and evils of vaccines. An expanding catalog of recommended vaccines has led to increased anxiety about the effects and pain associated with multiple injections, despite the concomitant expansion of disease protection provided to children. Additionally, the large number of routine vaccines has made it increasingly difficult for parents to track and ensure adequate, timely administration.

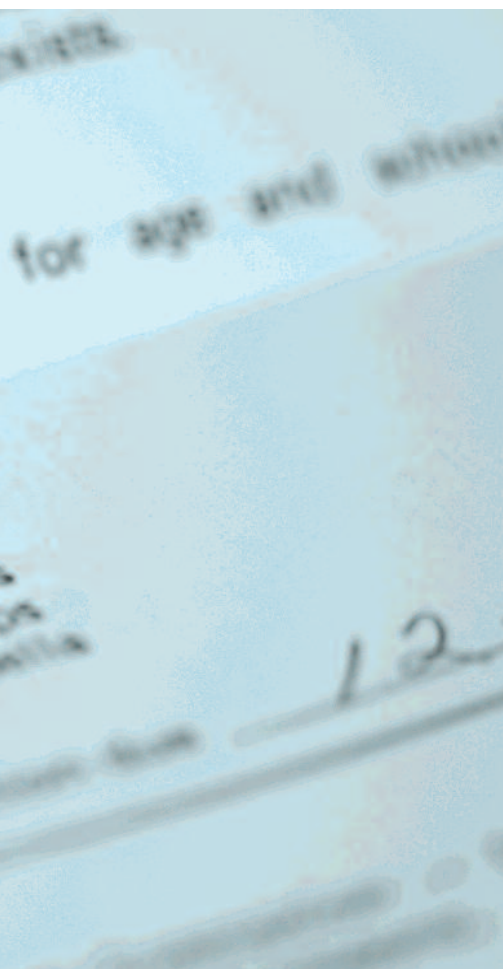
As health care professionals, it is important for us to understand the barriers to vaccination from the standpoint of the patient. Just as we encourage a holistic approach to health, understanding the societal, cultural, educational, and family influences on perceptions of immunization practices is vital in helping educate patients about the importance of this critical health care intervention. Although we encourage parents to take an active role in the provision of health care to their children, it is key that we make sure they make adequately informed decisions about vaccination. This means understanding their concerns and taking the time to counsel them appropriately.

Similarly, in our practices we should endeavor to create processes to minimize pain and address the anxiety related to vaccination. Interventions designed to reduce pain from vaccines will help to alleviate stress of immunization on patients, parents, and health care professionals alike. Ideally, this should translate into more acceptance of timely vaccination among all parties.

Along those same lines, providers and health care organizations should take measures to improve access to vaccines by participating in the VFC program and local immunization registries, offer after-hours immunizations, and institute tracking or reminder and recall systems.

References

1. Centers for Disease Control and Prevention. Advisory Committee on Immunization Practices (ACIP) recommended immunization schedule for persons aged 0 through 18 years—United States, 2013. *MMWR Morb Mortal Wkly Rep*. 2013;62(1):2-8.
2. Centers for Disease Control and Prevention. Summary of notifiable diseases—United States, 2010. *MMWR Morb Mortal Wkly Rep*. 2013;59:1-104.
3. Centers for Disease Control and Prevention National Immunization Program. *Epidemiology and Prevention of Vaccine Preventable Diseases*. 12th ed. Atlanta, GA: Centers for Disease Control and Prevention; 2012.
4. Burns IT, Zimmerman RK. Immunization barriers and solutions. *J Fam Pract*. 2005;54(suppl 1):S58-S62.
5. Richards JL, Wagenaar BH, Van Otterloo J, et al. Nonmedical exemptions to immunization requirements in California: a 16-year longitudinal analysis of trends and associated community factors. *Vaccine*. 2013;31(29):3009-3013. 10.1016/j.vaccine.2013.04.053.
6. Omer SB, Pan WK, Halsey NA, et al. Nonmedical exemptions to school immunization requirements:



© Shutterstock.com

- secular trends and association of state policies with pertussis incidence. *JAMA*. 2006;296(14):1757-1763.
7. Flanagan-Klygis EA, Sharp L, Frader JE. Dismissing the family who refuses vaccines: a study of pediatrician attitudes. *Arch Pediatr Adolesc Med*. 2005;159(10):929-934.
 8. Salmon DA, Moulton LH, Omer SB, et al. Factors associated with refusal of childhood vaccines among parents of school-aged children: a case-control study. *Arch Pediatr Adolesc Med*. 2005;159:470-476.
 9. Davies P, Chapman S, Leask J. Antivaccination activists on the world wide web. *Arch Dis Child*. 2002;87(1):22-25.
 10. Zimmerman RK, Wolfe RM, Fox DE, et al. Vaccine criticism on the World Wide Web. *J Med Internet Res*. 2005;7(2):e17.
 11. Kennedy A, Basket M, Sheedy K. Vaccine attitudes, concerns, and information sources reported by parents of young children: results from the 2009 HealthStyles survey. *Pediatrics*. 2011;127(suppl 1):S92-S99.
 12. Gellin BG, Maibach EW, Marcuse EK. Do parents understand immunizations? A national telephone survey. *Pediatrics*. 2000;106(5):1097-1102.
 13. Offit PA, Quarles J, Gerber MA, et al. Addressing parents' concerns: do multiple vaccines overwhelm or weaken the infant's immune system? *Pediatrics*. 2002;109(1):124-129.
 14. Marshall GS. *The Vaccine Handbook: A Practical Guide for Clinicians*. New York, NY: Lippincott, Williams and Wilkins; 2003.
 15. Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 11th ed. Atkinson W, Wolfe S, Hamborsky J, McIntyre L, editors. Washington, DC: Public Health Foundation; 2009.
 16. Fredrickson DD, Davis TC, Arnold CL, et al. Childhood immunization refusal: provider and parent perceptions. *Fam Med*. 2004;36(6):431-439.
 17. Davis TC, Fredrickson DD, Arnold CL, et al. Childhood vaccine risk/benefit communication in private practice office settings: a national survey. *Pediatrics*. 2001;107(2):E17.
 18. Freed GL, Clark SJ, Butchart AT, Singer DC, Davis MM. Sources and perceived credibility of vaccine-safety information for parents. *Pediatrics*. 2011;127(suppl 1):S107-S112.
 19. Institute of Medicine. *Calling the Shots—Immunization Finance Policies and Practices*. Washington, DC: National Academy Press; 2000.
 20. Schechter NL, Zempsky WT, Cohen LL, McGrath PJ, McMurtry CM, Bright NS. Pain reduction during pediatric immunizations: evidence-based review and recommendations. *Pediatrics*. 2007;119(5):e1184-e1198.
 21. Jacobson RM, Swan A, Adegbenro A, Ludington SL, Wollan PC, Poland GA; Vaccine Research Group. Making vaccines more acceptable—methods to prevent and minimize pain and other common adverse events associated with vaccines. *Vaccine*. 2001;19(17-19):2418-2427.
 22. Princeton Survey Research Associates. *Benchmark surveys on childhood immunizations*. Princeton, NJ: Gallup Poll; 1996.
 23. Ornstein P, Manning EL, Pelphrey KA. Children's memory for pain. *J Dev Behav Pediatr*. 1999;20(4):262-277.
 24. Craig KD, McMahon RJ, Morison JD, et al. Developmental changes in infant pain expression during immunization injections. *Soc Sci Med*. 1984;19:1331-1337.
 25. Cohen LL, Blount RL, Cohen RJ, McClellan CB, Bernard RS, Ball CM. Children's expectations and memories of acute distress: the short- and long-term efficacy of pain management interventions. *J Pediatr Psychol*. 2001;26(6):367-374.
 26. Weisman SJ, Bernstein B, Schechter NL. Consequences of inadequate analgesia during painful procedures in children. *Arch Pediatr Adolesc Med*. 1998;152(2):147-149.
 27. Cohen LL, Blount RL, Panopoulos G. Nurse coaching and cartoon distraction: an effective and practical intervention to reduce child, parent, and nurse distress during immunizations. *J Pediatr Psychol*. 1997;22(3):355-370.
 28. Meyerhoff AS, Weniger BG, Jacobs J. Economic value to parents of reducing the pain and emotional distress of childhood vaccine injections. *Pediatr Infect Dis J*. 2001;20(suppl 11):S57-S62.
 29. Abbotts B, Osborn LM. Immunization status and reasons for immunization delay among children using public health immunization clinics. *Am J Dis Child*. 1993;147(9):965-968.
 30. Madlon-Kay DJ, Harper PG. Too many shots? Parent, nurse, and physician attitudes toward multiple simultaneous childhood vaccinations. *Arch Fam Med*. 1994;3(7):610-613.
 31. Woodin KA, Rodewald LE, Humiston SG, Carges MS, Schaffer SJ, Szilagyi PG. Physician and parent opinions: are children becoming pincushions from immunizations? *Arch Pediatr Adolesc Med*. 1995;149(8):845-849.
 32. Taddio A, Katz J, Ilersich AL, Koren G. Effect of neonatal circumcision on pain response during subsequent routine vaccination. *Lancet*. 1997;349(9052):599-603.
 33. Pate JT, Blount RL, Cohen LL, Smith AJ. Childhood medical experience and temperament as predictors of adult functioning in medical situations. *Children's Health Care*. 1996;25(4):281-296.
 34. Centers for Disease Control and Prevention. National, state, and urban area vaccination coverage levels among children aged 19-35 months—United States, 2000. *MMWR Morb Mortal Wkly Rep*. 2001;50(30):637-641.
 35. Klevens RM, Luman ET. US children living in and near poverty: risk of vaccine-preventable diseases. *Am J Prev Med*. 2001;20(suppl 4):41-46.
 36. Wood D, Donald-Sherbourne C, Halfon N, et al. Factors related to immunization status among inner-city Latino and African-American preschoolers. *Pediatrics*. 1995;96(2):295-301.
 37. Herrera GA, Zhao Z, Klevens RM. Variation in vaccination coverage among children of Hispanic ancestry. *Am J Prev Med*. 2001;20(suppl 4):69-74.
 38. Kenyon TA, Matuck MA, Stroh G. Persistent low immunization coverage among inner-city preschool children despite access to free vaccine. *Pediatrics*. 1998;101(4):612-616.
 39. Smith PJ, Santoli JM, Chu SY, Ochoa DQ, Rodewald LE. The association between having a medical home and vaccination coverage among children eligible for the vaccines for children program. *Pediatrics*. 2005;116(1):130-139.
 40. Yawn BP, Xia Z, Edmonson L, Jacobson RM, Jacobsen SJ. Barriers to immunization in a relatively affluent community. *J Am Board Fam Pract*. 2000;13(5):325-332.
 41. National Vaccine Advisory Committee. Strategies to sustain success in childhood immunizations. *JAMA*. 1999;282(4):363-370.
 42. Guide to Community Preventive Services. Universally recommended vaccinations: home visits to increase vaccination rates. <http://www.thecommunityguide.org/vaccines/universally/homevisits.html>. Accessed June 10, 2013.
 43. Brenner RA, Simons-Morton BG, Bhaskar B, Das A, Clemens JD; NIH-D.C. Initiative Immunization Working Group. Prevalence and predictors of immunization among inner-city infants: a birth cohort study. *Pediatrics*. 2001;108(3):661-670.
 44. Smith PJ, Lindley MC, Shefer A, Rodewald LE. Underinsurance and adolescent immunization delivery in the United States. *Pediatrics*. 2009;124(5):S515-S521.
 45. Centers for Disease Control and Prevention Vaccines For Children Program. <http://www.cdc.gov/vaccines/programs/vfc/index.html>. Accessed June 10, 2013. **hw**

About the Authors

Tami Hendriksz, DO, FACOP, FAAP, is a pediatrician, assistant professor, and co-director of the third-year pediatric clerkship at Touro University California in Vallejo, California. As a mother of two and a pediatrician, Dr Hendriksz is a strong advocate of preventative medicine and better health for all children. She can be reached at tami.hendriksz@tu.edu.

Philip Joseph Malouf, MD, FAAP, is a pediatrician, assistant professor, and co-director of the third-year pediatric clerkship at Touro University California. His interests lie in innovative teaching technologies, clinical reasoning, and preventative medicine. He can be reached at philip.malouf@tu.edu.

Stella Sarmiento, DO, FAAP, is a pediatrician and assistant professor at Touro University California. She enjoys seeing pediatric patients in the clinic and teaching medical students on campus. She can be reached at stella.sarmiento@tu.edu.

James E. Foy, DO, FACOP, is professor of pediatrics, chair of the pediatric division, and director of pediatric care at Touro University College of Osteopathic Medicine. He can be reached at james.foy@tu.edu.