Immunization of Solid Organ Transplant Candidates and Recipients: A 2018 Update

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KEYWORDS

• Vaccine • Immunization • Solid organ transplant • Immunosuppressed

KEY POINTS

- Appropriate vaccines should be administered as early in the pretransplant period as possible.
- Data are lacking regarding the safety of live vaccines in the posttransplant period and are currently contraindicated.
- Vaccines should be given before foreign travel, but yellow fever vaccine is currently contraindicated posttransplantation.

INTRODUCTION

Vaccination in transplant candidates is important, but often overlooked. Vaccine-preventable diseases continue to be a considerable cause of morbidity and mortality in solid organ transplant (SOT) candidates and recipients.[1] Vaccinating SOT candidates pretransplant can improve their posttransplant response to vaccines.[2] Certain vaccines may allow SOT recipients to accept organs they may not have otherwise, as in the case of the hepatitis B core antibody positive donor organs. In addition, in the case of influenza vaccine in particular, vaccination may help avoid organ turndown due to SOT candidate illness.

Ideally, SOT candidates should have their vaccines updated as early as possible before transplantation because vaccine immune response is decreased during organ failure and even more so in the setting of immunosuppression after transplant surgery. It is recommended to make sure measles, mumps, rubella, varicella, tetanus-diphtheria-pertussis, pneumococcal, influenza, and hepatitis A and B

Disclosure Statement: The authors have no conflicts of interest to disclose.
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Infect Dis Clin N Am 32 (2018) 517–533
https://doi.org/10.1016/j.idc.2018.04.002 **id.theclinics.com**

vaccines are up to date in all appropriate candidates. If a patient has plans for foreign travel after transplant, it should be ensured that travel-related vaccines, especially live vaccines, are given before transplantation.

There is not a clear consensus about when vaccination should resume after transplantation although many centers vaccinate 3 to 6 months after transplantation. Serologic tests can be used to decide if certain vaccines are necessary pretransplant and should be used in certain instances to assess adequate immunologic response more than or equal to 4 weeks after vaccine administration.[3]

MECHANISMS OF IMMUNOSUPPRESION

It is important to understand the mechanism of immunosuppression in SOT recipients because this can help determine the appropriate timing of the vaccines. The immunosuppressive medications used in SOT recipients reduce B-cell and T-cell immune responses, which decrease the vaccine immune response.[4–7] Vaccine response is inversely proportional to the number of immunosuppressive drugs used.[7,8] Also, the specific immunosuppressive drug used may affect the level of immune response to vaccines. Previous studies have found that mycophenolate use was associated with decreased seroresponse in influenza-vaccinated kidney transplant recipients.[1,9,10] Another study evaluated the response to influenza vaccine in the setting of anti–T-cell therapy impact and did not find a significant difference with thymoglobulin versus basiliximab.[1,11]

TIMING

The current recommendation is to complete updating vaccines at least 4 weeks before transplant.[7,12–14] The American Society of Transplantation Third Edition of the Infectious Disease Community of Practice guidelines recommend at least a period of 4 weeks to repeat serologies after vaccine administration to ensure appropriate seroresponse.[3] Because patients are generally under the highest level of immunosuppression in the first 6 months after transplantation, it is recommended to avoid vaccinations in this period because of a likely lack of response. Patients are also recommended to avoid foreign travel in the early posttransplant period. After 6 months, immunosuppression can be reduced in some cases,[15] and therefore, there is improved immunogenicity and response to vaccination.[3,14] However, if T-cell depleting induction immunosuppression is used (ie, alemtuzumab or antithymocyte globulin), SOT recipients will have severely suppressed immune systems for up to 2 years posttransplantation.[16,17]

Several studies have been performed looking for antibody titers after exposure to monoclonal antibody medications. A study looking at vaccine response in patients with immune thrombocytopenia receiving rituximab after the *Haemophilus influenzae* type b (Hib) conjugate vaccine and the pneumococcal polysaccharide vaccine found that 3/14 (21%) in the rituximab group and 4/6 (67%) in the placebo group achieved a 4-fold increase of titers in antipneumococcal antibodies. On the other hand, 4/14 (29%) and 5/6 (83%) achieved a 4-fold increase for anti-Hib antibodies. This finding showed that the antibody responses were impaired for at least 6 months after rituximab administration.[18] A study on autologous hematopoietic cell transplant recipients showed that live vaccines (measles, mumps, and rubella virus [MMR] and Herpes zoster vaccine) were safe and well tolerated 24 months after transplant on patients with bortezomib maintenance therapy.[19] The use of plasma exchange could also affect antibody titers after vaccination. Renal transplant patients who received plasma