Pocket Guide for Immunizers:

Measles, Mumps, and Rubella Vaccination

The purpose of this pocket guide is to serve as a tool for health care providers to learn more about measles, mumps, and rubella (MMR) vaccines, enabling them to make strong recommendations to their patients.

Measles, mumps, and rubella are highly transmissible viral infections that occur worldwide. All three have been effectively controlled by vaccination in Canada; however, outbreaks still occur, and the danger of a resurgence is high if immunization rates falter.

There are no effective treatments for any of these diseases, making prevention absolutely essential. Measles in particular is a life-threatening disease, especially for those under the age of five. Before widespread immunization, hundreds of thousands of Canadians were infected with measles every year. Hundreds of Canadians died of the disease annually, and survivors risked lifelong disability such as deafness and permanent brain damage.

These three diseases are today almost unknown in Canada thanks to routine immunization. But, with these diseases remaining endemic elsewhere in world, the risk of reintroduction is constant. Population immunity is critically important. The higher the rate of vaccination is in a given community, the less likely an outbreak is to occur, and the lower the risk for those who cannot be immunized, such as newborns and those with certain medical conditions.

Diligent vaccination with measles, mumps, and rubella vaccines is not only essential to individual health, it is vital to the safety of the community.

This pocket guide references recommendations made in the Canadian Immunization Guide Chapter on Measles Vaccine, the Canadian Immunization Guide Chapter on Mumps Vaccine, and the Canadian Immunization Guide Chapter on Rubella Vaccine from the National Advisory Committee on Immunization (NACI).

What vaccines are available?

Vaccines used in routine immunization against measles, mumps, and rubella fall broadly into two categories: those which also include varicella vaccine, and those which do not.

In cases where a formulation without varicella vaccine is used, a separate varicella vaccine must also be administered (see Pocket Guide for Immunizers: Varicella (Chickenpox) & Herpes Zoster (Shingles) Vaccination). The preparations including varicella vaccine have the benefit of requiring fewer injections. Guidance on which to prefer may vary by province or territory.

In the case of measles, there are also human immunoglobulin preparations which are approved for post-exposure prophylaxis for select susceptible individuals.

Table 1: Preparations Authorized for Use in Canada

Class Code	Class Details	Vaccine Name	Vaccine Code
MMR	Live attenuated measles, mumps, and rubella vaccines for routine immunization	M-M-R®II	MMR-Merck
		PRIORIX®	MMR-GSK
MMRV	Live attenuated measles, mumps, rubella, and varicella vaccines for routine immunization	Priorix-Tetra®	MMRV-GSK
		Proquad®	MMRV-Merck
Ig	Human measles immunoglobulin for post-exposure prophylaxis	GamaSTAN®	Ig-GT-1
		Gammagard®	Ig-SP
		Gamunex®	Ig-GT-2
		IGIVnex	Ig-GT-3
		Privigen®	Ig-CSLB
		Panzyga®	Ig-OPP

Note: Throughout the rest of this guide, vaccines will be referred to by vaccine code when there is a specific recommendation within the class, and by class code when there is not.

What is the recommended dosage and how is it given?

The dosage for **MMR** and **MMRV** is 0.5mL. **MMR** and **MMRV** (ProQuad) should be administered subcutaneously (SC). **MMRV** (PRIORIX-TETRA) may also be administered intramuscularly (IM) according to the product monograph.

The dosage and administration for **Ig** varies in accordance with a number of factors (see NACI recommendations and product monograph).

Who should receive the measles, mumps, and rubella vaccines?

Healthy children (12 months to 12 years of age)

- Routine immunization with **MMR** or **MMRV** is recommended
- Complete immunization schedule consists of two doses, ideally administered before school entry
- See Table 2 for schedule

Travellers

- Protection against measles, mumps, and rubella is especially important for those planning travel to areas where these diseases remain endemic (particularly China, South America, and certain regions within Africa) https://www.cdc.gov/globalhealth/measlesdata/global-measles-outbreaks.html
- Unimmunized adolescents and adults without laboratory evidence of prior infection or confirmed immunity to the endemic disease should receive one or two doses of **MMR**
- In the case of young children traveling before their routine immunization has taken place, **MMR** may be given as early as 6 months of age
- See page 5 for details

Susceptible unimmunized adolescents and adults (13 years of age or older)

- Immunization with **MMR** is recommended
- Susceptible unimmunized adolescents aged 13 to 17 years should receive two doses, while adults aged 18 years or older may receive one or two doses
- Health care workers, military personnel, and students in post-secondary educational settings are at increased risk of exposure, and thus immunization is particularly recommended (see page 5)
- Individuals are considered susceptible if they are unimmunized, born after 1970, and do not have laboratory evidence of prior infection or of confirmed acquired immunity
- Adults born in or before 1970 are presumed to have acquired natural immunity through exposure
- See Table 3 for schedule

Measles-susceptible individuals who have been exposed to the measles virus

- Both **MMR** and **Ig** can be used for post-exposure prophylaxis
- **MMR** is the recommended prophylaxis in immunocompetent non-pregnant individuals, including infants aged 6 months and older
- **Ig** should be considered for prophylaxis in pregnant or immunocompromised individuals, and in infants under the age of 6 months
- See page 6 for details

Who should not receive the measles, mumps, and rubella vaccines?

These vaccines have a well-established history of safety, but there are some contraindications and situations which warrant extra precautions.

- Individuals who have previously experienced an anaphylactic reaction to the vaccine – or who have a proven history of immediate or anaphylactic hypersensitivity to any vaccine component, with the exception of egg allergy – should not be given the vaccine.
- Individuals with suspected hypersensitivity or non-anaphylactic allergy to the vaccine or any of its components should be investigated further in consultation with an allergist. Immunization in a controlled setting may be advised.
- Children with a known or suspected family history of congenital or hereditary immunodeficiency contraindicating vaccination with live vaccine should not receive **MMR** or **MMRV** unless their immune competence has been established.
- **MMRV** can be contraindicated in persons with impaired immune function, including primary or secondary immunodeficiency disorders or immunocompromised state due to medication.
- **MMR** and **MMRV** are generally contraindicated during pregnancy.
- **MMR** and **MMRV** are contraindicated in individuals with active, untreated tuberculosis.
    - A delay between receiving certain blood products and **MMR** and **MMRV** vaccine should be taken. For details, see: https:/www.canada.ca/en/public-health services/publications/healthy-living canadian-immunization-guide-part-1-key-immunization-information/page-11-blood-products-human-immune-globulin-timing-immunization.html
- **Ig** should not be given to people with known isolated IgA deficiency unless the benefit outweighs the risk, in which case the product should be given with caution and under close observation.
- Immunization should be postponed for individuals with moderate or severe acute illness. In the case of minor illness, with or without fever, immunization may proceed normally.

Can these vaccines be given at the same time as other vaccines?

MMR may be administered at the same time as inactivated vaccines, live oral vaccines, or live intranasal influenza vaccine (LAIV), as well as other routinely provided live injected vaccines. MMR vaccines can be administered with other live injectable vaccines in the same visit. If the MMR vaccine is the sole vaccine given at a visit, it is recommended to wait a minimum of four weeks before administering another live injectable vaccine.

REMEMBER

In all cases, if vaccines are administered simultaneously, a separate injection site and a different syringe must be used for each.

What specific populations require special attention?

Persons with Inadequate Immunization Records

Children and adults with incomplete immunization records, or no immunization records, should be considered unimmunized and should be administered **MMR** or **MMRV** on a schedule appropriate to their age and risk factors, regardless of possible previous immunization.

Pregnant Individuals and Those Intending to Become Pregnant

Ensuring immunity to rubella is particularly important before becoming pregnant. Infection with rubella specifically during early pregnancy may result in miscarriage or congenital rubella syndrome.

Due to a theoretical risk to the fetus, however, **MMR** and **MMRV** are generally contraindicated during pregnancy. Susceptible individuals should receive immunization before becoming pregnant, and should delay pregnancy by at least 4 weeks following vaccination. In some situations, such as during active measles or rubella outbreaks, the potential benefits of vaccination with **MMR** may outweigh the risks in pregnant individuals.

Individuals Traveling to Areas where these Diseases are Endemic

Protection against measles, mumps, and rubella is especially important for those planning to travel to areas where these diseases remain endemic (particularly China, South America, and certain regions within Africa). Up-to-date information on disease prevalence may be found on the World Health Organization website. Travel Health Notices from the Public Health Agency of Canada should also be monitored.

Unimmunized adolescents without laboratory evidence of prior infection or confirmed immunity to the endemic disease should receive two doses of **MMR** before traveling. The same is true for adults born in or after 1970. Individuals born before 1970 should receive one dose of **MMR**. In the case of young children traveling before their routine immunization has taken place, two doses of **MMR** may be given beginning as early as 6 months of age.

In all cases, the minimum interval between doses is 4 weeks.

Military Personnel, Health Care Workers, and Post-Secondary Students

Due to increased risk of exposure, it is recommended that all susceptible (unimmunized and without laboratory evidence of prior infection or immunity) military personnel and health care workers receive two doses of **MMR** (at least 4 weeks apart) regardless of their birth year. For susceptible post-secondary students, 2 doses of **MMR** (at least 4 weeks apart) are recommended for those born in 1970 or later. One dose of **MMR** may be considered for those born before 1970.

What about side effects and adverse reactions?

Minor adverse events are occasionally seen following immunization with **MMR** and **MMRV**. In all cases, the events are less severe than those seen in naturally occurring disease.

- Pain or redness at the injection site, alongside malaise and mild fever (less than 39°C), are seen somewhat commonly in **MMR** and **MMRV** recipients.
- Rash – including measles-like, rubella-like or varicella-like rash – and fever greater than 39°C occur in between 1% and 10% of **MMRV** recipients – occurring 6-23 days post vaccination.
- Acute transient arthritis or arthralgia may occur 1 to 3 weeks after immunization with **MMR** or **MMRV**.

Less Common and More Severe Reactions

- Encephalitis has been reported in association with **MMR** and **MMRV** vaccines, at a rate of approximately 1 in 1,000,000. This is far less than the 1 in 1,000 incidence with natural measles infection.
- Febrile seizures are rarely reported in the 7 to 10 days after vaccination with **MMRV**, and especially if given as a first dose to 12- to 23-month-old children. This risk is slightly lowered with separate administration of **MMR** and varicella vaccine. The increased risk associated with **MMRV** is estimated at about 1 additional febrile seizure for every 2,300 to 2,800 doses.
- Reported associations linking measles, mumps, and rubella vaccines with conditions such as inflammatory bowel disease and autism have been rigorously studied – and refuted.

What about those who have been exposed to the measles virus?

Both **MMR** and **Ig** can be used for post-exposure prophylaxis. Prophylaxis is necessary only if the individual is unimmunized and susceptible.

MMR given within 72 hours of exposure is the recommended prophylaxis in immunocompetent non-pregnant individuals, including infants aged 6 months and older. When **MMR** vaccine is provided prior to 12 months of age, infants should still receive further doses of the vaccine on the usual schedule, to ensure lasting immunity.

Intramuscular or intravenous **Ig** should be considered for prophylaxis in pregnant or immunocompromised individuals, in infants under the age of six months, or when **MMR** cannot be administered within 72 hours of exposure. For dosage and administration instructions, refer to NACI guidelines and the product monographs.

Immunization schedules

Table 2: Recommended Routine Measles, Mumps, and Rubella Immunization for Healthy Children Aged 12 Months to 12 Years

At 12 to 15 months of age	One dose of either **MMR** or **MMRV**, depending on provincial or territorial schedule
After 18 months of age and before school entry	One dose of either **MMR** or **MMRV**, depending on provincial or territorial schedule

Table 3: Recommended Measles, Mumps, and Rubella Immunization for Susceptible Unimmunized Adults Aged 18 Years and Older

At time of presentation, if born in or after 1970	One dose of **MMR**
At time of presentation, if born before 1970	Natural immunity through exposure is presumed. Vaccination is recommended only in cases of increased risk (see page 5)

Notes on Tables 2 and 3

In all cases, doses of **MMR** and **MMRV** should be given at least 4 weeks apart.

Accelerated and Catch-up Schedules

Children aged 12 months to 12 years who have not received their routine immunization should be administered 2 doses of **MMR** or **MMRV**, with a minimum interval of 4 weeks between doses.

Adolescents aged 13 years to 17 years who have not received their routine immunization should be administered 2 doses of **MMR**, with a minimum interval of 4 weeks between doses, unless they have laboratory evidence of prior infection and/or immunity regarding *all three* of measles, mumps, and rubella.

A Note on Interchangeability

Expert opinion is that the approved **MMR** vaccines can be used interchangeably within that class.

For **MMRV**, it is recommended that the same formulation from the same manufacturer be used throughout the schedule. If there are unavoidable barriers to completing the schedule with the same vaccine used to begin it, administering another formulation from another manufacturer is preferable to discontinuing the schedule.