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Sevtap Velipaşaoğlu, Özlem Dicle*

Vaccinations in Adult Dermatology Patients

Erişkin Dermatoloji Hastalarının Aşılanması

Abstract

It is known that, susceptibility to infections may increase in dermatologic diseases due to the disease itself or the immunosuppressive/immunomodulatory treatments used. In clinical practice, many treatment options are used in chronic diseases, ranging from the long-standing, well-known immunosuppressive therapies to the numerous biological agents that have come into use in recent years. In dermatology, these kinds of drugs are frequently incorporated into the treatments of patients with psoriasis, pemphigus, bullous pemphigoid and other autoimmune bullous diseases. Although many infections are vaccine preventable, the importance of vaccines in adult dermatology patients undergoing such treatments is not sufficiently known. As every encounter with a patient is an opportunity to advise appropriate immunizations, this review focuses on immunizing adult dermatology patients with special emphasis on the patients using immunosuppressive treatments.

Keywords: Dermatology, immunization, psoriasis, pemphigus, bullous pemphigoid, immunosuppression

Öz

Dermatolojik hastalıklarda enfeksiyonlara eğilimin hastalığa ve kullanılan immunosüpresif ve immünomodülatuar tedavilere bağlı arttığı bilinmektedir. Klinik uygulamalarda, eskiden beri var olan, iyi bilinen immunosüpresan tedavilerden son yıllarda kullanım alanına giren çok sayıda biyolojik ajana kadar birçok tedavi seçeneği kronik hastalıklarda kullanılmaktadır. Dermatolojide bu grup tedavilerin sık kullanımına en iyi örnekler psoriasis ve pemfigus ve büllöz pemfigoid gibi otoimmün büllöz hastalıklardır. Her ne kadar birçok enfeksiyon aşı ile önlenebilir olsa da dermatolojide bu tedavilerin kullanıldığı hasta gruplarında immünizasyonun yeri yeterince bilinmemektedir. Hastayla her karşılaşma, gereksinim duyduğu aşıları önermek için bir fırsat olduğundan bu gözden geçirme yazısında erişkin dermatoloji hastalarının, özellikle de bağışıklığı baskılayıcı ilaç kullananların bağışıklanmasına değinilecektir.

Anahtar kelimeler: Dermatoloji, bağışıklama, psoriasis, pemfigus, büllöz pemfigoid, immünosupresyon

Akdeniz University Faculty of Medicine, Department of Pediatrics, Division of Social Pediatrics, Antalya, Turkey

*Akdeniz University Faculty of Medicine, Department of Dermatology and Venereology, Antalya, Turkey

Correspondence/ Yazışma Adresi:
Sevtap Velipaşaoğlu, Akdeniz University Faculty of Medicine, Department of Pediatrics, Division of Social Pediatrics, Antalya, Turkey
Phone: +90 242 249 65 29
E-mail: sevtapv@akdeniz.edu.tr
ORCID-ID: orcid.org/0000-0002-0200-8079

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Introduction

After safe water and sanitation, vaccination is the second best public health intervention to save lives. In Turkey, childhood immunizations against 13 different diseases are carried out with more than 95% coverage rate. Unfortunately, immunization rates of older age groups and people with special health conditions that make them more prone to infections remain low (1-4). Patients with dermatologic diseases may have a greater propensity for infections due to both the disease itself and the immunosuppressive and/or immunomodulatory treatments used. The disruption of skin barrier, multisystem involvement in many of the diseases, frequent inpatient and outpatient admissions and the immunosuppressive treatments are the major causes of vaccine preventable morbidity and mortality. In spite of their increased risk for vaccine preventable diseases, vaccine coverage in patients with chronic diseases is extremely low. The main barriers to vaccination are the prioritization of treating the condition instead of an integrated approach to prevent further morbidities, lack of knowledge about the indications and contraindications of vaccines and limited coordination between health professionals on immunization issues (*ie.* who should immunize the patient, with which vaccine, with which schedule, and where?) (Table 1).

The aim of this review is to briefly summarize Turkish immunization programme and to give an overview about the vaccines that need to be used in adult patients with certain dermatologic conditions. As in clinical practice immunosuppressive therapies are more frequently used in patients with psoriasis and autoimmune bullous diseases, this paper will also focus on the use of vaccines in this group of patients.

Turkish Immunization Programme

Every country decides on its own immunization schedule by considering several characteristics of the disease and the vaccine. The factors considered for the disease are its importance as a public health problem (*ie.* the epidemiology of the disease in that country, vulnerable age groups, complications of the disease, disease specific fatality rate, etc.), and the economic burden of the disease to the health care system and the society (absenteeism from work/school etc.). Factors regarding the vaccine are its safety, efficacy, cost, the need for logistics, the ease of implementation of a new vaccine to an already crowded immunization schedule, and the approval of that vaccine by both the medical and lay community.

Turkey has a well established childhood immunization system with high coverage rates at certain age groups against 13 vaccine preventable diseases. These diseases and the year (in brackets) in which the vaccine for that disease was introduced to the childhood immunization schedule are; diphtheria (1937), haemophilus influenzae type B (2006), hepatitis A (2012), hepatitis B (1998), measles (1970), mumps (2006), pertussis (1968), pneumococcal diseases (2008), poliomyelitis (1963), rubella (2006), tetanus (1968), tuberculosis (1952) and varicella (2012). This information is important to figure out which vaccines might have been given to the adult patient in the past. Although the introduction year of some vaccines dates back to 1930s, only after large immunization campaigns carried out in 1980s immunization coverage increased from 20% to 80%, and by the last five years to more than 95%. Therefore, many of the adult patients who are seen at dermatology clinics have never been immunized against these diseases. Seroepidemiologic studies have revealed that more than 90% of individuals over the age of 40 are seropositive for hepatitis A, varicella, measles, mumps, and rubella (5-7). However when seroprotection rates of individuals with a median age of 57.1 were evaluated, 65% were observed to have no protection against diphtheria, 69% against tetanus, and 90% against pertussis (8). These figures suggest that while many of the adults are protected from some of the viral diseases that leave lifelong immunity through natural infection, they are still susceptible to many vaccine preventable diseases.

Although adult immunization schedule is not comprehensively defined in Turkey, many professional associations in collaboration with the ministry of health have suggested some schedules for healthy adults, with the last one updated in

Table 1. Why patients with certain dermatologic diseases are more prone to vaccine preventable infections and what are the barriers to timely and complete immunization of patients?

Why patients with certain dermatologic diseases are more prone to vaccine preventable infections?	Main barriers to timely and complete immunizations of patients with certain dermatologic diseases
- Disrupted skin barrier - Multisystem involvement - Frequent in patient and outpatient admissions - Use of immunosuppressive, immunomodulatory treatments	- Prioritizing the treatment of the main condition instead of an integrated approach to prevent further morbidities - Lack of knowledge about the indications and contraindications of vaccines - Limited coordination between health professionals on immunization issues

Table 2. Suggested immunization schedule for healthy adults in Turkey

	Age group				
Vaccine	**19-26 years**	**27-36 years**	**37-59 years**	**60-64 years**	**≥65 years**
Td/Tdap[1]	A booster dose every 10 years, preferably on should be Tdap instead of Td				
Influenza					One dose every year
PCV13					One dose
PPSV					One dose
Hepatitis B	Three doses with 0, 1, 6 months schedule for seronegative individuals				
Hepatitis A	Two doses with 0, 6 months schedule for seronegative individuals				
MMR	Two doses with at least one month interval for seronegative individuals		Most are protected by naturally acquired immunity		
Varicella	Two doses with at least one month interval for seronegative individuals		Most are protected by naturally acquired immunity		
HPV	Three doses with 0, 2, 6 months schedule				
Zoster				One dose	

Td: Tetanus-diphtheria, Tdap: Tetanus-diphtheria-acellular pertussis, PCV: Pneumococcal conjugate vaccine, PPSV: Pneumococcal polysaccharide vaccine, MMR: Measles-mumps-rubella vaccine, HPV: Human papilloma virus vaccine

2016 (Table 2) (9). Currently, adult immunisation schedule of Turkish Ministry of Health consists of tetanus and diphtheria vaccine boosters for all adults, and seasonal influenza and pneumococcal vaccines for people who are ≥65 years of age. For certain adult risk groups, above mentioned vaccines in the childhood immunization schedule can be administered free of charge by the family physician. Three component seasonal influenza and pneumococcal conjugate vaccines for risk groups of any age are funded by the state. Human papilloma virus vaccines, pneumococcal polysaccharide vaccines, meningococcal conjugate vaccines and herpes zoster vaccines are self funded even in the risk groups. These four vaccines can be bought by the patient with a physician's prescription.

Overview of Vaccines

Vaccines are divided into two general groups as live and inactivated vaccines (Table 3). Bacillus Calmette-Guerin (BCG), measles-mumps-rubella (MMR), oral polio (OPV), varicella and herpes zoster vaccines are live vaccines. In addition to these, rotavirus vaccines (used only in infants) and two travel vaccines (yellow fever and live Ty21a *Salmonella* typhi vaccines) are live vaccines. Live influenza vaccine is not on the market in Turkey. All other vaccines are inactivated. Inactivated vaccines do not contain live microorganisms. Rather they contain inactivated (killed) whole microorganism or the products or certain parts of a microorganism (such as purified proteins, polysachharides, oligosaccharides, toxoids, self assembling virus like particles, or conjugates of oligo/polysaccharides with proteins) (10).

- For all vaccines, prior anaphylaxis to that vaccine or one of its components is a general contraindication for further use of that vaccine. Atopic dermatitis is not a contraindication for any vaccine.

- To be effective, live vaccines have to replicate within the body. Under immunosuppressed conditions the body's ability to control the replication of vaccine microorganism decreases considerably. Therefore, moderate to severe immunosuppression and pregnancy are accepted as general contraindications for all live vaccines due to safety concerns. Inactivated vaccines can be given to immunosuppressed individuals because they do not contain any live microorganism. However, the effectiveness of inactivated vaccines may decrease according to the level of immunosuppression (10-12).

- Presence of moderate or severe illness at the time of immunization is a general precaution to all vaccines. A precaution is a condition in the recipient that might increase the possibility of a serious side effect, or might cause diagnostic confusion, or might interfere with the vaccine's efficacy. During moderate or severe disease attacks it is preferred to defer the vaccines until disease activity subsides. If a long period is anticipated for the decrease in disease severity, the physician has to decide whether or not to continue immunizations. If the physician deems that immunity that will be provided by the vaccine outweighs the risk of an adverse event, immunization may be continued (10,11).

- Transfusion of blood/blood products prior to immunization is known to decrease the immune response to varicella or

Table 3. Differences between live and inactivated vaccines

	Live vaccines	Inactivated vaccines
Vaccines in this group	- BCG - MMR - OPV - Varicella - Herpes zoster - Rotavirus (indicated only in infants) - Yellow fever and oral typhoid vaccine (only used as travel vaccines for some countries) - Live influenza vaccine (it is not licensed in Turkey)	- DTaP (for children) - Hep A - Hep B - Hib - HPV - IPV (this vaccine is not found as a stand alone product in Turkey) - MCV4 - PCV - PPV - Seasonal influenza - Td - Tdap (for adults)
General contraindication	- A history of anaphylaxis to the vaccine or a component in the vaccine - Pregnancy - Immunosuppression	- A history of anaphylaxis to the vaccine or a component in the vaccine
Precaution	- Moderate or severe illness at the time of immunization - Presence of passively acquired antibodies may interfere with response to MMR or varicella vaccine - Antivirals against herpesviruses interfere with response to varicella and zoster vaccines - Special precautions apply for the use of OPV, varicella, herpes zoster, and rotavirus vaccines in the close contacts of immunosuppressed individuals (please refer to text on immunization of contacts)	- Moderate or severe illness at the time of immunization

BCG: Bacillus Calmette-Guérin vaccine, MMR: Measles-mumps-rubella vaccine, OPV: Oral polio vaccine, DTaP: Diphtheria-tetanus-acellular pertussis, Hep A: Hepatitis A, Hep B: Hepatitis B, Hib: Haemophilus influenzae type B, HPV: Human papilloma virus vaccine, IPV: Inactivated polio vaccine, MCV4: Meningococcal conjugate vaccine for serogroups A, C, W, Y, PCV: Pneumococcal conjugate vaccine, PPV: Pneumococcal polysaccharide vaccine, Td: Tetanus-diphtheria toxoid for adults, Tdap: Tetanus, diphtheria, acellular pertussis

measles containing (for example MMR) vaccines. This is due to the neutralizing effect of the passive antibodies against measles and varicella acquired through the blood/blood product. In this case, varicella and MMR vaccines have to be deferred according to the type and dose of the blood product received (Table 4). If a need for transfusion arises within 14 days of administering varicella or MMR vaccine, the patient has to be re-immunized after the time specified for the elimination of passively acquired antibodies in that blood product (Table 4). Since herpes zoster vaccine contains much more virus than varicella vaccine, passively acquired antibodies are not expected to offset the effect of the vaccine and there is no need to defer herpes zoster vaccination (10-12).

- Antiviral drugs active against herpesviruses (such as acyclovir or valacyclovir) may reduce the efficacy of varicella and herpes zoster vaccines. If the patient is already taking an antiviral drug against herpesviruses, these two vaccines should be postponed at least 24 hours after the discontinuation of the drugs. For the individuals who are not taking antiviral drugs, postpone antivirals until 14 days after vaccination with these two vaccines, if clinically appropriate. Otherwise check immune response to the vaccine at least 4 to 6 weeks after the vaccine dose (12).

Immunization of Patients with Dermatologic Diseases

Routine adult immunizations are mostly carried out by primary care physicians. However, adults may need additional immunizations due to their chronic illnesses. Every encounter with a patient is also an opportunity for the dermatologist to discuss the immunization needs of the patient, especially in the presence of chronic diseases. Furthermore, the therapies suggested by the dermatologist may lead to new indications for additional vaccines. Vaccines are not shown to cause disease flares in dermatology patients. Although there are some case reports of disease flares after immunization, studies on causality have to consider the basal rates of the flares, eliminate the effect of coincidental reactions, and compare the rate of flares in natural infection *vs.* immunization (13). On the other hand, efficacy of vaccines may change according to the type of vaccine, age and immune status of the recipient, immunosuppressive and/or immunomodulatory drugs used, and the presence of additional diseases and comorbid conditions. In order to immunize patients with chronic conditions a dermatologist has to answer 4 questions: *i.* Does the illness or the drug used pose an increased risk of vaccine preventable infections to the patient?, *ii*. Does the illness or the drug used constitute a contraindication to any vaccine?, *iii.* Which vaccines can be given to the patient without compromising patient safety?, *iv*. Who should administer the vaccines, with which schedule?

In fact, general rules help us deciding on which vaccines are needed and which are contraindicated. Adult dermatology patients should be immunized with adult immunization schedule unless they are immunosuppressed.

Immunosupression and Vaccines

Immunosuppressive conditions in the adults may be due to the disease itself (*eg*. patients with cancer, AIDS, or immune mediated diseases) or to the treatments such as corticosteroids, chemotherapy, radiotherapy, immunosuppressive and/or immunomodulating agents. In immunosuppressed patients additional rules have to be considered for safe and effective immunization. The decision to immunize the patient with certain vaccines would change according to whether the patient is likely to get immunosuppressive treatments or to whether s/he is already experiencing low or high level immunosuppression (14-21).

a) Planned Immunosupression

In patients who are anticipated to take immunosuppressive medications, it is best to start immunization before commencing immunosuppressive therapies. Most of the times the vaccination records of adult patients are missing and immunization history is unclear. In such cases serological tests should be performed to assess the immune status of the patient (against measles, mumps, rubella, hepatitis A, hepatitis B and varicella) and vaccines should be used according to the adult immunization schedule with few exceptions; influenza and pneumococcal vaccines should be immediately given to all adult age groups who are likely to start immunosuppressive medications (14-21). Inactivated influenza vaccine should be repeated every influenza season. For pneumococcal vaccines it is better to start with pneumococcal conjugate vaccine (PCV13) and continue with the polysaccharide vaccine (PPSV23) 8 weeks later. Herpes zoster vaccine can be started as early as 50 years of age if the use of immunosuppressive therapies is likely (16). For example relative risk for herpes zoster infection on azathioprin, cyclophosphamide and glucocorticoid treatments are 2, 4.2,

Table 4. Recommended intervals between blood/blood product and measles or varicella containing vaccines according to the type and dose of blood/blood product

Type of blood product	Dose of the product	Recommended interval before administering measles or varicella containing vaccines
Red blood cell (washed)	10 mL/kg	None
Red blood cell (saline added)	10 mL/kg	3 months
Red blood cell (packed)	10 mL/kg	6 months
Whole blood	10 mL/kg	6 months
Plasma/platelet	10 mL/kg	7 months
Intravenous immunoglobulin	400 mg/kg 1000 mg/kg 2000 mg/kg	8 months 10 months 11 months

and 1.5-2.5 fold higher, respectively (22). The use of MTX in combination with biologic medications in psoriasis patients is also known to increase herpes zoster incidence (22).

To produce optimal immune response in the patient, inactivated vaccines should be given at least 2 weeks and live vaccines should be given at least 4 weeks before starting therapy. Earlier initiation of immunosupressive therapy may also have a negative impact on the safety of live vaccines (10,12,16,19).

b) Patients Already on Immunosuppressive Therapies

To immunize immunosupressed individuals first the physician has to decide on the level of immunosuppression. In adults, low level immunosuppression is defined as the use of prednisone or its equivalents less than 20 mg per day, glucocorticoid replacement therapy in adrenal insufficiency, topical or intra-articular use of steroids, low dose methotrexate (<0.4 mg/kg/week or <20 mg/week), low dose 6-mercaptopurine (<1.5 mg/kg/day) and low dose azathioprine (<3 mg/kg/day) (4,16,19). High level immunosuppression is defined as the use of above mentioned drugs in doses that exceed the levels specified for low level immunosupression or the use of biologic agents such as tumor necrosis factor inhibitors or rituximab (4,16,19).

Patients with Low Level of Immunosuppression: Topical or systemic steroids are used in a large number of diseases in dermatology. The topical use of steroids is not a contraindication for any vaccine. For patients with low level of immunosuppression as outlined above, all inactivated on adult immunization schedule can be used. Regardless of the patients age inactivated influenza vaccine should be given to all adults with low level of immunosuppression at each influenza season (4,16,19,20). For previously unimmunized adults immunization against pneumococcal diseases should be started with one dose of conjugate vaccine and continued with polysaccharide vaccine 8 weeks later. A second dose of polysaccharide vaccine needs to be given to immunosuppressed individuals 5 years later. For the patients who were immunized only with polysaccharide vaccine in the past, there should be a time interval of at least one year before giving conjugate vaccine.

Before starting live vaccines to patients on long term low level of immunosuppression it is better to consult with an expert, because recommendations change rapidly and contradictions are not uncommon. The need for live vaccines may also change according to individual conditions of the patient (such as occupation, living in a crowded family, disease activity in the society, etc.). Currently it is accepted that varicella vaccine may be used in varicella naive adults with low level of immunosuppression. A two dose schedule with at least 4 weeks interval is recommended. Although herpes zoster vaccine is usually recommended for patients ≥60 years, recent studies and guidelines suggest that it can be started as early as 50 years of age in patients with a history of varicella who have low level of immunosuppression (16,19,23). Due to the paucity of research many guidelines refrain from the use of MMR vaccine in seronegative adults (16,17,19). Thus the use of MMR vaccine should be individualized by consulting with a specialist. In Turkey OPV and BCG vaccines are not on adult schedule and live influenza vaccine is not on the market. However, use of OPV, yellow fever or live *Salmonella* vaccines is not advised due to the limited data on their safety.

Patients with High Level of Immunosuppression: Live vaccines should be postponed if high doses of systemic steroids are used. High dose corticosteroid use is defined as a total daily dose of ≥20 mg prednisone or its equivalent. If the steroid is used for less than 14 days, live vaccines can be given as soon as the high dose therapy is stopped. If high dose steroids are used for ≥14 days, than an interval of at least one month should be left before starting live vaccines (11,12,16,17).

Use of immunosuppressive/immunomodulatory treatments is a general contraindication for live vaccines. Live vaccines should

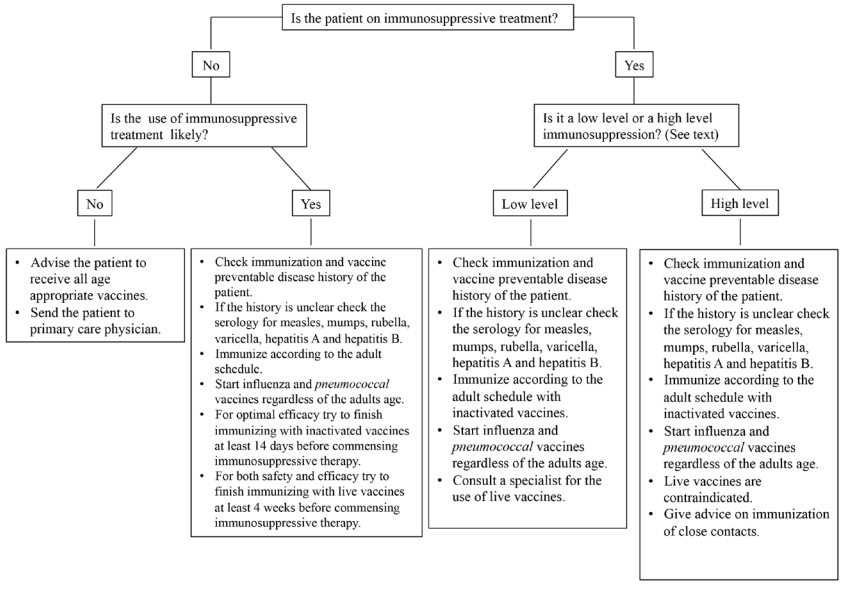

Figure 1. A quick guide to immunize adults with dermatologic diseases

Table 5. Immunizations in adult patients on systemic therapy for psoriasis

Drugs	Live vaccines	Notes*
Retinoid	No contraindication	
Low dose methotrexate	May be used (please refer to text and consult with a specialist)	Low dose is defined as; <0.4 mg/kg/week and <20 mg/week
High dose methotrexate	Contraindicated	High dose is defined as; ≥0.4 mg/kg/week and ≥20 mg/week
Cyclosporin	Contraindicated	
Etanercept Infliximab Adalimumab Ustekinumab Secukinumab	Contraindicated	- Do not give live vaccines while receiving any of these agents. - Use live vaccines at least 4 weeks before starting these agents. - After discontinuation of therapy wait for certain periods before starting live vaccines: Etanercept (4 weeks), infliximab and adalimumab (3 months), ustekinumab (6-12 months), secukinumab (6 months). - Avoid use of OPV in the household contacts. - Use varicella, herpes zoster and rotavirus vaccines in the household contacts with caution (please refer to the text on immunization of contacts).

*Use of inactivated vaccines is not contraindicated during treatment with any of these agents. Seasonal influenza and pneumococcal vaccines should not be forgotten
OPV: Oral polio vaccine

Table 6. Specific vaccination recommendations in adult patients on systemic therapy for autoimmune bullous dermatosis

Drugs	Live vaccines	Notes*
Low dose methotrexate	May be used (please refer to text and consult with a specialist)	Low dose is defined as; <0.4 mg/kg/week and <20 mg/week Live vaccines are contraindicated in higher doses of methotrexate treatment.
Low dose systemic steroids	May be used (please refer to text and consult with a specialist)	Low dose for adults is defined as; <20 mg/day of prednisone or equivalents Live vaccines are contraindicated in higher doses of corticosteroid treatments.
Low dose azathioprine	May be used (please refer to text and consult with a specialist)	Low dose is defined as: <3 mg/kg/day Live vaccines are contraindicated if higher doses of azathioprine is used
Mycophenolate mofetil	Contraindication	Immunizations with live vaccines should be completed at least 4 weeks before starting treatment. Patients will not receive live vaccines until 6 months after the discontinuation of therapy.
Rituximab	Contraindicated	Immunizations with live vaccines should be completed at least 4 weeks before starting treatment. Patients will not receive live vaccines until 6-12 months after the discontinuation of therapy and until B cell count returns to normal.
Cyclophosphamide	Contraindicated	
Dapson	Not contraindicated	Taking Dapson diminishes the effect of oral *Salmonella* vaccine which is used as a travel vaccine.
Intravenous immunoglobulin	Not contraindicated	Certain periods have to pass for optimal efficacy of MMR and varicella vaccines (check table 4 and the text).

*Use of inactivated vaccines is not contraindicated during treatment with any of these agents. Seasonal influenza and pneumococcal vaccines should not be forgotten. Effectiveness of inactivated vaccines can diminish considerably with some of these agents
MMR: Measles-mumps-rubella vaccine

be postponed until the immunosuppressive effects subside after the cessation of treatment (19,24,25). Except for steroids, this waiting period after the discontinuation of treatments is roughly estimated to be 5 half-lives. For more detailed recommendations on the safe time intervals for administering live vaccines after immunosuppressive treatments in patients with psoriasis, and autoimmune bullous diseases please refer to Tables 5 and 6, respectively. For a quick reference, readers are encouraged to review Figure 1 for immunizing patients with different levels of immunosuppression.

Inactivated vaccines can safely be given to patients with high level of immunosuppression, however their efficacy can change considerably. Use of seasonal influenza and pneumococcal vaccines should be carried out as described above for patients with low level of immunosuppression.

Information about the immunosuppressive drugs used and their influence on vaccine responses in dermatologic conditions mostly come from the research on other immune mediated inflammatory diseases (mainly inflammatory

bowel diseases and rheumatoid arthritis). Influenza vaccine responses usually do not diminish with the use of methotrexate or anti-tumour necrosis-α agents, however some studies report a decrease in the efficacy according to vaccine strain, comorbid conditions or concomitant use of other immunosuppressive drugs (26,27). Studies on the efficacy of conjugated pneumococcal vaccines have revealed that response to certain serotypes within the vaccine can decrease with methotrexate but not with anti-tumour necrosis-α agents (26). Rituximab (anti CD-20) has a negative impact on immunogenicity of both influenza and pneumococcal conjugate vaccines (26).

Immunizing Contacts of Immunosuppressed Individuals

In order to provide a circle of protection to the most vulnerable immunosuppressed individuals, household contacts and health staff should be up to date with their vaccines, for they may be the source of infection for these individuals. Contacts of such patients should also have influenza shots at each influenza season. All inactivated vaccines can be given to close contacts. For live vaccines exceptions apply (11,12,16,17). Household contacts of immunosuppressed individuals should not be immunized with OPV since viral shedding through faeces is likely. Infants in the household can be immunized with rotavirus vaccine but diapers should be handled with immune competent hosts and care should be taken for strict hand hygiene after changing the diapers. Varicella or herpes zoster vaccines can be used in the contacts of immunosuppressed individuals. If skin lesions due to the vaccine develop in the immunocompetent vaccine, contact isolation should be carried until all lesions are crusted. MMR and BCG vaccines can be given to close contacts of immunosuppressed patients without any precaution.

Conclusion

Using every encounter with the adult patient as an opportunity to discuss the immunization status is a good start for dermatologists. Adult patients who do not have immunosuppression will be advised to visit their primary care physician to keep up-to-date with their vaccines. For patients who are likely to take immunosuppressive treatments, effort should be given to immunize before starting immunosuppressive treatments with safe intervals. For immunosuppressed individuals frequent consultations with specialists can be needed on live vaccines.

Ethics

Authorship Contributions

Concept: S.V., Ö.D., Design: S.V., Ö.D., Data Collection or Processing: S.V., Ö.D., Analysis or Interpretation: S.V., Ö.D., Literature Search: S.V., Ö.D., Writing: S.V., Ö.D.

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Quiz

1. What are the main barriers to immunization of patients with dermatologic conditions?

a. Lack of knowledge among professionals about the indications of vaccines

b. Lack of knowledge among professionals about the contraindications of vaccines

c. Prioritizing the treatment of the condition instead of an integrated approach to minimize risks

d. Lack of coordination among health staff

e. All of above

2. Which of the following vaccines is not administered to adults?

a. Rotavirus vaccine

b. Tetanus-diphtheria toxoid vaccine

c. Hepatitis B vaccine

d. Influenza vaccine

e. Pneumococcal conjugate vaccine

3. Which of the following vaccines is a live vaccine?

a. MMR vaccine

b. Pneumococcal conjugate vaccine

c. Pneumococcal polysaccharide vaccine

d. Hepatitis A vaccine

e. Human papilloma virus vaccine

4. An adult patient has received intravenous immunoglobulin for the treatment of pemphigus vulgaris one month ago. Which of the following vaccines should be postponed for several months in this patient?

a. Human papilloma virus vaccine

b. Hepatitis A vaccine

c. Hepatitis B vaccine

d. Pneumococcal conjugate vaccine

e. Varicella vaccine

5. A 61-year-old patient is currently receiving oral acyclovir treatment. After discontinuation of acyclovir, what is minimum interval for administering herpes zoster vaccine to this patient?

a. One day

b. One week

c. One month

d. One year

e. Two years

6. Which of the following is accepted as highly immunosuppressive treatment?

a. Systemic prednisone 10 mg/day

b. Azathioprine 2 mg/kg/day

c. Methotrexate 0.2 mg/kg/week

d. 6-mercaptopurin 1 mg/kg/day

e. Rituximab 500 mg

7. Which of the following vaccines cannot be used in the household contacts of highly immunosuppressed patients?

a. Oral polio vaccine

b. MMR vaccine

c. BCG vaccine

d. Inactivated influenza vaccine

e. Hepatitis B vaccine

8. Which of the following vaccines is contraindicated in an adult patient receiving infliximab for the treatment of psoriasis?

a. Inactivated influenza vaccine

b. Tetanus-diphtheria toxoid vaccine

c. Human papilloma virus vaccine

d. Hepatitis B vaccine

e. Varicella vaccine

9. In Turkey, most of the adults who are older than 60 years of age have protective antibodies against the following diseases, except for?

a. Measles

b. Mumps

c. Rubella

d. Varicella

e. Pertussis

10. Which of the following statements is correct?

a. Adult immunization schedules are the same in all countries

b. Immunization coverage among healthy adults is very high in Turkey

c. Immunization coverage among adult patients with chronic diseases is very high in Turkey

d. Dermatologists have to be immunized against influenza each year

e. Household contacts of immunosuppressed patients have to be immunized with pneumococcal polysaccharide vaccine

Answer key

1.e, 2.a, 3.a, 4.e, 5.a, 6.e, 7.a, 8.e, 9.e, 10.d