

Adult Immunization

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ABSTRACT

Background: Immunization recommendations depend on epidemiological factors as well as age, sex, history of previous vaccination, current health status, occupation and lifestyle. Several vaccines are recommended for adults including, tetanus-diphtheria-acellular pertussis, tetanus-diphtheria, influenza, human papillomavirus, varicella, measles, mumps, and rubella, and pneumococcal 13-valent conjugate or pneumococcal 23-valent polysaccharide, and hepatitis. Such diseases have shown dramatic decrease in incidence and mortality after introduction of vaccines.

Methodology: We conducted this review using a comprehensive search of MEDLINE, PubMed, and EMBASE, January 2001, through February 2017. The following search terms were used: adult immunization, adult vaccine, recent vaccine guidelines, preventive medicine, human papillomavirus, MMR, S. pneumoniae, PCV13, PPSV23, hepatitis A, hepatitis B

Aim: In this review, we aimed at reviewing the updates in adult vaccine and their effectivity.

Conclusion: Vaccination for adult population has proved to be of extreme importance and has achieved great successes. Combined efforts of patients, physicians, and policy makers are needed to achieve higher levels of success and improve vaccine coverage.

Keywords: adult vaccine, tetanus-diphtheria-acellular pertussis, human papillomavirus, MMR, S. pneumoniae, PCV13, PPSV23, hepatitis A, hepatitis B

INTRODUCTION

Vaccine-preventable diseases have dramatically decreased in both incidence and mortality since the introduction of vaccination. More than one hundred cases of communicable diseases such as rubella, mumps, diphtheria, pertussis, smallpox and many others have been avoided since the 1900s. The last three decades had more than 92% and 99% decrease in incidence and mortality, respectively. Thanks to vaccinations, polio, smallpox, and rubella (which were endemic in the United States) have been eradicated. Thus, vaccines are considered among the most important interventions in the history of medicine and public health, and Center of Disease Control (CDC) has considered vaccination development as one of its priorities during the last century. Crucial benefits to both health and economic sectors can be achieved by preventing infectious diseases, which makes public health strategies consider proper vaccination as an important cost-effective target^[1].

METHODOLOGY

• Data Sources and Search terms

We conducted this review using a comprehensive search of MEDLINE, PubMed, and EMBASE, January 2001, through February 2017. The following search terms were used: adult immunization, adult vaccine, recent vaccine guidelines, preventive medicine, human papillomavirus, MMR, S. pneumoniae, PCV13, PPSV23, hepatitis A, hepatitis B

• Data Extraction

Two reviewers have independently reviewed the studies, abstracted data, and disagreements were resolved by consensus. Studies were evaluated for quality and a review protocol was followed throughout.

The study was done after approval of ethical board of King Abdulaziz university.

VACCINATIONS RECOMMENDED FOR ADULTS

Continuous development and updating of vaccination protocols for adult and elderly is always required. These developments should include several areas including: updating indications for adults in different populations, associating these indications

with ecological and epidemiological studies of diseases, taking demographic changes such as aging into consideration, and other related areas^[2].

The American College of Physicians (ACP), in collaboration with other national associations, approved the release of the “Recommended Adult Immunization Schedule: United States, 2016” by the Advisory Committee on Immunization Practices (ACIP) in January 2016. This full schedule included all recommended routine immunizations with details, explanations, indications, contraindications, and precautions. Moreover, it includes vaccines that are recommended for specific high-risk populations^[3].

In general, immunization recommendations depend on epidemiological factors as well as health-related factors. These factors include: age, sex, history of previous vaccination, current health status, occupation and lifestyle. Immunocompromised status and travelling are also important factors that affect the decision of immunization. Several vaccines are included in these recent recommendations including: tetanus-diphtheria-acellular pertussis (Tdap), tetanus-diphtheria (Td), influenza (IIV or LAIV), human papillomavirus (HPV, 2vHPV, 4vHPV, or 9vHPV), varicella (VAR), measles, mumps, and rubella (MMR), and *S. pneumoniae* (pneumococcal 13-valent conjugate [PCV13] or pneumococcal 23-valent polysaccharide [PPSV23]). Other vaccines were indicated for specific populations with certain risk factors that may be medical, occupational, and/or lifestyle-related. These vaccines include hepatitis A (HepA), hepatitis B (HepB), meningococcus, and *Haemophilus influenzae* type b (Hib)^[4].

Human Papillomavirus

The human papilloma virus ‘HPV’ vaccine is recommended for women up to 26 years, and men up to 21 years, unless they received the complete dose during childhood. A four-week interval is at least required between the first and the second doses, whereas a twelve-week interval is the minimal required between the second and the third doses^[5]. Three types of HPV vaccines are approved for use in women: bivalent HPV vaccine [2vHPV], quadrivalent HPV vaccine [4vHPV], and nine-valent HPV vaccine [9vHPV]. However, only the last two are approved for use in men. Female patients are recommended to routinely receive a series of three doses of any of the approved vaccines from 19

through 26 years old, unless completely vaccinated in childhood. Males are recommended to receive a routine three doses of any of the approved vaccines from 19 through 21 years old, unless completely vaccinated^[3].

Influenza

Administration of seasonal influenza vaccinations are recommended annually for all adults and children older than 6 months in the United States. As influenza is considered an important cause of significant morbidity and mortality among the elderly, seasonal influenza vaccinations among this population is of special importance. The formulation and dose should be decided and provided according to age of patient; patients older than 6 months and pregnant women are eligible for the inactivated influenza vaccine (IIV) which is given intradermal. However, a high-dose IIV is a better option for patients older than 65 years. Healthy, non-pregnant individuals between 2 and 49 years age are eligible for live attenuated influenza vaccine (LAIV). However, a later report by the same organization revealed that this later formula was lower efficacy and poor response in the period between 2013 and 2016. Therefore, a decision regarding its use is pending currently^[6].

Measles, Mumps, and Rubella

People who were born prior to 1957 are not recommended to receive vaccinations for measles and mumps, as they are considered immune to these diseases. On the other hand, patients who were born later are not considered immune to these diseases and are recommended to receive one or more doses of MMR vaccine, if they do not have verified documentation of vaccination. Exceptions to this rule include absolute contraindication to the vaccine, or the presence of laboratory-confirmed immunity of all three diseases. However, a history of a provider-diagnosed disease does not exclude the patient from receiving the MMR vaccine. Women during childbearing age should be further evaluated for rubella vaccine despite their birth date. Pregnant women without confirmed immunity are recommended to be vaccinated against measles, mumps, and rubella after pregnancy is finished^[7].

Tetanus-Diphtheria and Tetanus-Diphtheria-Acellular Pertussis

All adults of all ages are recommended to receive the Td vaccine, and to receive a booster dose every

ten years. Patients older than eleven years who did not receive the Tdap vaccine, or no documentation of immunization is available, are recommended to receive Tdap first, and then receive a booster Td dose every ten years. The administration of Tdap does not depend on the date of the last vaccine containing last tetanus or diphtheria-toxoid^[8].

When dealing with unvaccinated patients, ACIP recommends a series that contains three doses of Td, with one dose containing Tdap. The interval between the first two doses should not be less than four weeks, and the interval between the second and the third doses should be six up to twelve months. In cases of patients with documentation of only one or two doses, the remaining doses are indicated. Tdap vaccination is also indicated for pregnant women during each pregnancy between 27 and 36 weeks of gestation, and the interval is not taken into consideration. ACIP also provide strict recommendations that should be followed when managing wounds^[9].

Pneumonia

Elderly older than 65 years are recommended to receive the pneumococcal vaccine, but the exact formula is debated; some authors argue that PPSV23 is preferred, whereas PCV13 is recommended by others. PPSV23 is recommended in two or three doses, but only one dose of PCV13 is enough. Patients with documented vaccination after 65 years age are not required to receive additional doses.

When vaccination history is not complete or not available, PCV13 and PPSV23 are indicated. When PCV13 and PPSV23 are indicated together, administer PCV13 first, then PPSV23 is administered after at least 8 weeks. It is contraindicated to administrate both together. It was shown in an RCT that the incidence of pneumococcal pneumonia reduced by 63.8% among institutionalized elderly patients^[10].

Meningococcal

There are two approved conjugate vaccinations for meningococcal infections (MCV4): *Menactra* (Sanofi Pasteur), and *Menveo* (Novartis, East Hanover, NJ). The first is approved for patients between 2 and 55 years age, whereas the other one is recommended for patients older than 11 years and younger than 55 years. Patients older than 55 years are recommended to receive the A quadrivalent meningococcal polysaccharide vaccine (MPSV4)^[11].

Adults who are at high-risk (asplenic, microbiologists, or travelers) are recommended to receive vaccination even if they were previously vaccinated with MCV4 or MPSV4. Those patients if aged between 11 and 55 years and need revaccination, can receive any of the MCV4 vaccines. A booster dose after five years of the first MCV4 is recommended for patients whose MCV4 dose was during their adolescence. The reason for this booster dose is that young adults tend to have decreasing antibody levels and thus are at increased risk for developing meningococcal disease^[12].

Hepatitis A

Patients who need to travel within a month are recommended to receive a combination vaccine for both hepatitis A and B (*Twinrix*). This combination is administered in four doses and can give sufficient protection in less than a month. In patients who do not require rapid protection doses can be given at 0, 7, 21 days, followed by a dose after 12 months^[13].

Adults with no history of vaccination who are exposed to hepatitis A virus, or who need to travel and do not have time for full dose, a single-dose of vaccination is acceptable even without immunoglobulins administration, especially for patients who you are older than 40 years. However, simultaneous administration of both vaccine and immunoglobulin are recommended in older, immunocompromised, or liver patients in two separate anatomic injection sites^[13].

Hepatitis B

People between 19 and 59 years with no previous vaccination and with diabetes (either type 1 or 2) are recommended to receive hepatitis B vaccination immediately after diabetes diagnosis. Diabetics were found to have about doubled the risk of infection with hepatitis B than the general population; this may be due to inadequate hygiene when glucose monitoring devices are used. On the other hand, diabetic patients older than 60 years are not recommended to get hepatitis B vaccine as it was found to be not cost-effective. However, it is noticed that some physicians still administrate it to this population due to the probability of them developing serious complications that follow hepatitis B^[14].

CONCLUSION

Vaccination for adult population has proved to be of extreme importance and achieved large successes.

However, further development and improvement in guidelines will always be needed. Combined efforts of patients, physicians, and policy makers are needed to achieve higher levels of success and improve vaccine coverage. All these approaches toward better prevention of infectious diseases, will eventually lead to a significant improvement in the public health sector.

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