CST statement on Measles: Awareness and guidance

Background:

Measles is a highly contagious viral infection. Measles cases are increasing globally, including several Canadian provinces with evidence of community spread in certain locations.

After being exposed to the virus, it can take approximately 10 days (range 7– 18 incubation period) for people to develop symptoms. Symptoms in the general population start by fever, cough, coryza, conjunctivitis (3C's), followed 3-7 days later by a generalized maculopapular red blotchy rash (begins behind the ears and/or the face and spread to trunk and extremities). Measles can lead to serious complications including blindness, deafness, encephalitis and pneumonitis.

In immunocompromised patients including Solid Organ Transplant (SOT) recipients, rash can be absent and presentation can be atypical. Complications (neurologic and pneumonitis) are more common and associated with increased mortality. In a recent review of published reports of measles infections in pediatric SOT recipients, measles-associated mortality occurred in 33% (4 of 12 children were non or partially immunized) presenting most frequently with neurologic or lower respiratory complications (3).

Measles transmission:

Measles is highly communicable and transmission occurs:

- Person-to-person via large respiratory droplets and airborne transmission in closed areas for up to 2 hours after a person with measles occupied the area
    - Immunocompetent individuals with measles are infectious from 4 days before rash onset to 4 days after the rash appears.
    - SOT recipients may be infectious for longer and should be advised to isolate for the duration of illness
- Theoretical transmission via organ donation from an infected donor.
    - Organs from actively infected donors or recent infection (within the last 2-3 months) should not be used.
    - Donation from living donors with recent measles exposure should be delayed for at least 21 days

Measles Prevention optimization pre-transplant:

Since measles vaccines (MMR and MMR-V) are live attenuated vaccines, and are contraindicated in adults and most pediatric SOT after transplant, it is important to provide age appropriate vaccination to non or partially immune SOT candidates ≥ 6 months of age at least 4 weeks before transplantation.

Criteria for measles immunity:

1- Documentation of vaccination with two doses of vaccines.
    a. In all pediatric candidates and in centers, where access to previous vaccination records is not available, serologic status pre-transplant with measles IgG, should be performed, so seronegative candidates can be vaccinated pre-transplant.
2- Laboratory evidence of immunity
3- History of laboratory confirmed infection
4- Although adults born before 1970 are generally presumed to have natural immunity to measles, some of these individuals may be susceptible. Therefore, we suggest to confirm serologic status with measles IgG. if seronegative, vaccination is highly recommended if not on active immunosuppression.

Vaccination pre-transplant:

Transplant candidates, with lack of measles immunity, should be advised to receive 2 doses of MMR vaccines (interval of 4 weeks between doses), with second dose being given at least 4 weeks prior to transplant.

Transplant candidates with documentation of only 1 MMR vaccine, should be advised to receive a second dose of MMR vaccine if time permits.

Measles Prevention optimization post-transplant:

- To protect SOT recipients, we encourage health care providers taking care of SOT patients, family members, caregivers and household contacts to ensure they are immune to measles.
- Due to evolving data, showing safety of MMR vaccines in subgroup of pediatric liver and kidney SOT (> 1 year from transplant, and meet specific criteria of "low-level" immune suppression), pediatric liver and kidney recipients who are unvaccinated, received 1 dose of MMR vaccine pre-transplant, or remain measles seronegative despite pre-transplant vaccination, should be referred to specialized pediatric transplant Infectious disease physician for evaluation and advice on safety of proceeding with MMR vaccines.
- Measles IgG can be considered after SOT, to determine potential risk due to travel, occupation or community exposure.

Post exposure prophylaxis

- There is no specific antiviral to treat measles infection.
- Partially vaccinated or non-immune SOT recipients should receive human immune globulin products intramuscular IMIg ((0.5 mL/kg) (limited protection if 30 kg or more) or IVIg (400mg/kg) within 6 days of exposure. (9)
- Since some immunosuppressed transplant recipients may not maintain adequate antibody levels from past exposure or pre-transplant vaccination, consider testing post exposure for measles IgG and giving IMIg or IVIg if seronegative. If is not possible to test within 6 days of exposure, then consider offering IMIg or IVIg on a case-by-case basis.
- Post exposure MMR vaccine is NOT generally recommended in SOT recipients.
    - Can be considered on a case by case basis, in select pediatric kidney and liver recipients with input from pediatric transplant ID, using principles outlined in manuscript by Suresh et al. (6)

Measles infection prevention and control in health care settings:

- If a transplant patient is suspected or confirmed with measles, they should be advised to avoid clinics.
- In hospitals they should be placed in isolation in a single-person room with airborne precautions. A fit-tested N95 (or an equivalent or higher protection) respirator is recommended when caring for SOT with suspected or confirmed measles, for all staff regardless of immunity to measles

This document was written by the Canadian Society of Transplantation's Transplant Infectious Diseases Group and endorsed by the Canadian Society of Transplantation

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References:

1. www.canada.ca/en/public-health/news/2024/02/statement-from-the-chief-public-health-officer-of-canada-on-global-increase-in-measles-and-risk-to-canada.html
2. Kaplan LJ, Daum RS, Smaron M, McCarthy CA. Severe Measles in Immunocompromised Patients. *JAMA.* 1992;267(9):1237–1241. doi:10.1001/jama.1992.03480090085032

3. Statler VA, Fox T, Ardura MI. Spotting a potential threat: Measles among pediatric solid organ transplantation recipients. Pediatr Transplant. 2023 Jun;27(4):e14502. doi: 10.1111/petr.14502. Epub 2023 Mar 15. PMID: 36919399.

4. https://www.canada.ca/en/public-health/services/diseases/measles/surveillance-measles/measles-rubella-weekly-monitoring-reports.html

5. https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2018-44/issue-9-september-6-2018/article-7-naci-recommendation-pep.html

6. Suresh S, Upton J, Green M, Pham-Huy A, et al . Live vaccines after pediatric solid organ transplant: Proceedings of a consensus meeting, 2018. Pediatr Transplant. 2019 Nov;23(7):e13571. doi: 10.1111/petr.13571. Epub 2019 Sep 9. PMID: 31497926.

7. Fieldman AG, Beaty BL, Ferrolino JA et al. Safety and Immunogenicity of Live Viral Vaccines in a Multicenter Cohort of Pediatric Transplant Recipients. JAMA Netw Open. 2023 Oct 2;6(10):e2337602. doi: 10.1001/jamanetworkopen.2023.37602. PMID: 37824141; PMCID: PMC10570873.

8. Sallie R. Permar, William J. Moss, Judith J. Ryon, et al Prolonged Measles Virus Shedding in Human Immunodeficiency Virus—Infected Children, Detected by Reverse Transcriptase—Polymerase Chain Reaction, *The Journal of Infectious Diseases*, Volume 183, Issue 4, 15 February 2001, Pages 532–538, https://doi.org/10.1086/318533

9. https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2018-44/issue-9-september-6-2018/article-7-naci-recommendation-pep.html

10. https://www.canada.ca/en/public-health/services/diseases/measles/health-professionals-measles/updated-infection-prevention-control-recommendations-healthcare-settings.html