PRACTICE POINTS
FOR CDA MEMBERS

Measles: Potential surge in Canada

On February 23, 2024, Dr. Theresa Tam, Canada's Chief Public Health Officer of Canada, issued a statement on the potential increase in imported measles cases into Canada due to increased exposure during the spring break travel season.

More than a dozen measles cases have been reported so far this year in Canada, surpassing the total number of 12 cases confirmed in 2023. At present, areas affected include Quebec, Ontario, British Columbia, and Saskatchewan.

While most of the cases have been associated with international travel, recent occurrences in Quebec and Ontario have sparked concerns about potential community transmission, as they lack connections to prior travel activities.

As the Public Health Agency of Canada continues to monitor and report on this highly contagious disease, the following practice points are provided as a timely reminder to help guide clinical decisions.

Practice Points

- Persons who have not had a previous measles infection or who have not had 2 doses of a measles-containing vaccine are at an increased risk.
- Persons born before 1970 are presumed to have acquired natural immunity to measles as they likely were infected. However, vaccination for measles is still recommended for some population groups such as health care workers, immunosuppressed patients and military personnel.
- Ensure all clinical staff have measles immunity from either 2 doses of the measles vaccine regardless of their year of birth or have acquired immunity from an earlier infection. If vaccination documentation is unavailable, laboratory testing to confirm immunity will be required. For further risk management including isolation, refer to health authority guidelines in your region.
    - Reference: Immunization of workers: Canadian Immunization Guide https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-3-vaccination-specific-populations/page-11-immunization-workers.html
- The measles virus can persist in the air or on surfaces for up to 2 hours after a person who is infected has left the space. **Airborne precautions should be used in the clinical setting for patients with confirmed or suspected measles.**
- Should patients present prodromal symptoms, inquire about recent travel and their vaccination history. If suspect, confirm diagnosis with a laboratory test and follow reporting protocols to health authorities as required in your region.

- Remind immunocompromised patients to avoid exposure to the measles virus by taking precautionary steps such as handwashing and masking, and to seek immediate medical attention if they develop any symptoms.
- Before initiating immunosuppressive therapies, review patients' vaccination history and discuss possible vaccines to mitigate their risk of exposure if applicable.
    - The Canadian Immunization Guide is available at https://www.canada.ca/en/public-health/services/canadian-immunization-guide.html
      Refer to Part 3: Vaccination of specific populations. Chapter: Immunization of immunocompromised persons.
        - A measles vaccine may be administered at least 4 weeks before initiating immunosuppressive therapy. Live vaccines are generally contraindicated when immunosuppressive therapy cannot be discontinued, however several cases series have suggested that measles vaccine appears to be safe for patients on low to moderate forms of immunosuppression.
- The CDA has prepared a position statement on *The Role of Dermatologists in the Return of Measles*. This publicly available document can be accessed at dermatology.ca.

Additional information about Measles

- Measles is highly contagious. 90% of persons who are not immune to measles and who come into contact with the virus will become infected. The 2023 adult National Immunization Coverage Survey (aNICS) and the 2021 children National Immunization Coverage Survey (cNICS) both reported the national vaccine coverage goal of 95% was not met.
- Prodromal symptoms of measles begin 7 to 21 days after infection and include fever, malaise, cough, runny nose, and conjunctivitis. Koplik spots may appear on the oral mucosa 2 to 3 days after symptoms begin. A generalized rash of erythematous macules and papules usually appears about 14 days after infection, or about 3 to 7 days after prodromal symptoms begin. The rash lasts 4 to 7 days, typically beginning on the face and advancing to the trunk of the body and then to the arms and legs. A cough may persist for 1-3 weeks.
- Measles presents the same in different skin types. Due to the natural pigmentation of skin, the rash may appear more purplish or brownish in colour in brown and black skin, which can also make it appear less visibly raised compared to lighter skin.
- The incubation period is about 10 days from exposure to the onset of prodromal symptoms (ranging from 7 to 18 days). The interval from infection to appearance of rash averages 14 days, but the rash can appear as late as 19-21 days from infection.
- **People with confirmed measles are infectious from 1 day before the beginning of the prodromal period (usually about 4 days before rash onset) to 4 days after the appearance of rash.**
- Common complications include otitis media (1/10 cases), bronchopneumonia (1/10 cases), diarrhea (less than 1/10 cases)
- Severe complications can include respiratory failure, encephalitis (1/1,000 cases), or death (1-3/1,000 cases)
- Long-term sequelae of measles can include blindness, deafness, permanent neurological sequelae, or subacute sclerosing panencephalitis (4-11/100,000 cases). These changes occur 7-10 years after infection with the measles virus.
- Treatment advice generally includes take fever-reducing medication, increase fluid intake, get ample rest, and to isolate at home until 4 days after the appearance of the rash to limit the spread of the virus. Additional advice should be provided for further health care needs as they present.

- **Of note: Atypical measles syndrome (AMS)** may present in patients who were vaccinated with the less effective formalin-inactivated measles vaccine in the 1960s. AMS may also present with much lesser frequency in patients who received the live attenuated vaccine or no vaccine at all.
    - Due to the dissimilarity with the symptoms and the biology of classical measles, the diagnosis of AMS may be overlooked. **AMS contrasts with the classical disease by several features. These may include a high and prolonged fever; a polymorphous eruption, starting in the hands and feet**; hilar lymphadenopathy and nodular pulmonary consolidations, with or without pleural effusion. The pulmonary nodules may persist for several weeks to years. Antibody titers to measles antigens in AMS are usually higher than 1:160.
    - AMS patients' nodules may resolve spontaneously and abruptly. This is very rarely the case for tuberculosis, sarcoidosis, histoplasmosis or metastatic cancer, which represent the main differential diagnostic conditions.
    - Additional symptoms of AMS include abdominal pain, abnormal liver function tests (perhaps with hepatitis), edema and headache. **Koplik spots are infrequent**, so are cough and dyspnea.

References

- The Public Health Agency of Canada's weekly updates of active, confirmed measles cases- https://www.canada.ca/en/public-health/services/diseases/measles/surveillance-measles/measles-rubella-weekly-monitoring-reports.html
- The Public Health Agency of Canada's guidance document, Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Healthcare Settings- https://www.canada.ca/en/public-health/services/publications/diseases-conditions/routine-practices-precautions-healthcare-associated-infections.html
- Adult National Immunization Coverage Survey (aNICS): 2023 results- https://www.canada.ca/en/public-health/services/immunization-vaccines/vaccination-coverage/adult-national-immunization-coverage-survey-2023-results.html

Canada set a vaccination goal of 95% by 2025 for children by 2 and 7 years of age. This high coverage will also develop herd immunity that can protect Canadians in general, including adults at risk of this vaccine-preventable disease.

Table 1: Routine immunization coverage by province/territory, among adults, aNICS, 2023 (in percentage)

Vaccine	Canada	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	YK	NT	NU
Hepatitis B	69.2	63.3	62.3	61.0	60.2	66.5	72.0	67.2	68.7	74.0	66.6	69.3	80.7	65.3
Tetanus	77.6	63.3	71.1	76.7	71.3	73.5	81.6	80.6	77.3	78.5	74.9	85.0	84.1	67.3
Pertussis	40.9	36.7	49.8	40.4	44.9	35.8	44.0	43.2	46.8	46.2	35.1	49.3	55.5	#
Varicella	52.9	47.4	60.0	50.5	52.7	52.1	55.3	43.7	47.5	54.2	50.9	42.4	#	#
HPV	17.7	14.0	19.6	15.4	15.1	16.4	19.3	14.2	14.6	20.9	15.7	19.6	37.3	#
Shingles	38.8	30.8	47.6	36.4	25.2	29.8	47.3	39.5	40.1	40.5	32.9	43.9	56.8	#
Pneumococcal	38.5	26.3	38.8	35.5	27.7	34.8	42.1	43.5	31.6	42.3	36.5	54.2	41.3	#
Mpox	5.9	4.0	7.2	3.7	3.6	4.0	7.4	5.6	4.7	7.2	5.4	#	#	#
Polio	83.6	83.7	85.4	85.6	86.3	70.9	87.7	88.7	86.4	88.1	86.0	83.8	87.5	#
Measles	**87.4**	89.7	89.9	88.7	85.8	86.4	87.4	87.4	89.8	89.3	86.7	85.3	86.4	68.0
Meningococcal	61.2	60.5	64.2	60.3	59.3	53.1	65.0	62.4	66.8	65.9	59.6	59.8	65.0	#

 # High sampling variability or small sample size – although an estimate may be determined from the table, data should be suppressed.

Table 2: Routine vaccine coverage among adults by select sociodemographic characteristics, aNICS, 2023 (in percentage)

Sociodemographic Characteristics	Measles - Adult (≥ 1 dose)
Location	
Canada	**87.4**
Urban (population >1,000)	87.7
Rural (population <1,000)	87.0
Gender	
Male	85.0
Female	89.6
Population Group: Adult	
People living with a disability	88.0
Black	85.4
East/Southeast Asian	83.0
Indigenous	90.6
Latino/Latina	85.1
Middle eastern and North African	78.0
South Asian	80.9
White	89.2

- Childhood National Immunization Coverage Survey (cNICS): 2021 highlights - https://www.canada.ca/en/public-health/services/immunization-vaccines/vaccination-coverage/2021-highlights-childhood-national-immunization-coverage-survey.html

  The national vaccine coverage goal of 95% was not met for any vaccine recommended for 2-year-old and 7-year-old children. The percentage of 2-year-old children vaccinated against measles with at least one dose by their second birthday was 91.6. The percentage of 7-year-old children vaccinated by their seventh birthday with at least one dose was 79.2.

  At the time of the survey, 2.1% of 2-year-old children and 3.7% of 7-year-old children had not received any vaccine in their lifetime. The main reasons cited among parents/guardians who chose not to vaccinate were: concern about the risk of side effects; did not consider it necessary; and not confident in effectiveness.

  Most parents/guardians of 2-year-old children continue to agree that childhood vaccines are safe (97%), effective (98%), and help to protect their child's health (97%). However, a larger proportion of parents/guardians believe that alternative practices such as homeopathy or naturopathy (15%) and healthy nutrition and hygiene (16%) can replace the need for vaccination – an increase of 4% and 5% respectively from 2019.

Table 3: Estimated vaccine coverage of routine childhood vaccines by 2 years of age across provinces and territories: cNICS, Canada, 2021 (in percentage)

Antigen	Number of doses	Canada	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	YK	NT	NU (a)
Diphtheria	≥ 4	77.1	80.0	95.8	70.3	78.1	76.2	76.7	75.5	80.9	74.6	83.6	66.6	66.0	24.1
Pertussis	≥ 4	77.1	80.0	95.8	70.3	78.1	76.2	76.7	75.5	80.9	74.6	83.6	66.6	66.0	24.1
Tetanus	≥ 4	77.1	80.0	95.8	70.3	78.1	76.2	76.7	75.5	80.9	74.6	83.6	66.6	66.0	24.1
Polio	≥ 3	91.8	95.4	(b)	87.9	89.6	91.7	94.4	87.9	91.0	85.7	92.6	86.3	80.4	33.5
Haemophilus influenzae type b (Hib)	≥ 4	75.3	76.8	95.8	66.8	75.9	75.8	73.8	75.3	80.6	71.1	82.8	64.0	60.0	24.1
Measles	≥ 1	**91.6**	97.0	98.0	93.6	94.3	93.2	92.0	87.1	91.4	88.4	91.3	85.3	90.8	34.6
Mumps	≥ 1	91.5	97.0	98.0	93.6	94.3	93.2	91.7	86.6	91.0	88.4	91.3	85.3	89.5	34.6
Rubella	≥ 1	91.5	97.0	98.0	93.6	94.3	93.2	91.7	86.6	91.0	88.4	91.3	85.3	88.2	34.6
Hepatitis B	≥ 3	82.6	n/a	97.7	n/a	79.8	80.6	n/a	n/a	n/a	n/a	87.1	71.3	81.0	32.5
Varicella	≥ 1	87.5	96.4	96.7	93.2	91.2	89.9	85.9	86.9	80.9	83.3	91.0	81.8	80.2	21.2
Meningococcal type C	≥ 1–2	90.5	93.6	(b)	89.4	90.6	90.2	90.1	88.8	89.1	89.8	94.2	90.0	88.8	34.5
Pneumococcal	≥ 3–4	85.1	87.8	97.4	79.0	86.7	85.3	86.1	81.7	83.7	81.3	88.2	73.2	59.9	21.0
Rotavirus	≥ 2	85.6	93.3	96.4	n/a	66.6	86.0	84.7	82.2	88.2	84.8	91.2	86.7	75.6	n/a

(a) Estimates and confidence intervals are of marginal quality due to high sampling variability and should be used with caution
(b) Not reportable due to high sampling variability or small sample size

Table 4: Estimated vaccine coverage by 2 years of age across provinces and territories: cNICS, Canada, 2021 (in percentage)

Demographic factors	Measles (≥ 1 dose)
Gender of child	
Male	91.3
Female	92.0
Education level: Parent	
High School or less	80.2
Above high school, below bachelor's	92.8
Bachelor's and above	95.3
2020 Household income	
Less than $40,000	80.2
$40,000–$79,999	86.1
$80,000–$99,999	91.1
$100,000–$119,999	92.4
$120,000–$139,999	97.1
$140,000–$159,999	95.9
More than $160,000	96.6
Population group: Child	
White	92.0
Indigenous	82.5
South Asian	94.1
Chinese	94.5
Black	82.4
Filipino	96.5
Other racialized groups	92.8
Remoteness index	
Easily accessible area	92.5
Accessible area	90.7
Less accessible area	84.1
Remote and very remote area	65.3