Immunizations: guidelines & practice for live vaccines

Thor Wagner, M.D.
Pediatric Infectious Diseases
Why immunizations are important for pediatric liver transplant recipients?
Most Recent Mumps Outbreak in Washington State

<table>
<thead>
<tr>
<th>County</th>
<th>Cases*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benton County</td>
<td>6</td>
</tr>
<tr>
<td>Ferry County</td>
<td>3</td>
</tr>
<tr>
<td>Grant County</td>
<td>45</td>
</tr>
<tr>
<td>King County</td>
<td>313</td>
</tr>
<tr>
<td>Kitsap County</td>
<td>2</td>
</tr>
<tr>
<td>Okanogan County</td>
<td>3</td>
</tr>
<tr>
<td>Pend Oreille County</td>
<td>3</td>
</tr>
<tr>
<td>Pierce County</td>
<td>62</td>
</tr>
<tr>
<td>Skagit County</td>
<td>17</td>
</tr>
<tr>
<td>Snohomish County</td>
<td>87</td>
</tr>
<tr>
<td>Spokane County</td>
<td>333</td>
</tr>
<tr>
<td>Stevens County</td>
<td>1</td>
</tr>
<tr>
<td>Thurston County</td>
<td>6</td>
</tr>
<tr>
<td>Whatcom County</td>
<td>5</td>
</tr>
<tr>
<td>Yakima County</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>891</strong></td>
</tr>
</tbody>
</table>

* Confirmed and probable cases in WA as of September 13, 2017 at 5:00 p.m.

No further updates are planned. The most recent onset for a mumps case in Washington was August 11, 2017.
From January 1 to August 12, 2017, 118 people from 14 states (California, Florida, Kansas, Maine, Maryland, Michigan, Minnesota, Nebraska, New Jersey, New York, Ohio, Pennsylvania, Utah, and Washington) were reported to have measles.

In 2016, 70 people from 16 states were reported to have measles. In 2015, 188 people from 24 states and the District of Columbia were reported to have measles. In 2014, the United States experienced a record number of measles cases, with 667 cases from 27 states reported to CDC’s National Center for Immunization and Respiratory Diseases (NCIRD); this is the greatest number of cases since measles elimination was documented in the U.S. in 2000.

- The majority of people who got measles were unvaccinated.
- Measles is still common in many parts of the world including some countries in Europe, Asia, the Pacific, and Africa.
- Travelers with measles continue to bring the disease into the U.S.
- Measles can spread when it reaches a community in the U.S. where groups of people are unvaccinated.
Trying to prevent:

Varicella-Associated Death of a Vaccinated Child with Leukemia — California, 2012

Paula Kriner, MPH¹, Karla Lopez, MD¹, Jessica Leung, MPH², Rafael Harpaz, MD², Stephanie R. Bialek, MD²

(Author affiliations at end of text)

• 7% mortality in immunocompromised patients with untreated varicella

• 20 cases (6%) over 11 years, 12 hospitalized, no organ involvement, no deaths
**Approach to Immunizations in organ transplant**

**Before Transplant (BT)**
- Normal Immune System (usually)
- Opportunity for maximum vaccine efficacy
- Vaccines often delayed with chronic illnesses

**After Transplant (AT)**
- Immunosuppression to prevent rejection
- Higher risk of infections
- Higher risk of complications
- Vaccines likely to be a little less effective

**Vaccine Strategy**

1. Continue routine vaccines (once on stable immunosuppression)
2. Consider live vaccines (MMR + chicken pox)

**Immunosuppression to prevent**

**Before Transplant (BT)**

1. Catch up on all routine vaccinations
   - Especially live vaccines
2. Give some vaccines early:
   i. MMR
      - recommended at 12-15mo
      - approved at 6 months of age
   ii. Polysaccharide pneumonia vaccine (PPSV23)
      - After conjugated pneumococcal vaccine
   iii. Meningococcal
      - normally given at 11-12 years old
      - approved for infants
   iv. HPV vaccine (against cervical cancer)
      - normally given at 11-12 years old
      - approved down to 9 years old
Data to support live vaccination after transplantation:

1. Weinberg, Horslen, et al., AJT, 2006
   - Study: Prospective, 16 OLT and SB recipients at Nebraska
   - Criteria: age >12 months; time from liver transplantation >6 months and from intestine transplantation >12 months; absence of rejection >1 month; maximum concurrent prednisone therapy of 0.3 mg/kg on alternate days and trough tacrolimus ≤10 ng/mL for >1 month; no blood products for >3 months before and 6 weeks after immunization
   - Efficacy: 87% with humoral seroconversion
   - Safety: 4(25%) rash, 4(25%) fever, no increase in LFTs, no disseminated disease

2. Khan, et al., Pediatric Transplant, 2006:
   - Study: Retrospective, 42 OLT recipients at CHOP
   - Criteria: (stable, nl LFTs, no rejection on monotherapy with tacro or siro)
   - Efficacy: Seroconversion (73% measles, 64.5% varicella)
   - Safety: No rejection or disseminated disease

3. Posfay-Barbe, et al., AJT, 2012:
   - Study: Prospective, 36 seronegative OLT recipients in Switzerland
   - Criteria: 1 year post tx, >2 months since rejection, Inclusion criteria for immunization included (1) to be on low immunosuppressive therapy, defined as <2 mg/kg/day of steroids and <0.3 mg/kg/day of tacrolimus (with levels <8 ng/mL for more than 1 month), and (2) to have a total lymphocyte count ≥750 cells/IL at time of immunization.
   - Efficacy: 97% seroconverted
   - Safety: localized reactions similar to healthy controls, no significant systemic illness, no rejection

**Summary:**
- Live vaccines have not caused disease
- Live vaccines have not caused rejection
Current Seattle Children’s guidelines

- VZV vaccine will be recommended for liver transplant patients who:
  - Not previously vaccinated
  - > 1 year since transplant
  - Lymphocyte Count > 750
  - Off steroids
  - On tacrolimus or sirolimus monotherapy, with a tacro trough < 8ng/mL

- Keep a record of those vaccinated

- Check VZV titer 3 months after vaccine
Current Seattle Children’s guidelines

- MMR vaccine will be offered to liver transplant patients who:
  - Not previously vaccinated
  - > 2 years since transplant
  - Lymphocyte Count > 750
  - Off steroids
  - On tacrolimus or sirolimus monotherapy, with a tacrolimus trough < 8ng/mL

- Keep a record of those vaccinated
- Check titers 3 months after vaccine