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Immunizations

What physicians need to know

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Immunization Task Force (ITF)

Advocating for Immunizations

www.ImmunizeNebraska.org

An overview and introduction to this issue

by Linda K. Ohri, Pharm.D., MPH

We continue to confront many societal challenges related to control of vaccine preventable diseases (VPDs). U.S. measles outbreaks are increasing in number and size (2013: 11 outbreaks; 187 cases; 2014: 23; 628; 2015, to 6/26/15: 5; 178).[1] Pertussis is considered an endemic illness again, occurring across all 50 states, with 28,639 U.S. cases reported in 2013, and 28,660 in 2014.[2] Many more cases go unreported. Influenza and pneumonia continue as the eighth leading cause of death in the latest 2013 statistics, both in deaths across the entire U.S. population (56,979) and for Nebraska (343).[3]

While overall daycare and school mandated pediatric immunization rates are high, non-mandated child and adolescent vaccination rates are less than optimal, and adult immunization rates in the U.S. are generally unsatisfactory.[4] Early season (November) 2014-15 influenza immunization rates for the U.S. were estimated at 40.3% across all ages.[5] Furthermore, GPS (Geographic Positioning System) population studies have demonstrated location / time clustering of pertussis or measles cases associated with regions also showing increased rates of non-medical immunization exemptions.[6,7,8] While no such studies have yet been published for Nebraska, we may look forward to the possibility of assessing such population trends through use of the Nebraska State Immunization Information System (NESIIS) as this registry grows more complete.

The reports in this issue are intended to provide updates and commentary on recommended immunizations in childhood (Michelle Petersen, MD), adolescence (Shirley Delair, MD, MPH) and for adults (Rudy Kotula, MD). To achieve the goal of "Optimal Immunization across the Lifespan," prevention through vaccination must be accepted as a responsibility of all health providers, regardless of specialty or patient population served. Meera Varman, MD, addresses HPV vaccination, where there has been slow acceptance by various medical providers as well as parents over the nine years since first approval, despite its potential to prevent several cancers in both genders. A report by Archie Chatterjee, MD, PhD, discusses factors involved in vaccine hesitancy and refusal, and general approaches by providers to address this problem. Katie O'Keefe, DNP, APRN-NP, further discusses strategies on how to effectively promote vaccination in communication with patients. Finally, Cathy Carrico, NP, FNP-BC, will address the need for and strategies to achieve a health provider's personal acceptance of optimal vaccination to protect both themselves and their patients.

Most of the authors for the articles in this issue are members of the Immunization Task Force – Metro Omaha (ITF). This all-volunteer coalition of immunization advocates was started in 1991, through the efforts of Dr. Don Glow, medical director of Children's Hospital, Omaha, and staff from the Douglas County Health Department. The coalition began in response to measles outbreaks and low immunization rates identified in Omaha and outstate Nebraska, as well as across the country. The goal of this coalition is "Optimal Immunization across the Lifespan." The website is located at: www.ImmunizeNebraska.org. Associate membership is open to advocates from across Nebraska. I also encourage all providers to attend the annual Immunize Nebraska conference, held in Omaha in early June each year. This conference provides approximately seven hours of immunization-related continuing education credit for physicians, NPs, PAs, nurses, and pharmacists; more information may be found on the website.

Over the years, one focus of ITF advocacy has been on legislation at the Nebraska Unicameral regarding immunization issues. I encourage you to stay informed about current activities to:

1) Oppose efforts to add a Philosophical Immunization Exemption in Nebraska. Research shows that states with non-medical exemptions in place have lower rates of vaccination and higher rates of VPDs.[8]
2) Add a requirement for meningococcal meningitis immunization for adolescent school entry (Legislative

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My vaccine perspective

by Michelle Petersen, MD
Pediatrician
NMA Past President, Lincoln

As a pediatrician, one of the most important jobs I have is working together with parents to assure their children are healthy and protected. Illnesses shift from season to season, but vaccinations and the discussion that they bring are daily routine. When reviewing the vaccines with families, I have often explained the diseases by telling of my time as a resident and the diseases that we would see on a regular basis. I find that past information is now more relevant in our current vaccine climate. Meningitis, measles, varicella, and pertussis are on the verge of making major inroads into the immunities our country has long enjoyed.

During my residency in the mid 1980s, measles was at an all-time low. The MMR as a combined vaccine started in 1971 and with widespread use, measles was nearly eradicated from the United States. My closest memories of the disease then were when my sister and I were sick with measles as children. Pictures in books are now being replaced with patients in our offices. The risk for deaths and disabilities from measles is rising.

One child in our care during residency contracted tetanus when her mother pierced her ears at six weeks of age, before her vaccinations. She was purposely paralyzed and ventilated for two months to prevent the toxins from killing her. The resulting developmental and physical damages were extensive.

There was a young girl with polio in our long-term unit. Her mom had not been vaccinated and she had no immunity as a newborn when her brother got his kindergarten vaccines. She contracted polio from him as he processed the oral polio vaccine; she remained ventilator dependent and non-mobile when her paralytic polio did not improve. The current inactivated polio vaccine avoids vaccine-associated polio rarely related to the live oral polio vaccine.

We took care of a 3 year old whose mom had taken him to a neighborhood "chicken pox party." Another child in the neighborhood had chicken pox so other children were brought there to be exposed. The child developed a secondary bacterial skin infection after getting varicella from the party. After weeks of ICU care, the child died of overwhelming sepsis.

In past decades, from January to June, we had 4-6 cases of meningitis monthly. Haemophilus influenza B and pneumococcus bacteria were the leading causes. Hearing damage, developmental delays, seizures, and brain abscesses were constant reminders of the severity of these illnesses. Septic joints, epiglottitis and buccal and periorbital cellulitis from HIB were also common. With the present vaccines, these are now rare reportable illnesses rather than routine. Another benefit is that fewer children need a lumbar puncture during illness evaluation. Another recent finding is that pneumococcal infections in adults have dropped since the start of the pneumococcal vaccine in children. In my time as a pediatrician, I have seen the HIB and pneumococcal vaccines come into routine use and it has changed my practice significantly.

Pertussis has been increasing over the last few decades. Pertussis has a 1% fatality rate in infants under two months of age with complications of pneumonia (22%), seizures (2%), and bradycardia, apnea, encephalopathy and others. Research found the spike in infant cases was mirrored in the 15-17 year age group. This information has precipitated use of a reduced booster dose of the pertussis portion of pediatric DTaP through Tdap use beyond the initial childhood vaccine schedule. Of note, the Tdap version of this vaccine is recommended for all new parents, older siblings and caregivers to reduce the pertussis risk to newborns.

The current immunization schedule is a collaborative effort between the Centers for Disease Control, the American Academy of Pediatrics and the American Academy of Family Practice. Prior to 1995, the schedule was reviewed on an as needed basis, and updated every two to three years. Since then, these three groups review current research and data from multiple sources on a yearly basis and make changes if needed. This vaccine schedule can be viewed on the CDC website at this address: http://www.cdc.gov/vaccines/schedules/easy-to-read/child.html or on page 5 of this issue.

Your patients may be asking about an "Alternative Vaccination Schedule" that is published online on a yearly basis. This is a schedule put together by Robert Sears, a pediatrician in California. His schedule has no research basis and cannot verify that immunizations given at his recommended intervals will produce adequate levels of immunity in children on a timely basis. Unfortunately, many families request that their child's vaccines be given in this manner. Consequences of

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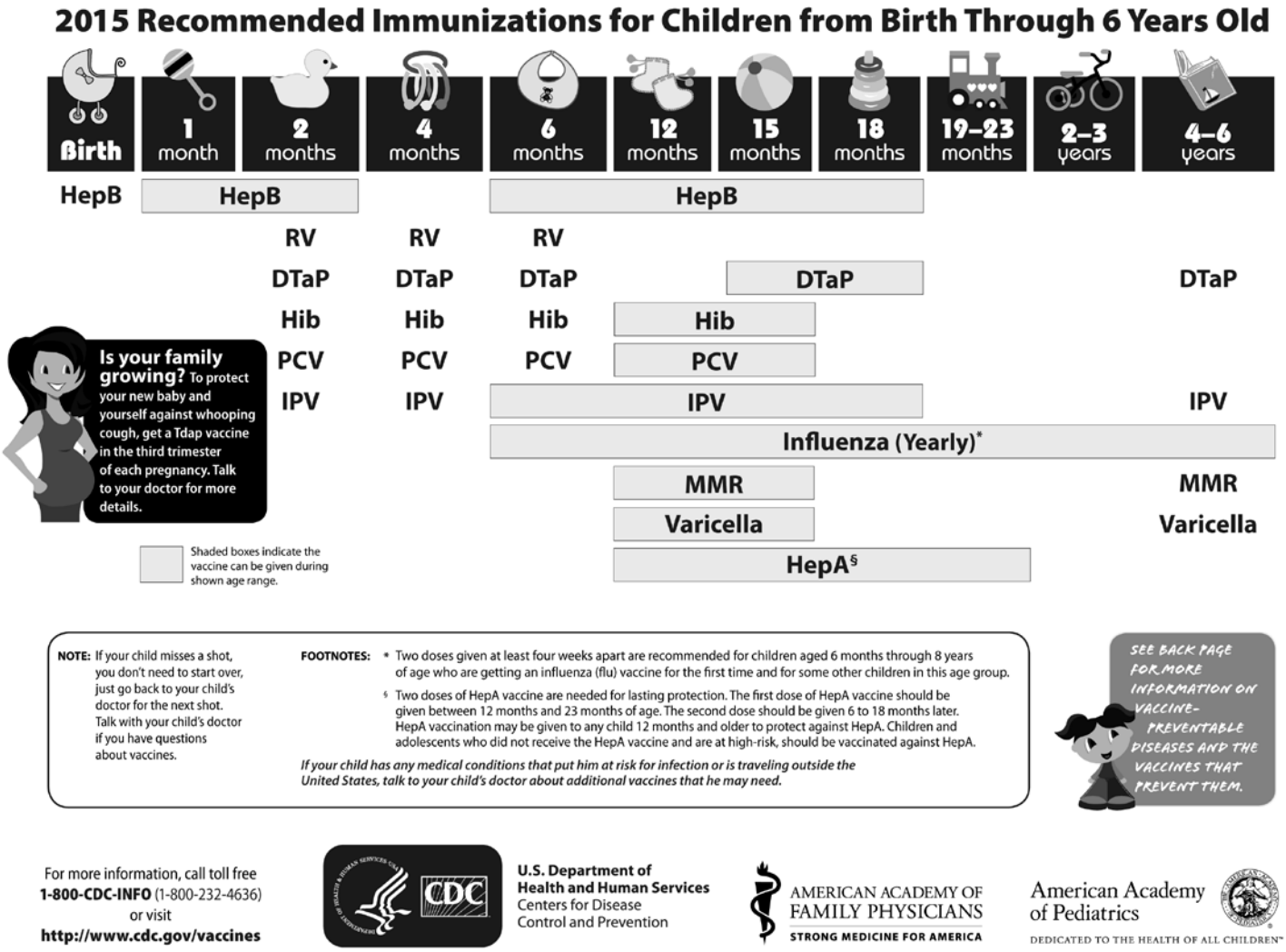
My vaccine perspective *(continued)*



this are that the children are not vaccinated quickly enough to produce protection when needed. With minor illnesses, often these immunizations are missed, causing the schedule to fall behind even more. This leaves our youngest patients vulnerable to disease and death.

It has been difficult to understand some of the reluctance of parents to immunize their children. I have heard many different reasons for parental refusal, from concern for the number of shots given to safety fears to ethical issues of using aborted fetal tissue in vaccine research. When working with these families, I find it is important to be patient but also factual and firm. Some families don't understand or don't have all the information and once explained, will vaccinate their children. It seems that reviewing the diseases, complications of those diseases, the longstanding research, constant new research and personal experience helps to guide families in their decisions. Some of these families are set in their decisions and will not vaccinate their children despite the facts. On the other hand, many families whose children are vaccinated are questioning the safety of pediatric waiting rooms where there may be children that are non-vaccinated. Pediatricians and family medicine providers are responding to these concerns by asking "vaccine limiters" to seek medical care at another office. Many offices are also requiring that the parents sign a form stating that not vaccinating their child puts them at risk of injury or death from any of the preventable diseases and that they will not hold the physician liable. This is a growing trend and made relevant by the epidemics of vaccine preventable diseases occurring across the U.S. The ethical issues on both

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Overview of adolescent immunizations

by Shirley Delair, MD, MPH
Assistant Professor of Pediatrics
University of Nebraska Medical Center

The Advisory Committee on Immunization Practices (ACIP) publishes yearly immunization recommendations to help ensure our adolescents receive protection through vaccines they need. These recommendations are endorsed by the American Academy of Pediatrics, the American Academy of Family Physicians, the American College of Obstetricians and Gynecologists and the Society for Adolescent Health and Medicine.

Table 1. Vaccines for Adolescents[1]

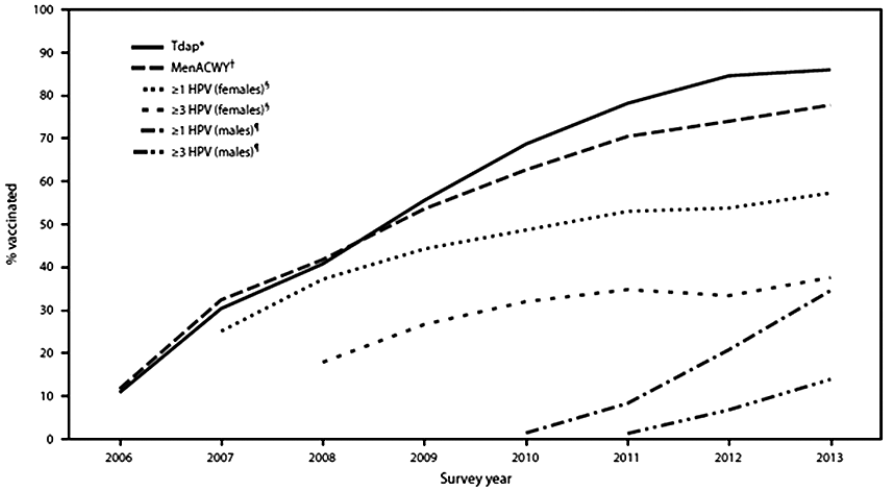
Routine adolescent vaccines
> Influenza vaccine
> Meningococcal conjugate vaccine
> Tetanus, diphtheria, and acellular pertussis vaccine
> Human papillomavirus vaccine
Catch-up adolescent vaccines if not fully immunized
> Hepatitis B vaccine
> Polio vaccine
> Measles, mumps, and rubella vaccine
> Varicella vaccine
Vaccines for adolescents at higher risk
> Pneumococcal vaccines
> Hepatitis A vaccine

Routine adolescent vaccines

Seasonal influenza vaccine

Most adolescents who contract the flu experience a self-limiting illness with fever, cough, headache, sore throat, and body aches and recover within a couple of weeks. More severe illness can occur particularly in adolescents with chronic diseases such as asthma or diabetes. Additionally, adolescents are an important reservoir for spreading influenza within their communities.

FIGURE 1. Estimated vaccination coverage with selected vaccines and doses among adolescents aged 13–17 years, by survey year — National Immunization Survey-Teen, United States, 2006–2013 [2].



Abbreviations: Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis; MenACWY = meningococcal conjugate, one or more doses; HPV = human papillomavirus.

Two types of influenza vaccines available are the live attenuated influenza vaccine (LAIV) and the inactivated influenza vaccine (IIV)[3]. In 2013, quadrivalent inactivated and live attenuated influenza vaccines were introduced and provide protection against two influenza A strains and two influenza B strains[3]. The live, attenuated vaccine is administered intranasally and is available for healthy, non-pregnant adolescents who do not like injections[3]. Both LAIV and IIV have been demonstrated to be effective in adolescents[3].

Adolescents are recommended to get the flu vaccine every year as soon as the vaccine becomes available, by October, if possible[3]. Vaccinations should continue throughout the flu season especially if the influenza virus continues to circulate[3].

As shown in Figure 2 on the next page, influenza vaccination rates tend to decrease as children grow older, with 76.9% of children 6-23 months receiving the vaccine down to 42.5 % of 13-17 year olds, leading to an overall pediatric rate in 2013-2014 of 58.9% which is still far from the Healthy People 2020 goal of 70% coverage [4,5]. More recently, there has been an increase in coverage among the 13-17 year old group by 8.8% from flu season 2011-12 to 2012-2013[4].

Figure 3 shows the pattern by strains of influenza diagnosed more frequently in this past 2014-2015 season through June 27, 2015.

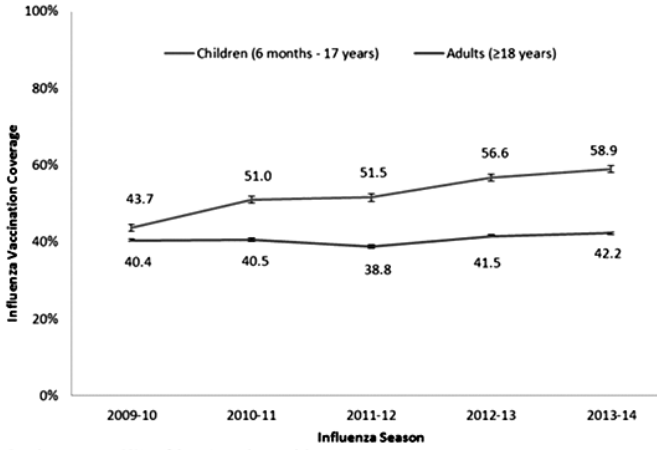
Meningococcal vaccines

Meningococcal disease is a bacterial infection caused by *Neisseria meningitides* that can cause severe illnesses such as bacteremia or meningitis. The bacteria

(continued on Page 7)

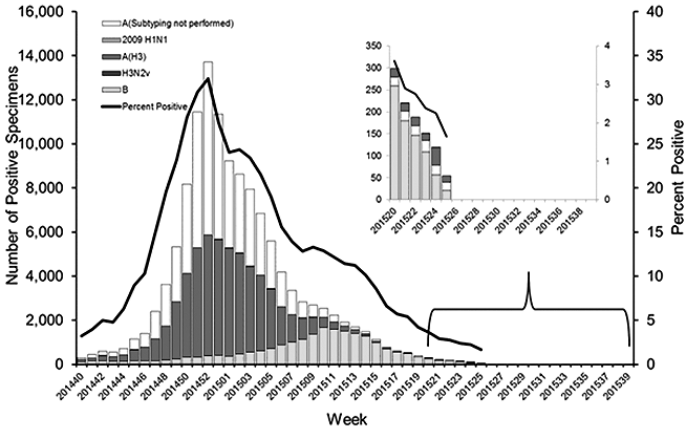
Overview of adolescent immunizations *(continued)*

FIGURE 2. Seasonal Flu Vaccination Coverage by Age Group and Season, United States, 2009-2014 [4].



Error bars represent 95% confidence intervals around the estimates.
The 2009-10 estimates do not include the influenza A (H1N1) pdm09 monovalent vaccine.
Starting with the 2011-12 season, adult estimates reflect changes in BRFSS survey methods: the addition of cellular telephone samples and a new weighting method.

FIGURE 3. Influenza Positive Tests Reported to CDC by U.S. WHO/ NREVSS Collaborating Laboratories, National Summary, 2015-15 [6].



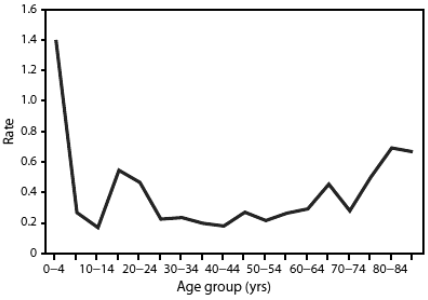
colonize mucosal surfaces of the nasopharynx and transmission occurs through direct contact with respiratory tract secretions from symptomatic or asymptomatic carriers. Adolescents have the highest nasopharyngeal carriage rates and serve therefore as an important reservoir for transmission.

Meningococcal vaccination with a quadrivalent conjugate vaccine that protects against four major meningococcal serogroups (A, C, W, and Y) is recommended for all adolescents[7]. A single dose of vaccine should be administered at age 11 or 12 years, with a booster dose at age 16 years for persons who receive the first dose before age 16 years[7]. If the first dose is administered at age 13 through 15 years, a booster dose should be administered at age 16 through 18 years with a minimum interval of at least eight weeks between both doses[7]. For those who receive a dose after 16 years of age, a booster dose is not required[7]. Two newer meningococcal vaccines recently approved in the U.S. protect against serogroup B strains, now the most common cause of meningococcal disease in U.S. adolescents[8]. The ACIP recommends this vaccine for those 10 years and older at increased risk of infection such as people with persistent complement component deficiencies, or with anatomic or functional asplenia[8]. During its June 2015 meeting, the ACIP made a category B (individual clinical decision making) recommendation for the use of a meningococcal B vaccine in patients ages 16-23, administered preferably between 16 and 18, for short-term protection against the disease[9].

Meningococcal serogroups B, C, and Y are the major causes of meningococcal disease in the United States with each accounting for approximately one third of cases. Though disease activity is currently at historic lows, the case-fatality ratio remains elevated at 10-14%[10].

The rate of meningococcal disease in adolescents aged 11-19 has decreased from 0.27 to 0.05 from 2004-2005 (just prior to routine vaccination), to 2010-2011[7]. Figure 3 shows that outside of early infancy and the elderly, adolescence

FIGURE 4. Rate of meningococcal disease, by age group — United States, 2002–2011 [7].



has a higher disease case rate than the general population. The percentage of adolescents aged 13-17 in the U.S. who received at least one dose of meningococcal vaccine increased from 74% in 2012 to 77.8% in 2013[10]. There is, however, a significant gap with completing the second dose of meningococcal vaccine when needed, with only 29.6% of adolescents achieving two doses[2].

Tetanus, diphtheria, and acellular pertussis (Tdap)

Routine adolescent Tdap vaccinations are important to reduce pertussis transmission rates, especially to infants in the household or the community

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Overview of adolescent immunizations *(continued)*

that are particularly susceptible, especially those who are too young to have completed their primary immunization series. Adolescents who develop pertussis usually have mild symptoms that may last for weeks, and thus serve as important vectors to transmit the illness. The main objective of the Tdap is not only to reduce illness in the vaccinated individual, but additionally to reduce the pertussis reservoir in the population at large, which would lead to less overall disease with its ensuing complications. Additionally, Tdap vaccine administered during adolescence provides booster doses to maintain protection against tetanus and diphtheria.

Current recommendations for adolescents aged 11-18 is a Tdap booster once, followed by the Td booster every 10 years[11]. Adolescents who have already received a booster dose of Td should get a single dose of Tdap as well for protection against pertussis[11]. Tdap vaccination coverage in the U.S. increased from 84.6% in 2012 to 86.4% in 2013 among children 13-17 years[2]. Forty-two states met the Healthy People 2020 target in 2012, of 80% of adolescents aged 13-15 with at least one dose of Tdap, up from 36 states[2].

Human papillomavirus (HPV)

HPV is the most common sexually transmitted disease in the U.S. and it is a known cause of genital warts; cervical, vaginal, vulvar, anal and penile cancers; as well as some cancers of the head and neck. Currently there are 3 HPV vaccines available: a 2-valent, 4-valent and a 9-valent vaccine[12]. The ACIP recommends all females, aged 11 to 12 years of age, receive a three-dose series of any of these three, and that males, aged 11 to 12 years of age, receive a three-dose series of 4-valent or 9-valent vaccine[12]. Immunization is recommended through age 26 for all females and high risk males; all males may be vaccinated through 26 years[12].

Table 2 compares the adolescents who completed more than ≥1 HPV vaccine dose in 2012 and 2013. Though there is an increase in coverage, the percentage completing all three doses remains low especially in adolescent males[2].

Table 2. HPV vaccination rates [2]

Females	*2013*	*2012*
≥1 dose	57.3%	53.8%
≥2 dose	47.7%	43.4%
≥3 doses	37.6%	34.4%
Males 2013	*2012*	
≥1 dose	34.6%	20.8%
≥2 dose	23.5%	12.7%
≥3 doses	13.9%	6.8%

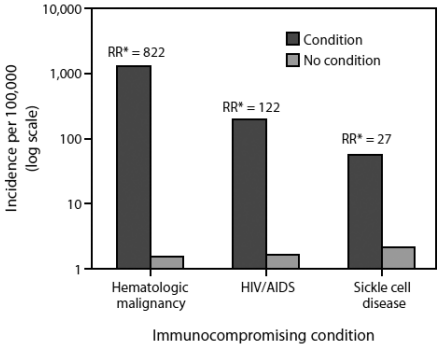
Vaccines for adolescents at higher risk

Pneumococcal vaccines

Streptococcus pneumoniae is a leading cause of otitis media and serious infections such as sepsis and meningitis, and causes significant morbidity and mortality in the United States. Since their introduction, the pneumococcal conjugate vaccines have decreased the rates of invasive pneumococcal disease (IPD) directly in vaccinated individuals and indirectly by herd protection in unvaccinated persons [13]. In 2010, the 13-valent pneumococcal conjugate vaccine (PCV13) replaced the 7-valent conjugate vaccine (PCV7) for prevention of IPD and otitis media in infants and young children[13].

A single dose of PCV13 is currently also recommended for all children six through 18 years old with certain medical conditions, who have not previously received PCV13, regardless of whether they have previously received PCV7 or 23-valent pneumococcal polysaccharide vaccine (PPSV23)[13]. These conditions include sickle cell disease, HIV-infection, other immunocompromising conditions, cochlear implant, or cerebrospinal fluid (CSF) leaks [13]. A dose of PPSV23, administered at least eight weeks after PCV13, is also recommended for use in the above high risk individuals if they have not previously received it; PPSV23 should be repeated five years after the first dose if the immune compromising condition persists[13]

FIGURE 5. Annual average incidence of PCV13-type IPD in children aged 6–18 years, with and without selected underlying immunocompromising conditions — United States 2007–2009[13].



Abbreviations: PCV13 = 13-valent pneumococcal conjugate vaccine; IPD = invasive pneumococcal disease; RR = rate ratio; HIV/AIDS = human immunodeficiency virus/acquired immunodeficiency syndrome.

Hepatitis A

Hepatitis A virus infects the liver. Though many infected remain asymptomatic some may develop loss of appetite, vomiting, nausea, fatigue and in rare cases liver failure resulting in death.

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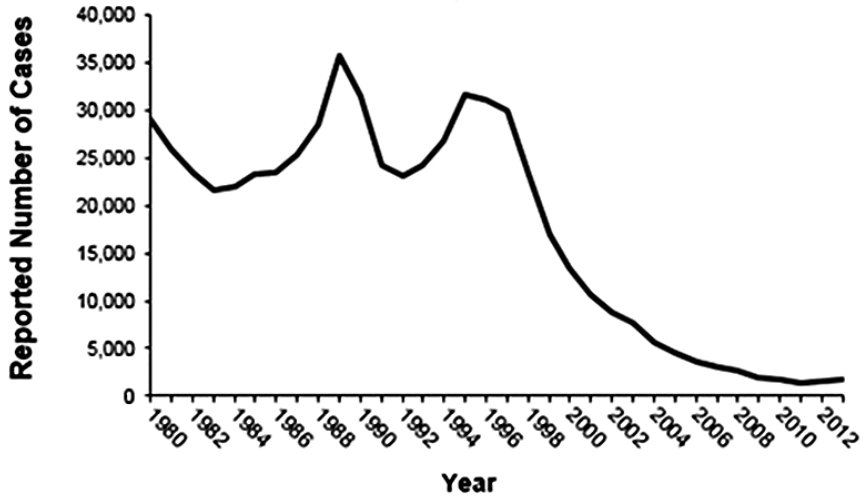
Overview of adolescent immunizations *(continued)*

FIGURE 6. Incidence of hepatitis A, by year. United States, 1980-2013[15].



Transmission from one person to another is through contaminated food or water or sexual contact with an infected person. The current vaccine recommendation is a 2-dose series that may be given any time after age one through 18 years, with doses six months apart[14]. Additionally, recommendations are extended for adolescents engaged in international travel, and men who have sex with men are given higher risk status[14]. Since Hepatitis A vaccine first became available in 1995, hepatitis A rates in the U.S. have declined by 95% as seen in Figure 6 above[15].

Importance of state immunization mandates

Across the U.S., there is a lack of uniformity and consistent enforcement of individual state immunization mandates for school enrollment. State-based immunization laws using ACIP recommendation that time vaccinations to entry into the sixth or seventh grade ensure more consistent vaccination coverage early in the adolescent years, as young an age as possible to achieve maximum protection. □

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Adult immunizations in 2015: what works

by Rudolf J. Kotula, MD, FACP, FIDSA
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Epidemiologist Methodist Women's Hospital
Asst. Clinical Professor of Medicine
Creighton University

The need for immunizations does not end when you reach adulthood. It is estimated that between 50,000 to 70,000 U.S. adults die each year as the result of a disease that could be prevented by vaccinations. For example, influenza is the sixth leading cause of death for adults and contributes to at least 200,000 hospitalizations and 36,000 deaths annually. The specific vaccines needed as an adult depend not only on your age, lifestyle, overall health, pregnancy, immune competency status and travel plans, but also on whom you are in close contact with and what vaccines you had as a child. The goal of these increasingly evidence-based guidelines is to decrease morbidity and mortality from vaccine preventable diseases (VPD).

Each year the U.S. Advisory Committee on Immunization Practices (ACIP), the American College of Obstetrics and Gynecologists (ACOG), the American College of Physicians (ACP), the American Academy of Family Physicians (AAFP), and the American College of Nurse- Midwives (ACNM) recommends a specific immunization schedule. Other organizations such as the Infectious Disease Society of America (IDSA) tend to endorse these guidelines. The updated schedule is available on the web page of the Center for Disease Control and Prevention (CDC) in several versions. The printable table format of the yearly Adult Immunization Schedule, with helpful footnotes, is probably the best resource for a busy clinician to provide "cutting edge" medical care to his or her patients. http://www.cdc.gov/vaccines/schedules/easy-to-read/adult.html

So what is new in 2015? First, the 13-valent pneumococcal conjugate vaccine (PCV 13) is now recommended for all adults 65 years and older, in series with the pneumococcal polysaccharide vaccine (PPSV 23). When possible, PCV 13 should be administered prior to PPSV 23 for best immune response. Full guidelines on use of these two vaccines is available at www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/pneumo.html.

Secondly, the indicated age group for the recombinant influenza vaccine (RIV), which is egg free, has been expanded from ages 18 to 49 to include all individuals 18 and older.

All adults are advised to receive influenza vaccine yearly, one dose of TdaP (tetanus, diphtheria, acellular pertussis) vaccine immediately (regardless of interval since last Td), shingles vaccine at age 60 and the two different pneumococcal vaccines (PCV13 and PPSV23) at age 65, or sometimes earlier, depending on the patient's medical conditions.

However, missed opportunities and quality gaps for vaccinations exist between the patients who are recommended to receive vaccinations and those who actually receive them. A variety of obstacles - at the practice, economic, patient related, and social levels - help explain the missed opportunities. Numerous organizations have developed quality improvement programs to help clinicians and practice teams raise awareness and improve immunizations rates in our communities. Suggestions include:

Education of members of the practice team – Education can occur through webinars, conferences, participation in coalition, training/technical assistance, distribution of information, templates, policies, etc.

Convenient vaccination services – This can include office-based vaccinations, referrals to pharmacies, written information for vaccines to take home and tell others about.

Enhanced primary care/hospital systems to facilitate immunizations – This can be accomplished through education, electronic medical records alerts, standing orders or protocols.

Establish an "immunizations champion" monitoring progress and adherence to vaccination guidelines – These are individuals who make things happen, whether they are physicians, nurses, allied health care practitioners, pharmacists or others.

In my opinion, the power of the "white coat" is tremendous when communicating the need for proper immunizations to patients. When asked to see an outpatient or inpatient in consultation, I make vaccinations a part of taking a patient's history. Unfortunately, stating to a patient that a vaccine is recommended by the CDC to prevent certain infections does not always generate enthusiasm. People generally do not like "shots." My strong recommendation can often convince patients that the protection is worth the pain. Infrequently, despite my efforts, some patients refuse or postpone immunizations. In that case, I ask the office or hospital nurse to give them written patient-oriented information for educational purposes to consider vaccinations in the future. Some patients prefer to talk to their primary care provider;

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Adult immunizations in 2015: what works *(continued)*

confirmation from both providers can reinforce the importance of vaccine protection. Raising awareness tends to be a good start for implementation!

Immunizations are fundamental to the success of health promotion of the population. Our current health care delivery system is oriented toward managing diseases, with a few resources targeted towards prevention. Reinforcing the recommendations of CDC, ACIP and other expert entities involved in immunization practice, and applying educational efforts at the community level by all participating team members can be a win-win situation. □

Recommended Adult Immunization Schedule—United States - 2015

Note: These recommendations must be read with the footnotes that follow containing number of doses, intervals between doses, and other important information.

Figure 1. Recommended adult immunization schedule, by vaccine and age group[1]

VACCINE ▼ / AGE GROUP ►	19-21 years	22-26 years	27-49 years	50-59 years	60-64 years	≥ 65 years
Influenza*,2	1 dose annually					
Tetanus, diphtheria, pertussis (Td/Tdap)*,3	Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs					
Varicella*,4	2 doses					
Human papillomavirus (HPV) Female*,5	3 doses					
Human papillomavirus (HPV) Male*,5	3 doses					
Zoster6					1 dose	
Measles, mumps, rubella (MMR)*,7	1 or 2 doses					
Pneumococcal 13-valent conjugate (PCV13)*,8	1-time dose					
Pneumococcal polysaccharide (PPSV23)8	1 or 2 doses					1 dose
Meningococcal*,9	1 or more doses					
Hepatitis A*,10	2 doses					
Hepatitis B*,11	3 doses					
Haemophilus influenzae type b (Hib)*,12	1 or 3 doses					

*Covered by the Vaccine Injury Compensation Program

For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection; zoster vaccine recommended regardless of prior episode of zoster

Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indication)

No recommendation

Report all clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at www.vaers.hhs.gov or by telephone, 800-822-7967.

Information on how to file a Vaccine Injury Compensation Program claim is available at www.hrsa.gov/vaccinecompensation or by telephone, 800-338-2382. To file a claim for vaccine injury, contact the U.S. Court of Federal Claims, 717 Madison Place, N.W., Washington, D.C. 20005; telephone, 202-357-6400.

Additional information about the vaccines in this schedule, extent of available data, and contraindications for vaccination is also available at www.cdc.gov/vaccines or from the CDC-INFO Contact Center at 800-CDC-INFO (800-232-4636) in English and Spanish, 8:00 a.m. - 8:00 p.m. Eastern Time, Monday - Friday, excluding holidays.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

The recommendations in this schedule were approved by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians (AAFP), the America College of Physicians (ACP), American College of Obstetricians and Gynecologists (ACOG) and American College of Nurse-Midwives (ACNM).

Figure 2. Vaccines that might be indicated for adults based on medical and other indications[1]

VACCINE ▼ / INDICATION ►	Pregnancy	Immuno-compromising conditions (excluding human immunodeficiency virus [HIV]) 4,6,7,8,13	HIV infection CD4+ T lymphocyte count 4,6,7,8,13: < 200 cells/μL	HIV infection CD4+ T lymphocyte count 4,6,7,8,13: ≥ 200 cells/μL	Men who have sex with men (MSM)	Kidney failure, end-stage renal disease, receipt of hemodialysis	Heart disease, chronic lung disease, chronic alcoholism	Asplenia (including elective splenectomy and persistent complement component deficiencies) 8,12	Chronic liver disease	Diabetes	Healthcare personnel
Influenza*,2	1 dose IIV annually				1 dose IIV or LAIV annually	1 dose IIV annually					1 dose IIV or LAIV annually
Tetanus, diphtheria, pertussis (Td/Tdap)*,3	1 dose Tdap each pregnancy	Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs									
Varicella*,4	Contraindicated			2 doses							
Human papillomavirus (HPV) Female*,5	3 doses through age 26 yrs					3 doses through age 26 yrs					
Human papillomavirus (HPV) Male*,5	3 doses through age 26 yrs					3 doses through age 21 yrs					
Zoster6	Contraindicated			1 dose							
Measles, mumps, rubella (MMR)*,7	Contraindicated			1 or 2 doses							
Pneumococcal 13-valent conjugate (PCV13)*,8						1 dose					
Pneumococcal polysaccharide (PPSV23)8						1 or 2 doses					
Meningococcal*,9	1 or more doses										
Hepatitis A*,10	2 doses										
Hepatitis B*,11	3 doses										
Haemophilus influenzae type b (Hib)*,12	post-HSCT recipients only	1 or 3 doses									

*Covered by the Vaccine Injury Compensation Program

For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection; zoster vaccine recommended regardless of prior episode of zoster

Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications)

No recommendation

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

These schedules indicate the recommended age groups and medical indications for which administration of currently licensed vaccines is commonly recommended for adults ages 19 years and older, as of February 1, 2015. For all vaccines being recommended on the Adult Immunization Schedule: a vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Licensed combination vaccines may be used whenever any components of the combination are indicated and when the vaccine's other components are not contraindicated. For detailed recommendations on all vaccines, including those used primarily for travelers or that are issued during the year, consult the manufacturers' package inserts and the complete statements from the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/hcp/acip-recs/index.html). Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

Human papillomavirus (HPV) infection and vaccination

by Meera Varman, MD
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More than 80% of people living in the world today will be exposed to Human papillomavirus (HPV) in their lifetimes, making HPV by far the most common sexually transmitted infection. In some circumstances, the virus progresses to intraepithelial neoplasia, including cancerous and precancerous lesions in the cervix, vagina, vulva, penis, anus, and oropharynx. HPV is also a major cause of genital warts.

HPV vaccination, however, can dramatically reduce these cases and, in the U.S. alone, save more than $7 billion annually in health care costs stemming from oropharyngeal and genitourinary cancers and HPV-related gynecological procedures. Yet for all the protections the simple, three-dose HPV vaccine can give, the U.S. and the wider world lag in administering it.

How common is HPV and how serious is it?

There are more than 100 identified strains of HPV. Worldwide in 2008, more than 500,000 new cases of cervical cancer and 275,000 deaths due to cervical cancer were reported, many of these cases attributable to HPV.[1,2] About 79 million Americans are currently infected with HPV and 14 million new infections are diagnosed in the U.S. every year. Annually, 11,000 cases of cervical cancer are diagnosed with 4,000 deaths reported.[3] And every year in the U.S., more than 330,000 women undergo cone or other gynecologic procedures due to HPV-related cervical symptoms.

In men, HPV-attributable oropharyngeal cancers are also on the rise. About 11,000 HPV-related oropharyngeal cancers are diagnosed in the U.S. each year, 7,000 in men. Such cancers are expected to surpass cervical cancer diagnoses by 2020.

Additionally, about 360,000 men and women suffer from genital warts annually in the U.S.

What are the different types of HPV vaccines?

HPV vaccine is a noninfectious recombinant vaccine prepared from purified HPV viral-like particles (VLP) from capsid (L1) proteins of HPV types. In 2006, the FDA approved the quadrivalent 4vHPV vaccine for females aged nine through 26 years as a three-dose series spaced at zero-, one-, and six-month intervals. In 2009, 4vHPV was approved for males aged nine through 26 years, as was the bivalent 2vHPV vaccine for females. The 2vHPV vaccine protects against HPV types 16 and 18 which cause 70% of cervical cancers. The 4vHPV vaccines, in addition to covering types 16 and 18, also protect against types 6 and 11 which cause 90% of genital warts and recurrent respiratory papillomatosis cases. The Advisory Committee on Immunization Practices (ACIP) recommends routine HPV vaccination for 11- to 12-year-old males and females. ACIP recommends 2vHPV, 4vHPV and 9vHPV for female vaccination, whereas 4vHPV and 9vHPV for male vaccination. The catch-up vaccination age is 13 through 26 years for females and 13 through 21 years for males; ACIP states that all males 22 through 26 years may be vaccinated. ACIP also recommends routine vaccination from 22 through 26 years for men having sex with men and immunocompromised men (including HIV-positive men). The HPV series can be started as early as nine years of age.

There is non-inferiority of efficacy when the vaccines are co-administered with other concurrent teen vaccines such as Tdap, MCV4 and influenza vaccines.[4] In 2014, FDA approved 9 valent HPV vaccine (9vHPV) covering HPV oncogenic types 31, 33, 45, 52 and 58, in addition to types 6, 11, 16, and 18. The 9vHPV vaccine reduces the risk of disease caused by these five additional HPV types by 97%. The 9vHPV vaccine is FDA approved in girls and young women nine through 26 years and in boys nine through 15 years. ACIP currently states 9vHPV can be used to initiate, or complete the vaccine series in both females and males through 26 years if the vaccination has been initiated with another HPV vaccine, but offers no preference for its use over other indicated HPV vaccines.[5]

In Australia, after the government reported a 70% HPV vaccination rate, a near disappearance of genital warts was observed in males and females under 21 years.[6] In the U.S. since the introduction of HPV vaccination, there is a 56% decline in vaginal HPV.[7]

The most common side effect of the HPV vaccine is mild to moderate pain at the injection site, erythema, swelling and syncopal episodes. Fifteen minutes

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Human papillomavirus (HPV) infection and vaccination *(continued)*

observation is recommended after the vaccine unless syncope develops when you observe until the patient recovers. Among post-vaccination syncopal reports 49% were females.[8] More than 170 million HPV vaccine doses worldwide and 57 million doses in the U.S. have been administered since 2006. Post-licensure national safety data monitoring shows the HPV vaccine is safe and no increase in autoimmune diseases has been reported.

How are we doing with teen HPV vaccination rates?

Despite having a safe and effective vaccine and plenty of opportunities to deliver it, HPV vaccination rates remain low for both males and females. Overall, U.S. HPV vaccination rates for adolescent girls remained about the same between 2011 and 2012, hovering around 53% for girls who received at least one dose of vaccine. Among females across the U.S. states in 2013, the proportion receiving one or more doses of a HPV vaccination ranged from 39.9% to 76.6%. American females achieving three-dose series completion ranged from 20.5% to 56.5%. For American males, coverage of one or more doses ranged from 7.3% to 43.2% and those achieving the three-dose completion cycle ranged from 7.3% to 43.5%.

National HPV vaccination rate in 2012 and 2013[9]

Females	*2013*	*2012*
≥1 dose	57.3%	53.8%
≥3 doses	37.6%	34.4%
Males	*2013*	*2012*
≥1 dose	34.6%	20.8%
≥3 doses	13.9%	6.8%

Nebraska HPV vaccination rate in 2013

Females	*2013*
≥1 dose	65.1%
≥2 dose	55.3%
≥3 doses	41.5%
Males	*2013*
≥1 dose	38.2%
≥2 dose	26.4%
≥3 doses	19.7%

There is regional and racial disparity in HPV vaccination rates. Girls 13 to 17 years of age living in the Southern U.S. were less likely to have initiated and completed the series compared to girls in the Northeastern U.S.[10] A survey of 132 women aged 18 to 22 and of differing ethnic backgrounds showed a three-dose completion rate as follows: 33% among people of Haitian descent, 42% among African-Americans, 63% among Latinos, and 65% among Caucasians.[11]

HPV awareness/hesitancy

There is a clear need for increasing HPV education for parents and teens. At best, among those who go unvaccinated, there is little to no awareness of the HPV vaccine. On the other end of the spectrum, parents are refusing the vaccine because they feel it opens a door to their teen's sexual activity. CDC research has shown messages communicating that HPV is preventable by vaccine and does not increase the likelihood of sexual activity at a younger age resonate well with parents.[12,13] Providing public health service announcements and social marketing, especially in populations where vaccination is low, would be effective in reaching underserved populations and eliminating the vaccination disparity. Across all ethnic groups, provider recommendation has a strong impact on vaccine uptake among teens.[14]

How to improve?

The wonderful news is that we have a cancer-preventing vaccine. Though education is essential for parents and teens, there is also a much-needed push to make sure providers are creating every opportunity to administer the vaccine. The goal is to increase awareness, vigilance and overall vaccination. National immunization survey-teen (NIS-Teen) shows that if HPV vaccine had been given routinely along with other teen vaccines, the coverage with at least one dose before 13 years of age would have reached about 91.3%. All it may have taken to get these young people vaccinated was a strong positive recommendation from their provider. Policy changes at the organizational level could also dramatically increase vaccination rates. Being aware of vaccination schedules, sending reminders via telephone call, text messages or email, having standing orders for vaccination and creating convenient hours for vaccinations are just a few things providers can do to increase overall vaccination rates.

A strong cancer prevention message and recommendation from the provider is the key. Let us spread the word about HPV to the community and increase not only HPV vaccination but all vaccination rates across all age groups for a healthy future. □

References

1) Parkin, D. and F. Bray., The burden of HPV - related cancers. Vaccine, 2006. 24(S3): p. 11-25.

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Vaccine hesitancy and strategies to address it

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Introduction

From the time that vaccines first began to be used extensively, concerns have been expressed about their safety and efficacy. Despite this, vaccines to prevent a number of deadly infectious diseases such as small pox and measles have been developed and deployed successfully in the past century, leading to a singular impact on public health. Small pox has been eradicated from the world, and many other vaccine-preventable diseases are rarely seen today by either the public or health care providers. The unparalleled success that vaccines have enjoyed has led on the one hand to complacency that these diseases have been conquered, and on the other to rising concerns about the risks/benefits of current immunization strategies.[1-3] The congruence of the disappearance of these diseases from the public eye and increasing questions about vaccine safety, has led to increasing numbers of people requesting alternative vaccination schedules (AVS),[4,5] postponing some vaccines, or in the worst case scenario, declining vaccination altogether.[6]

The phrase "vaccine hesitancy" has emerged in recent years as the preferred term to refer to individuals and groups who express varying degrees of concern about some or all vaccines. Vaccine hesitancy has been recently defined by the World Health Organization as "a behavior, influenced by a number of factors including issues of confidence (do not trust a vaccine or a provider), complacency (do not perceive a need for a vaccine or do not value the vaccine), and convenience (access)." [7] Since vaccine hesitancy may be viewed as a spectrum, a "one size fits all" strategy to address it is unlikely to succeed. Instead, public health agencies, professional societies and other vaccine advocates suggest tailoring the message about the need for vaccines and their safety profiles to the audience.[8,9]

Parental Concerns About Vaccines

Various studies estimate that while most parents believe that vaccines protect their children from diseases, nearly half have some level of concern about childhood vaccines.[10,11] These may be categorized into four types of concerns:

1. The safety of vaccines
2. The necessity of vaccines
3. The freedom to choose vaccines
4. The mistrust of vaccine manufacturers and advocates

The Safety of Vaccines

One of the most common concerns that parents voice about vaccines is their safety.[12] The list of concerns includes:

- Possible association with autism and other neurodevelopmental disorders
- Vaccine additives such as thimerosal, aluminum, formaldehyde, etc.
- Too many vaccines "overloading" the immune system
- Serious adverse reactions such as seizures
- Potential for unknown long-term adverse events
- Inadequate testing of vaccines
- Pain due to multiple injections
- Fever associated with vaccination
- The vaccine actually causing disease such as varicella or measles

The Necessity of Vaccines

Some parents believe that:

- The diseases that vaccines are designed to prevent occur rarely
- "Natural" immunity is better
- Many of the currently recommended vaccines are unnecessary
- Most vaccines don't work/nor provide long-term benefit

The Freedom to Choose Vaccines

It has also been argued that:

- Parents have the right to choose whether to vaccinate their child or not
- Mandatory vaccination undermines parental authority
- Vaccine risks outweigh benefits
- Vaccination violates certain religious beliefs

The Mistrust of Vaccine Manufacturers and Advocates

Some members of the public are:

- Skeptical about vaccine manufacturers
- Distrustful of governmental agencies
- Suspect the motives of vaccine advocates

Health Care Provider Perspective

Primary care providers have been reporting increasing vaccine hesitancy over the past decade.[13,14] Nationally, random sample American Academy of Pediatrics Periodic Surveys addressing vaccine refusals, conducted in 2006 and 2013 with a 53% response rate in both years, showed the following[13]:

Vaccine Refusals: The proportion of pediatricians reporting parental refusals for vaccines increased from 75% in 2006 to 87% in 2013 (adjusted OR 3.07, $p<.001$); on average pediatricians estimated 14% of parents refused ≥ one vaccine (2013 data). Nearly all respond-

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Vaccine hesitancy and strategies to address it *(continued)*

ing pediatricians in both survey years (96%, 94%) reported attempts at educating parents after refusal. The proportion of parents persuaded to give permission for a vaccine (32%, 34%) and who were dismissed for continually refusing permission (6%, 9%) were similar across study years.

Requests for AVS: In 2013, most pediatricians (87%) reported having parents request an AVS; they estimated 16% of parents asked for an AVS for at least one vaccine during the past year. Pediatricians in suburban (aOR 7.22, p<.01) and rural areas (aOR 13.68, p<.05) were more likely to report AVS requests. Nearly all pediatricians (94%) discuss the importance of immunization with parents requesting an AVS.

Providing vaccine information can be time consuming. In one study it was reported that 53% of physicians spend 10-19 minutes discussing vaccines with concerned parents and 8% of physicians spend 20 minutes or more with these parents, scheduling longer well care visits, with some loss of overall efficiency and revenue.[14] Some providers end up dismissing such patients from their practice, or simply not having the discussion and acceding to a parent's request to defer, delay or skip a vaccination.[14] Additionally, pediatricians experience decreased job satisfaction because of time spent with parents with significant vaccine concerns.[14] Pediatricians are also becoming concerned about the risk that unimmunized/under-immunized children pose to other children in their practices including immunized children and those too young to be immunized or with medical contraindications, and some are electing to dismiss those who refuse vaccines from their practices.[15]

It is important to note that recent surveys indicate that providers often overestimate a parent's vaccine hesitancy, or mistake a simple lack of knowledge for hesitancy or opposition.[16] Thus, while time-consuming, it is imperative for health care providers to elucidate the source and details of every vaccine-hesitant parent's issues surrounding vaccination. It is also disturbing to note that only 55% of providers routinely provide parents with the rationale for why vaccines are administered and their potential side effects.[17]

Strategies to Address Vaccine Hesitancy

Clinicians who encounter vaccine hesitancy should[18]:

1. Acknowledge the varied concerns of vaccine-hesitant parents using parent-centered motivational interviewing techniques
2. Elicit specifics about their concerns
3. Optimize communication with parents regarding the development and safety testing of vaccines, the reasons for immunizing, and the risks of not doing so
4. Articulate clearly the message that vaccines are safe and effective, and serious disease can occur if immunizations are deferred or not given
5. Explain why the recommended immunization schedule is the best one for children and why alternative schedules place children at risk
6. Recount personal experiences with vaccine-preventable diseases
7. Emphasize that they and their family members are vaccinated
8. Utilize a team approach so that the parents hear the same message from all staff in the clinic
9. Appoint a "vaccine champion" within the clinic who will ensure that all team members are updated on vaccine-related information
10. Consider providing information regarding vaccination (such as the Centers for Disease Control and Prevention's Vaccine Information Sheets) prior to the visit
11. Supply a list of websites that provide accurate information about vaccine safety e.g. Here is a list to get you started:

- Immunization Action Coalition: http://www.immunize.org/
- CDC provider resources for vaccine conversations with parents: http://www.cdc.gov/vaccines/hcp/patient-ed/conversations/index.html
- Healthy Children from the American Academy of Pediatrics: http://www.healthychildren.org/English/safety-prevention/Pages/default.aspx
- The Children's Hospital of Philadelphia's Vaccine Education Center: http://www.chop.edu/service/vaccine-education-center/home.html
- American Academy of Pediatrics immunization page: http://www2.aap.org/immunization/pediatricians/pediatricians.html

12. Review immunizations at all visits and offer additional time for discussion if necessary

The above strategies may not be needed or effective for all vaccine-hesitant parents. The health care provider needs to select the ones that are most likely to be successful for his/her patients. Most importantly, developing a trusting relationship with the family, as well as conducting an open and honest discus-

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Parental decisions to not vaccinate: is it time to take a stand or understand?

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The good news is that the majority of the reporting states in the United States (U.S.) are at or near the 95% national Healthy People 2020 targets for 4 doses of DTaP, 2 doses of MMR, and 2 doses of varicella vaccine (CDC, 2014). The bad news is that there has been a resurgence of clustered outbreaks of vaccine preventable diseases largely induced and spread by intentionally unvaccinated individuals. In 2014, the U.S. experienced 668 cases of measles from 27 states representing the largest number of cases since 2000 when measles was declared eliminated in the United States. In the first five months of 2015, there were 173 laboratory confirmed measles cases (21 states and the District of Columbia) reported in the U.S. (CDC, 2015a; CDC, 2015b). Most of the 2015 cases have been traced to an outbreak at a Disney theme park in California during December 2014. In 2014, there were 23 measles outbreaks in the U.S. which included one outbreak of 383 cases in Ohio Amish communities affecting primarily unvaccinated individuals. Many of the 2014 and 2015 cases were found to be imported from the Philippines which was experiencing a large measles outbreak (2015b). The 2015 measles cases ranged in age from six weeks to 70 years with the largest proportion (36%) from the 20 to 39 years age group. Initially there were no deaths but 22 people were hospitalized including five with pneumonia (CDC, 2015). Recently, it was reported that one woman in the state of Washington died from measles-related pneumonia. There is also a worrisome increase in another vaccine preventable disease: pertussis. As of December 31, 2014, the provisional 2014 count in the U.S. of pertussis cases was 28, 660 representing an 18% increase compared to the provisional numbers reported at the same time in the previous year. In 2012, there were 48,227 reported cases of pertussis with 20 related deaths mostly infants under three months of age (CDC, 2015c).

Non-vaccinated individuals can present a public health threat. When a child is not vaccinated against one or all of the 17 vaccine preventable diseases available in the U.S., that child poses a real threat to continued herd immunity offered by large pools of vaccinated individuals. However, they benefit from the herd immunity created by those who were vaccinated. Children who have immuno-compromising medical conditions often cannot receive the full complement of vaccines to prevent these diseases which may be life-threatening to them. They are dependent upon herd immunity to protect them. A child whose parents have decided to not vaccinate can endanger an immuno-compromised child whose parents have no choice to vaccinate.

Parental Decisions to Vaccinate … or Not?

Vaccinations have been lauded as among 10 great public health achievements in the last century. Therefore, the question must be asked – why is the most resource-rich country in the world experiencing a resurgence of vaccine preventable diseases? There are many factors to consider when addressing this question. However, the scope of this article will be limited to a discussion of parental decisions to delay and/or refuse vaccines for their children. In addition, the role of health care providers when encountering a vaccine hesitant parent will be explored.

The way parents view vaccines has changed since the 1950s when children and their parents lined up at schools, churches and community centers to receive the oral polio vaccine. There was no question among parents as to whether they would vaccinate their children. They had seen the devastating paralysis of and deaths due to polio and were anxious to protect their children from this deadly disease. Due to the success of large scale vaccination programs in the U.S., parents today have little or no familiarity with vaccine preventable diseases like polio and thus do not understand the severity of these diseases. This lack of understanding coupled with an unprecedented onslaught of social media reporting vaccine dangers has led to a greater fear of the vaccines than the diseases (Siddiqui et al., 2013). Well-known and influential individuals ranging from celebrities to politicians have represented themselves as experts in the area of vaccine safety. Their messages have been taken to be the "truth" and have significantly contributed to the current anti-vaccine movement. The pro-vaccination movement has yet to identify similarly well-known celebrities to endorse childhood vaccine safety (Gowda & Dempsey, 2013). However, organizations such as Moms Who Vax (http://momswhovax.blogspot.

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Parental decisions to not vaccinate: is it time to take a stand or understand? *(continued)*

com/) are starting to create a digital footprint (Shelby & Ernst, 2013).

The Centers for Disease Control and Prevention (CDC) and the American Academy of Pediatrics (AAP) have attempted to counter the anti-vaccine activists by providing online resources to assist parents and providers in discussing the topic vaccine-hesitancy. These resources can be found at http://www.cdc.gov/vaccines/hcp/patient-ed/conversations/ and https://www2.aap.org/immunization/pediatricians/refusaltovaccinate.html. However, parents may find it difficult to determine what information is trustworthy and scientifically correct (Williams et al., 2013). Health care professionals can have a profound influence on parental decisions to vaccinate (Gust et al., 2008; Brown et al., 2010; Smith et al., 2006; Benin et al., 2006). However, providers often lack confidence in addressing parents' vaccine hesitancy (Healy et al., 2014; Leask et al., 2012; Sarnquist et al., 2013; Henrikson et al., 2015). Providers also cite inadequate time and resources to address parent's concerns about vaccines.

Reluctant, hesitant, conflicted—these are all words used to describe parents who delay and/or refuse to have their child(ren) vaccinated. However, these words are not synonymous but rather are descriptors of parents along a continuum of vaccination decision making from Refusal Acceptance (Dube´ et al., 2013; Dube´ et al., 2015). Parents cite innumerable reasons for either refusing or accepting vaccinations and health care providers need a better understanding of the contextual framework of these vaccine decisions. Opel et al (2011) first developed and validated a tool used to identify the determinants of vaccine hesitancy and measure the nature and degree of vaccine hesitancy. It is entitled the Parent Attitudes about Childhood Vaccines (PACV) survey. The PACV survey explores the dimensions of: (1) immunization behavior; (2) beliefs about vaccine safety and efficacy; and (3) general attitudes and trust (Opel et al., 2013). This survey has been used as a research tool to measure the influence of interventions to increase vaccination rates among vaccine hesitant parents. However, it is limited by the homogeneity of the samples representing a higher-income status. Subsequently, with the PACV as a framework, Larson et al (2015) sought to develop a tool with a broader global relevance. The clinical practicality of such tools remains untested. The reader is encouraged to read the original sources and the questions asked of the parents in order to gain insight into vaccine hesitance and the wide variation in concerns expressed by parents.

Vaccine-Hesitant Parent – Now What?

Vaccine hesitance is complex and multidimensional and cannot be addressed by a single strategy. The traditional approach is based on the assumption that the vaccine-hesitant parent simply needs the correct information and then they will "see the light" and vaccinate their child. However, this suggests that parents are delaying and/or refusing vaccines solely based on a lack of knowledge. When, in fact, there are multiple psychosocial, cultural, religious or political factors in play (Dube´ at al., 2013). Furthermore, past experiences, and perceived importance of vaccines coupled with perceived risk of disease must be considered (Dube´ et al., 2013; MacDonald et al., 2015).

The medical and lay literature is replete with described causes of parental hesitancy, delay or refusal to vaccinate their children. But there is a dearth of information to inform providers as to effective interventions to address parental concerns. In fact, recently published systematic reviews (Sadaf et al., 2013; Dube´ et al., 2015) have revealed limited evidence available to guide providers in addressing the increasing incidence of parental delays and/or refusal to vaccinate their children. But what is known is that parents look to their child's health care provider for answers (Mergler et al., 2013). The parent who is wavering along the vaccine decision making continuum is often looking for validation of their concerns and what they perceive as a respectful and unbiased response from their child's provider. This is a critical juncture in the provider-parent relationship. A vaccine hesitant parent is at that moment poised to evolve into a vaccine refuser or vaccine acceptor.

The American Academy of Pediatrics (AAP) has addressed this difficult issue (AAP, 2005; AAP, 2012). The AAP recommends that pediatric providers not dismiss families due to parental refusal to vaccinate. The AAP policy suggests that building a relationship of trust with the family is paramount. Pediatric health care providers who follow the AAP policy must first assess where the parent(s) are along the vaccine decision-making continuum, and then tailor their vaccine discussion to the parent's position at the time. This charge can be challenging in today's high volume, production driven health care environment. As office visits get shorter and shorter, parents and providers be-

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Warning! Undervaccinated health care personnel in this facility!

by Catherine Carrico, DNP, FNP-BC
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Creighton University College of Nursing

Warning: Undervaccinated health care personnel in this facility! Should this sign be hanging as a warning to your patients and visitors where you work? The United States (U.S.) currently employs over 12 million health care personnel (HCP), with Nebraska employing over 84,000 persons working in hospitals, medical clinics, home health agencies, urgent cares, and long-term care facilities.(Kaiser Foundation). Health care personnel are often thought of as those providing direct patient care. The Centers for Disease Control and Prevention (CDC) defines HCP as physicians, nurses, lab technicians, emergency medical personnel, dentists, administrative staff, pharmacists and volunteers and environmental services. All HCP are at increased risk for exposure to vaccine preventable diseases (VPD) on a daily basis, either from patients or coworkers. Unfortunately, this is one of the most undervaccinated groups in the U.S. and globally.

Although effective vaccines have been available for many years, VPD still remain a major threat to health not only in the U.S., but worldwide (Galanakis, Jansen, Lopalco, & Giesecke, 2013). However, the past experiences and devastation of infectious diseases prior to the availability of vaccines have never been experienced, or are long forgotten by some HCP. Many HCP remain uninformed regarding updates to the vaccination schedules, and are unaware that these diseases are contagious prior to onset of symptoms or may present with subclinical symptoms in adults. In turn, these uninformed, non-vaccinated, and infected HCP continue to work, despite recommendations to stay at home when ill, and spread the pathogens to coworkers and patients (Russi, et al, 2013).

Influenza is the most frequently transmitted VPD, but pertussis, due to waning immunity, has resulted in an upsurge of the disease in the U.S., placing HCP and patients, especially pediatric patients, at increased risk. Hepatitis B, varicella, measles, mumps, and rubella are also VPDs with great potential for transmission between HCP and patients. Those HCP who are not fully vaccinated are putting themselves and others at risk for acquiring these diseases (U.S. Department of Health and Human Services).

Infection of patients and coworkers by HCP in hospitals, outpatient clinics, long-term care facilities and nursing homes has been documented in the literature. Outbreaks such as pertussis, influenza, measles and varicella have involved HCP (Fitzsimmons, Hendrickx, Badur, & Vorsters, 2014). Such outbreaks result in increased costs of health care due to labor needed to trace the contact(s), cost of laboratory testing and prophylactic antibiotics and other vaccines and/or medications for those that have been exposed to the VPD (Russi, 2013). In addition, the loss of the employee to the workforce due to illness puts additional strain on the health care system.

Recommended HCP vaccines

There is great support for the vaccination of HCP. The Advisory Committee on Immunization Practices (ACIP) has published recommended vaccines for health care workers since 1997. The current (2011) ACIP recommended vaccines for HCP include hepatitis B, tetanus-diphtheria-acellular pertussis (Tdap), varicella, measles, mumps, and rubella (MMR), an annual influenza, and meningitis vaccines (Shefer et al.). Table 1 (page 20) details the specific recommendation of each vaccine. In addition to the CDC, several U.S. federal and organizational policies and recommendations for the vaccination of HCP have been published, including: Healthy People 2020, Department of Health and Human Services (DHHS), the Joint Commission, and the Occupational Safety and Health Administration (OSHA).

Healthy People 2020 has a target rate of 90% for vaccination of HCP for hepatitis B (3 or more doses) and influenza (annually), but does not address pertussis or varicella. This is a lofty increase from the actual vaccination rates in 2008, when hepatitis B was at 64.3% and influenza at 45.5%. OSHA requirements are in place requiring employers to offer the hepatitis B vaccine series free of charge for all employees whose job duties include potential exposure to blood or other potentially infectious materials (Fitzsimmons, et al, 2014). The Joint Commission, in 2006, required health care facilities to establish an annual influenza vaccination program which, at minimum would offer onsite vaccination, monitor vaccine coverage, and provide education for HCP (Joint Commission). In 2009, the Joint Commission published a monograph with recommendations for Tdap for all HCP (Tan & Gerbie). The National Action Plan to Prevent Healthcare Associated Infections: Road Map to Elimination, Phase 2 has made the

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Warning! Undervaccinated health care personnel in this facility! *(continued)*

vaccination of HCP against influenza a high priority.

Mandatory Vaccines for HCP

In an effort to increase the vaccination rate of HCP, mandatory vaccination policies have been implemented. The most prominent mandates are for annual influenza vaccination. Several medical organizations support this mandate including: The American Academy of Family Physicians, American Academy of Pediatrics, American College of Physicians, American Hospital Association, the American Public Health Association, and the Infectious Diseases Society of America, to name a few (Immunize.org). In 2014, a variety of health care settings were surveyed to determine the rate of vaccination among HCP for the 2013-2014 influenza season (Black et al). The survey addressed facilities who 1) require vaccination, 2) have no requirement but promote vaccination, and 3) have neither a requirement nor promote vaccination. The range of influenza vaccine uptake for those that required vaccination was 96.4-99.5%. For those that do not require but promote vaccines, the range dropped to 61.5% for long-term care facilities and 79.8% for hospitals. Finally, for those facilities that neither required nor promoted vaccination, uptake was only 44.5% for ambulatory care, 47.7% for long-term care, and 70.3% for hospitals. It is easy to see from these numbers that mandating vaccines does increase the uptake of vaccination, at least for influenza (Black et al.).

Perceived Barriers to Vaccines

One may then wonder, why, despite all of the recommendations and published mandates, are HCP workers not being vaccinated? Several studies have surveyed HCP to determine the perceived barriers to vaccination. Perceived barriers of HCP to vaccines include concerns regarding vaccine safety and effectiveness, medical contraindications, adverse side effects, religious beliefs, inconvenience, have not been offered, cost, fear of obtaining the disease from the vaccine, and denial of being at risk (Christini, Shutt, Byers, 2007, Fitzsimmons et al. 2014). Many of the perceived barriers to vaccination can easily be overcome through education of HCP. Providing education to HCP as to the importance of vaccination to protect self and others is an important aspect to vaccine acceptance by HCP. Many vaccination program toolkits are available free of charge, including those from ImmunizeNebraska.org, Immunize.org and the CDC (cdc.gov/vaccines). Studies have proven the safety of vaccines and their minimal side effects. Inconvenience, cost, and not being offered are easily resolved through good vaccination programs in the workplace. "When the perceived risk of vaccination is high, vaccination is less likely; when the perceived risk of infection is high, vaccination is more likely"(Betsch, 2013).

Ethics of HCP vaccination

Ethically, it is the responsibility of health care facilities to provide a safe environment for both patients and staff (Fitzsimmons et al, 2014). In addition, HCP have the obligation to do no harm, and to put the patient's interest before their own concerns. Patients have the expectation that HCP and institutions will have policies and procedures in place to ensure they will have safe care (Tilburt, Mueller, Ottenberg, Poland, and Koenig, 2008). Surveyed HCP that accepted vaccination cited motivating factors as: wanting to protect self, family, friends, and patients from disease; and employer or physician recommendation (Corace et al. 2013). But for those not engaged by these motivators, can mandatory vaccines be the answer? Ethical questions include: Do institutions have an obligation to require vaccination of their employees to protect patient health and safety, as well as ensure adequate staffing? Are mandatory vaccination programs an infringement on a HCP rights? Gostin, Bayer, and Fairchild developed a framework of when mandatory public health interventions can be justified. The framework includes some of the following recommendations: There must be a compelling employee or patient safety problem that is clearly communicated to the employees, the least restrictive means should be used to achieve the objective, there should be clear opt-out criteria for medical reasons, the process should be transparent with a broad range of HCP member perspectives in policy development, institutions should support HCP through the implementation of vaccination procedures that are free and easy to access, and for those that opt-out or who meet medical exclusion criteria, institutions should offer alternative means to achieve control of transmission of disease (Tilburt et al, 2008).

As previously discussed, in those facilities with little to no requirement or promotion for their employees to get vaccinated, the rates of HCP vaccination were considerably lower. These facilities (with the lowest rates reported from long term care), and their employees are exposing high risk populations to VPD. Is this the fault of the facility and its administrators

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Warning! Undervaccinated health care personnel in this facility! *(continued)*

TABLE 1

Vaccine	Recommended Vaccine/Evidence of Immunity
Influenza	*Annual vaccine*
MMR	- Documentation of 2 doses of live measles virus, and 1 dose of rubella OR - 1 dose of MMR, repeated in 28 days OR - Serologic evidence of immunity (IgG) OR - Lab confirmation of disease OR - If born prior to 1957 and unvaccinated, consider vaccination with 2 doses of MMR Avoid pregnancy after receiving rubella vaccine
Varicella	- Evidence of disease (varicella or herpes zoster) OR - Serologic evidence of immunity (preferred) OR - 2 doses of varicella vaccine 4 weeks apart
Tdap	- One time dose as adult - Pregnant HCW, one dose with each pregnancy
Hepatitis B	- 3 dose series at 0, 1, and 6 months - Serologic testing recommended at 1-2 months after dose #3
Meningococcal	- 1 dose to those routinely exposed to isolates of *Neisseria mengitidis*. Boost every 5 years if continued risk.

Adapted from ACIP 2012, (McClean, Fiebeldorn, Tempte & Wallace)

or of the HCP? Many HCP, as defined by the CDC, may not think of themselves as HCP. It is important to include clerical and environmental services personnel, and volunteers in education about VPD, encourage their vaccination, and remind them of their importance as a member of the health care team.

Interventions to raise vaccination rates include increasing HCP knowledge about vaccine safety, VPD routes of transmission, and benefits of vaccination; as well as providing easy access and incentives to vaccination. For those that continue to decline vaccine, the signing of a formal declination form and mandatory alternative infection control measures or even termination of employment may influence vaccine acceptance (Zimmerman, 2013). As administrators, the cost of providing vaccination needs to be looked upon as an investment in their employees. As providers, it is important to not only discuss and encourage vaccines with patients, but with coworkers as well. □

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An overview and introduction to this issue *(continued)*

Bill, LB18). While 2013 first dose meningitis A/C/W/Y vaccination rates in Nebraska were relatively high (77.5%),[9] this still leaves almost one-quarter of students unprotected, and rates for the critical second dose are only at 29.6% nationwide.[10] While meningococcal meningitis is a relatively rare disease, we all know it is unpredictable and devastating when it occurs. Those who are interested in working with one of these legislative advocacy efforts may contact me at lohri@creighton.edu.

The ACIP (Advisory Committee on Immunization Practices), a rotating group composed of private and nonprofit sector practitioner and academic vaccine experts, advises the federal Immunization Program of the CDC (Centers for Disease Control and Prevention) on evolving immunization policy. (Information on current members and charter of ACIP is at: www.cdc.gov/vaccines/acip/committee/members.html). ACIP uses an evidence-based approach referred to as the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) process to assess the quality of evidence and the strength of recommendations they make to the CDC.

According to ACIP guidelines, "Key factors considered in development of [GRADE] recommendations include balance of benefits and harms, type or quality of evidence, values and preferences of the people affected, and health economic analyses…… Evidence tables are used to summarize the benefits and harms and the strengths and limitations of the body of evidence." (More information on GRADE is available at: www.cdc.gov/vaccines/acip/recs/GRADE/about-grade.html#about.) A review of this evidence-based evaluation system should inform and prepare all health care providers to authoritatively reassure their patients about the efficacy and safety of the vaccines they are recommending. And, furthermore, it is heartening to know that most patients do respond to these recommendations from their own personal and trusted health care provider![11] □

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My vaccine perspective *(continued)*

sides are hotly debated.

The Biologic Control Act passed in 1902 to regulate production of vaccines and other drugs and to reduce the risk of negligence after two tetanus outbreaks from contaminated diphtheria antitoxin and smallpox vaccine. In 1955, contaminated polio vaccine caused multiple illnesses and deaths. Lawsuits after this outbreak set the precedence of suing the manufacturers for adverse events. In the 1970s and 1980s, large numbers of lawsuits against DPT manufacturers caused all but one U.S. DPT supplier to leave the market by 1984.

The National Childhood Vaccine Injury Act was passed in 1986 to address this and included a mandate for manufacturer and provider adverse event reporting and a national vaccine adverse event reporting system (VAERS). This act established a process for families to obtain compensation for adverse events associated with properly manufactured vaccines through the registry and was funded by taxing each vaccine dose. VAERS has been used to monitor current vaccines, with the CDC vaccine program sometimes acting immediately to suspend a vaccine and sometimes using accumulated data to counter inaccurate information. All vaccines used today are subject to continued evaluation and research to prove effectiveness and safety. Currently, the pertussis vaccine schedule and composition are being reviewed in light of increased pertussis cases across the U.S. Manufacturers of new vaccines must provide studies that show the vaccine's effectiveness and prove there is no potential to decrease the immunity produced by concurrent vaccines. By doing this, the immunity produced by current immunizations is consistently proven and protected.

Vaccines have improved the health of both individuals and their communities for years. History has been able to show us that deadly diseases can be eradicated. Polio has only a few endemic regions left; smallpox is now held in laboratories only. No vaccine is risk free, but the diseases carry a much greater risk. Ben Franklin was reluctant to vaccinate his children against smallpox. Unfortunately, his 4 year old son later died of the disease.

"In 1736 I lost one of my Sons, a fine Boy of 4 Years old, taken by the Small Pox in the common way. I long regretted that I had not given it to him by Inoculation, which I mention for the Sake of Parents, who omit that Operation on the Supposition that they should never forgive themselves if a Child died under it; my Example showing that the Regret may be the same either way, and that therefore the safer should be chosen."

— Benjamin Franklin, quoted in *Franklin on Franklin* by Paul Zall

He was a wise man. □

Human papillomavirus (HPV) infection and vaccination *(continued)*

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Vaccine hesitancy and strategies to address it *(continued)*

sion about the issues are vital in influencing vaccine-hesitant parents.

Summary

While a majority of health care providers report encountering vaccine hesitancy, only a small minority of parents refuse all vaccines for their children.[19] It is heartening to note that between a third to half of initially vaccine-hesitant parents ultimately accept vaccines that are recommended by their health care providers, highlighting the important role of clinicians in influencing parental decision-making around immunizations.[13,17] It is also encouraging that despite health care providers feeling like they are swimming against it, the tide of vaccine hesitancy may actually be turning. For example, in the wake of the recent Disneyland associated outbreak of measles that ultimately infected more than 150 people, the legislature in California moved swiftly to require mandatory vaccinations for all children enrolled in schools, except those with medical exemptions.[20] Similar legislation is pending in several other states. Despite this, health care providers need to continue to keep themselves updated on the science basis upon which vaccines are licensed and recommended, the robust vaccine safety infrastructure, and effective communication strategies around vaccine hesitancy so that they can best serve their patients. □

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Parental decisions to not vaccinate: is it time to take a stand or understand? *(continued)*

come frustrated with the lack of time to adequately address vaccine concerns much less build a trusting relationship. In addition, patients and providers are now being encouraged to engage in a shared decision making model of health care. This requires a pre-existing mutual reciprocity and understanding that can create role confusion and anxiety on the part of both groups. For example, there will likely be conflict if a beneficent provider encounters an autonomy-seeking parent. This discord serves little purpose as the parent leaves unsatisfied and all too often with an unvaccinated child.

Conclusion

In order to increase vaccination rates and sustain confidence in vaccination programs pediatric health care providers must develop appropriate strategies and policies to address the parental concerns about vaccinations that may lead to delays, altered schedules, and/or refusal of vaccines (Larson et al, 2015). The growing phenomenon of vaccine-hesitant parents has generated significant debate among pediatric health care providers. There are experts in the area of pediatric vaccine research who proclaim it is time to "take a stand against vaccine refusers" (Pichichero, 2015). They feel that the public health threat of unvaccinated children outweighs the individual rights of parents to choose. In the other camp are the pediatric health care providers who approach the parent "where they are at" on the continuum of vaccine decision making with the hope of continuing to influence the parent to eventually agree to vaccinate. It remains to be seen which approach is most successful in increasing vaccine uptake among reluctant, conflicted and hesitant parents. But, unless we are willing to open our minds to novel and contextually contemporary approaches to the vaccine hesitant parent then we will be witness to persistent vaccine refusals and continued outbreaks of vaccine preventable diseases. □

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Additional recommended reading:

How to communicate with vaccine-hesitant parents http://pediatrics.aappublications.org/content/127/Supplement_1/S127.long

American Academy of Family Physicians Child and Adolescent Immunization Office Champions Project http://docs.google.com/viewerng/viewer?url=http://www.aafp.org/dam/AAFP/documents/patient_care/immunizations/office-champions-final-report.pdf

Focus on 5 Things You Can Control for Better Investment Results

by Ross Polking
Provided by the Foster Group

Any golfers out there? Earlier this spring I read *Golf Is Not a Game of Perfect* (describing my game perfectly!) by sports psychologist Dr. Bob Rotella. In the book, he emphasized focusing on things within the golfer's control to achieve better results. Rather than worrying about wind, what other players are doing, or complaining about the speed of the greens or depth of the rough, he encouraged golfers to keep a good attitude, follow a pre-shot routine, choose only to play a shot they have confidence in, and focus on the smallest target.

Rotella's advice regarding focusing on what golfers can control has some helpful parallels to achieving better investment results.

First, what are things beyond the investor's control and, therefore, not helpful to focus on? The daily direction of world stock markets is beyond an investor's control. Interest rates are beyond an investor's control. Geo-political events are beyond an investor's control. While there is plenty of media attention given to these things, focusing on trying to control or predict these things does not enhance an investor's performance. Most often, it leads to worse performance and increased worry.

What is controllable by an investor and, therefore, helpful to focus on?

- Investors can let markets work for them. Rather than trying to beat a market, investors today can make markets and asset classes their allies by investing in funds that closely track them. Research continues to show that markets regularly beat the majority of managers, so why not increase the likelihood of success by choosing to get market-like returns?
- Investors can diversify their portfolios. Effective diversification involves more than having six mutual funds in a portfolio. The global opportunity for investors today is enormous, with over half of all available stock market value, and over two-thirds of all bond issuance, occurring outside the United States. The free flow of capital allows investors to access and benefit from thousands of possible investments.
- Investors can lower the costs associated with their investments. The average managed U.S. stock mutual fund has an internal expense ratio of over 1.2% annually. An index or asset class fund designed to track the entire U.S. stock market can be found today with an expense ratio of less than 0.10% annually. All things being equal, the lower cost investor starts out with a 1.1% return advantage each year! Vanguard Chairman John Bogle's maxim still bears repeating, "The return of the market LESS COSTS equals the return to the investor."
- Investors can use structure to manage risk and return. While no one seems able to predict what will happen from year to year in investment markets, the larger body of academic work available today indicates that investors can raise their expected return in equities by emphasizing value, company size (small), and stocks with certain profitability measures in their portfolios. These "factors" can be quantified and are available to investors in a similar way to global diversification.
- Finally, investors can choose to effectively execute their portfolio. Choosing an asset allocation to apply across the entirety of our accounts (401k, IRA, personal, trust) creates the risk and return profile of our total investment portfolio. Rebalancing our total portfolio at regular intervals or according to pre-determined tolerances, maintains stock-to-bond, domestic-to-foreign and other purposefully selected ratios, managing the risk and return profile of our investments over time. Maintaining appropriate cash and liquid assets to fund near- and intermediate-term cash flow requirements is also in an investor's control.

By choosing to focus on things within our control as investors, we can significantly raise the probability of our long-term success as well as reduce the worry and anxiety associated with those things we can't control.

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The information and material provided in this article is for informational purposes and is intended to be educational in nature. We recommend that individuals consult with a professional advisor familiar with their particular situation for advice concerning specific investment, accounting, tax, and legal matters before taking any action.


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