

**Guideline for the Vaccination of Patients with Splenic Injury Requiring Splenectomy or Splenic Embolization**

This guideline is written for individuals 12 years and older admitted to the Maine Medical Center trauma service with splenic injury requiring splenectomy or splenic embolization. This guideline will need to be revisited on a **yearly** basis.

*Background:*

- The spleen provides immunologic defense against encapsulated organisms, such as *Streptococcus pneumoniae*, *Haemophilus influenzae* type B, and *Neisseria meningitidis*
- Patients who undergo splenectomy are at risk for life-threatening bacterial infections, referred to as overwhelming post-splenectomy infection (OPSI)<sup>1</sup>
- The incidence of OPSI after splenectomy for trauma is unknown, but tends to occur  $\geq 5$  years after splenectomy.<sup>2</sup>
- *S. pneumoniae* remains the most frequent cause of OPSI<sup>1</sup>
- **The Centers for Disease Control and Prevention provide annual recommendations for vaccination in at risk individuals, including patients with anatomical and functional asplenia**
- There are multiple types of vaccines available: conjugated, protein, and polysaccharide<sup>12</sup>
  - Conjugated and protein vaccines elicit a more immunogenic response than polysaccharide vaccines
- Due to the difference in serogroup coverage provided, the administration of two pneumococcal vaccines (Prevnar 13<sup>®</sup> and Pneumovax<sup>®</sup> 23) and two meningococcal vaccines (Menactra<sup>®</sup> and Bexsero<sup>®</sup>) is recommended<sup>4,5</sup>
- Re-vaccination is recommended for certain vaccines (e.g. Menactra<sup>®</sup> and Pneumovax<sup>®</sup> 23) as they do not provide lifelong protection<sup>4,5,12</sup>
- While some studies suggest that splenic embolization does not adversely affect the immunologic activity of the spleen, this question has not been fully answered and it is our practice to consider vaccination in these patients<sup>3</sup>

*Vaccination Recommendations (See Appendix 1)<sup>4-10</sup>:*

Vaccine	Description	Administration	Re-vaccination
<b>Pneumococcal Vaccines</b>			
Prevnar 13 <sup>®</sup> (PCV 13)	Conjugate vaccine, 13-valent (serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F)	<ul style="list-style-type: none"> <li>• Administer during incident admission if never received PPSV23 or received PPSV23 <math>\geq 12</math> months ago</li> <li>• If PPSV23 administered within</li> </ul>	N/A

		past year, wait to administer PCV13 until 12 months from administration	
Pneumovax®23 (PPSV23)	Polysaccharide vaccine, 23-valent (serotypes 1, 2, 3, 4, 5, 6B, 7F, 8, 9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19F, 19A, 20, 22F, 23F, and 33F)	· Administer $\geq 8$ weeks after PCV13 administration	Repeat in 5 years and then again at age >65 years (if patient is <65 years of age)
<b>Meningococcal Vaccines</b>			
Menactra® (MenACWY)	Conjugate vaccine, covers serogroups A, C, Y, and W-135	· Administer during incident admission	· Repeat administration $\geq 8$ weeks after first administration and then every 5 years
Bexsero® (MenB)	2-series recombinant protein vaccine, serogroup B	· Administer during incident admission	· Administer second dose $\geq 4$ weeks from first dose
<b>Haemophilus influenzae B vaccine</b>			
ActHIB®	Conjugate vaccine, active against <i>H. influenzae</i> type B	· Administer during incident admission if patient has never received in the past	N/A
<b>Influenza Vaccination</b>			
Influenza Vaccine	Quadrivalent vaccine for age <65 years High-dose trivalent vaccine for $\geq 65$ years	· Administer during incident admission if during “flu season” and patient has not already received this year	· Annually

- **If possible, obtain patient’s immunization history to determine appropriate vaccines for administration**
  - If unable to obtain immunization history, offer all of the above vaccines
- **Sample vaccination schedule**
  - Prior to hospital discharge:
    - Pevnar 13® plus ActHIB® plus Menactra® plus Bexsero®
  - At least 8 weeks from discharge:
    - Pneumovax® 23 plus Menactra® plus Bexsero®
  - 5 years from discharge:
    - Pneumovax® 23 plus Menactra®
  - Repeat Menactra® every 5 years following. Repeat Pneumovax® 23 at age >65 years.

*Timing of Vaccine Administration:*

- One study<sup>11</sup> suggests that waiting until postoperative day 14 allows for a better functional antibody response against Pneumovax® 23. This study, however, did not find a significant difference in antibody concentrations compared to normal subjects at days 1, 7, or 14.
- Vaccination rates in the trauma literature range from 11 to 75%.<sup>2</sup>
- **We recommend vaccines are administered prior to discharge, preferably on the day of discharge if possible.**

*Precautions/ Contraindications for Consideration with Vaccination<sup>4-10</sup>:*

- Moderate or severe acute illness, with or without fever
- Immunosuppressive therapy or systemic steroid therapy (prednisone  $\geq$ 20 mg or equivalent) within the previous 2 weeks
  - Defer immunizations for at least 1 month from discontinuation if possible
- Hypersensitivity reaction to previous dose of vaccine or to a vaccine component
- History of Guillain-Barré syndrome (Menactra, ActHIB, Influenza)
- Latex allergy (Bexsero, ActHIB)
- Egg allergy (Influenza)

*Adverse effects:*

- Injection site reactions (pain, redness, induration, swelling)
- Myalgias, fatigue, headache, chills
- Decreased appetite, nausea, diarrhea

*Resources:*

<http://www.cdc.gov/vaccines/schedules/hcp/adult.html>

<http://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html>

*References:*

1. Theilacker C, Ludewig K, Serr A, et al. Overwhelming Postsplenectomy Infection: A Prospective Multicenter Cohort Study. *Clinical Infectious Diseases* 2016;62:871-8.
2. Taylor MD, Genuit T, Napolitano LM. Overwhelming Postsplenectomy Sepsis and Trauma: Time to Reconsider Vaccination? *J Trauma* 2005;59:1482-5.

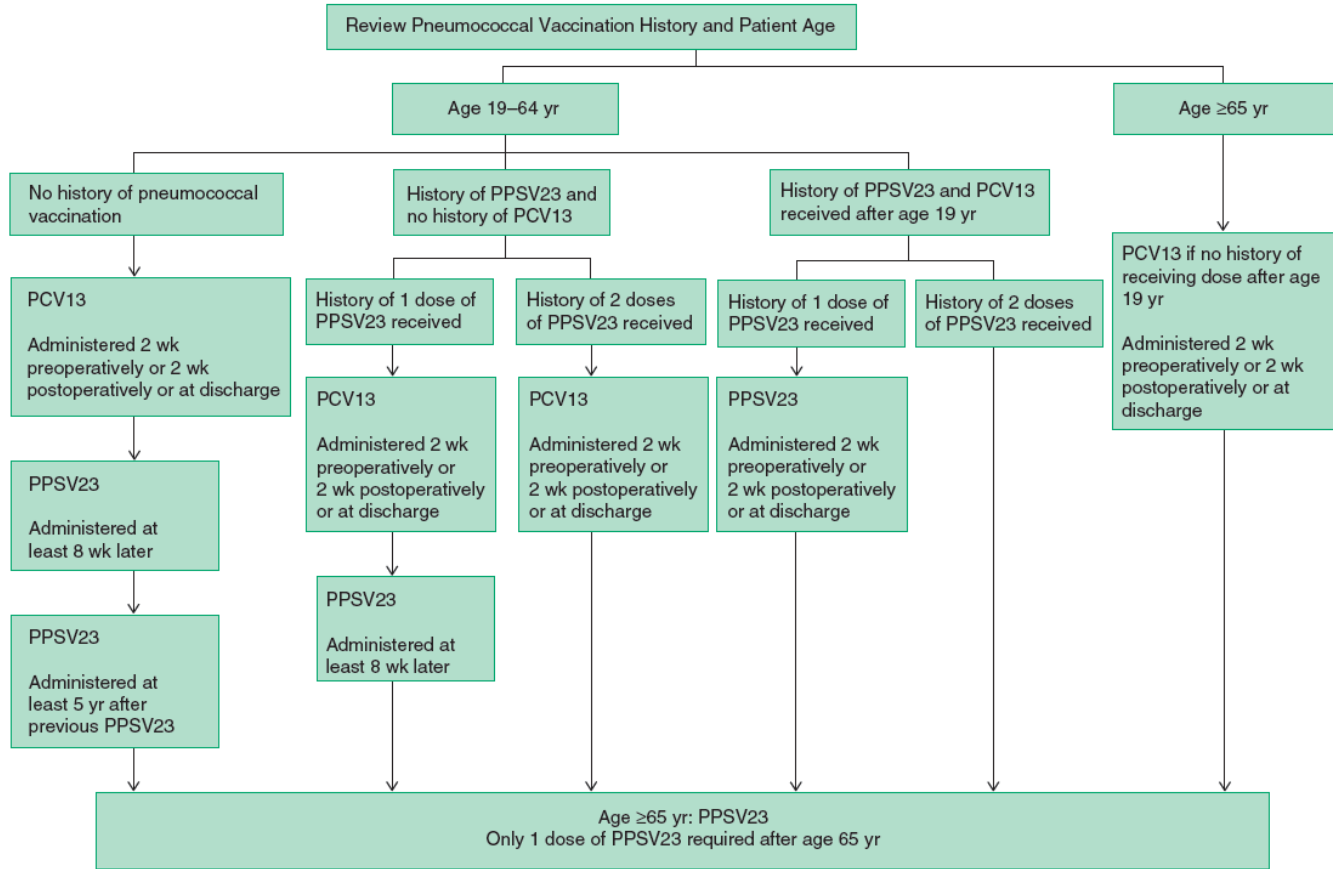
3. Stassen NA, Bhullar I, Cheng JD et al. Selective nonoperative management of blunt splenic injury: An Eastern Association for the Surgery of Trauma Practice management guideline. *J Trauma Acute Care Surg* 2012;73:S294-S300.
4. Centers for Disease Control and Prevention. (2016). Recommended Adult Immunization Schedule—United States – 2016. Retrieved from: <http://www.cdc.gov/vaccines/schedules/hcp/adult.html>
5. Centers for Disease Control and Prevention. (2016). Recommended Immunization Schedules for Persons Aged 0 Through 18 Years - UNITED STATES, 2016. Retrieved from: <http://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html>
6. Prevnar 13<sup>®</sup> [Package Insert]. Philadelphia, PA: Wyeth Pharmaceuticals, Inc; 2015.
7. Pneumovax<sup>®</sup> 23 [Package Insert]. Whitehouse Station, NJ: Merck Sharpe & Dohme Corp, a subsidiary of Merck & Co., Inc.; 2015.
8. Menactra<sup>®</sup> [Package Insert]. Swiftwater, PA: Sanofi Pasteur Inc.; 2014.
9. Bexsero<sup>®</sup> [Package Insert]. Sovicille, Italy: Novartis Vaccines and Diagnostics S.r.l.; 2015.
10. ActHIB<sup>®</sup> [Package Insert]. Marcy L'Etoile, France: Sanofi Pasteur SA; 2016.
11. Shatz DV, Schinsky MF, Pais LB et al. Immune Responses of Splenectomized Trauma Patients to the 23-Valent Pneumococcal Polysaccharide Vaccine at 1 versus 7 versus 14 Days after Splenectomy. *J Trauma* 1998;44:760-6.
12. Crum-Cianflone N, Sullivan E. Meningococcal Vaccinations. *Infect Dis Ther* 2016 Apr 16. [Epub ahead of print]

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Approved by Trauma Operational Performance Improvement Committee:

Appendix 1:



Hammerquist RJ, Messerschmidt KA, Pottebaum AA et al. Vaccinations in asplenic adults. *Am J Health-Syst Pharm* 2016;73:e220-8.