

Vaccine Update: Revised Rotavirus Vaccine Schedule

May 15, 2018

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Resource Nurse**

*Revised from Rotavirus Vaccine Implementation:
Dr. M. Dawar & Tamsin Morgana
January 2012*



Historical Schedule for Rotavirus Vaccine

Oral Rotavirus Vaccine - Rotarix™

Introduced January 2012

As new publicly funded program

Rotarix™ = human rotavirus, live, attenuated

1.5 mL x 2 doses for Infants:

2 and 4 months of age



Rotavirus Vaccine Product & Schedule Change

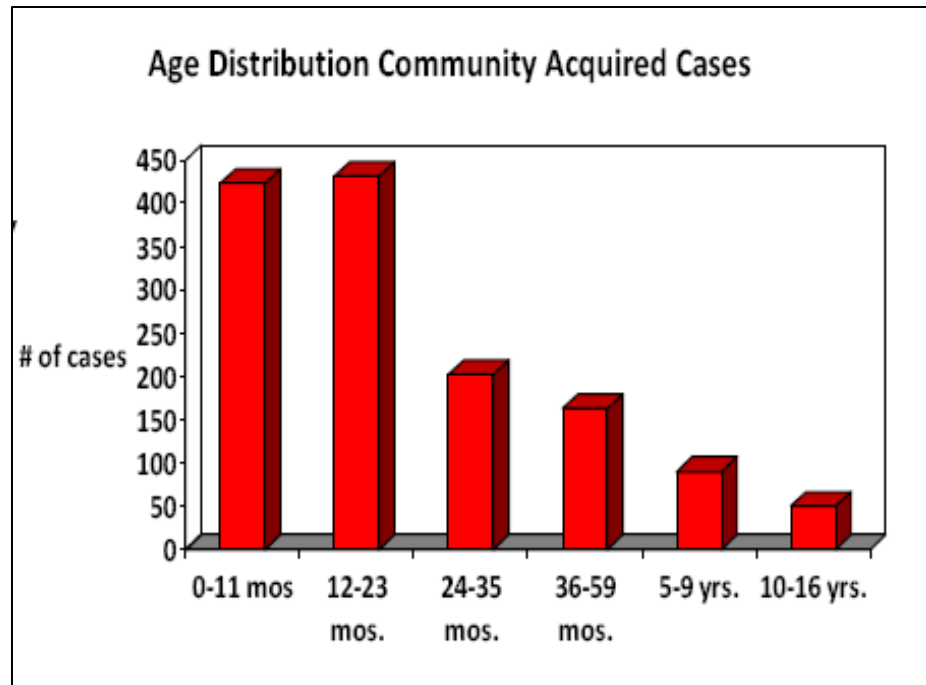
May 2018

**RotaTeq[®] live, oral, pentavalent
2.0 mL x 3 doses for Infants:
2, 4, and 6 months of age**

Rotavirus Key Messages

- **Indication:** To prevent rotavirus gastroenteritis predominantly caused by x 5 serotypes: **G1**(P1A[8]), **G2** (P1B[4]), **G3**(P1A[8]), **G4**(P1A[8]), **G9** (P1A[8])/(P2A[6])
- Rotavirus is the leading cause of **severe viral diarrhea**
- Approximately **600,000 deaths annually** worldwide
- **By 5 years of age** almost all children have been infected with rotavirus gastroenteritis
- **PEAK incidence:** 6 months to 2 years of age
- **Symptoms:** watery diarrhea, low grade fever & vomiting
- **Complications:** (most severe in children <2 years old)
 - dehydration, electrolyte imbalance & metabolic acidosis

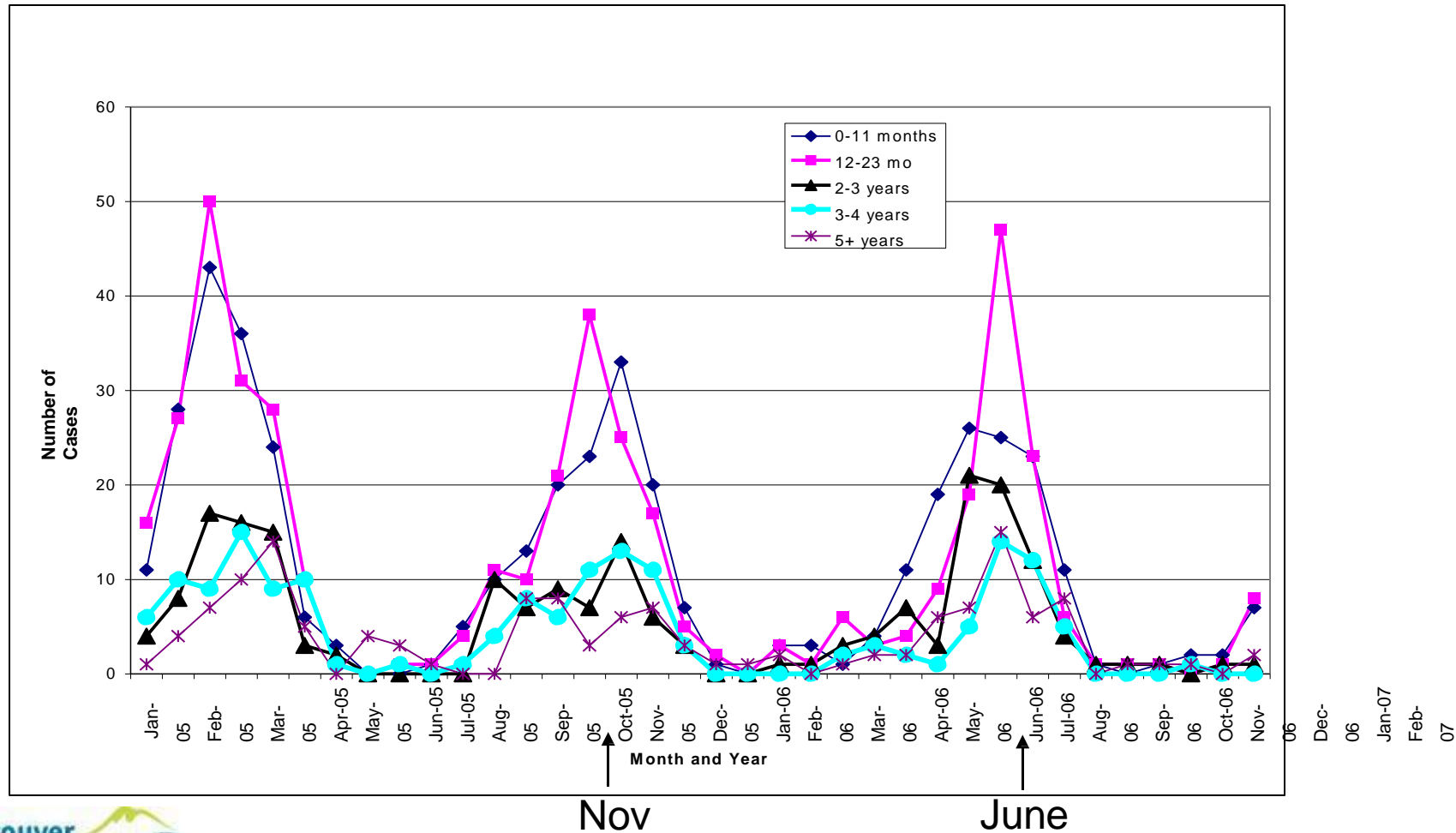
Community-acquired rotavirus age distribution



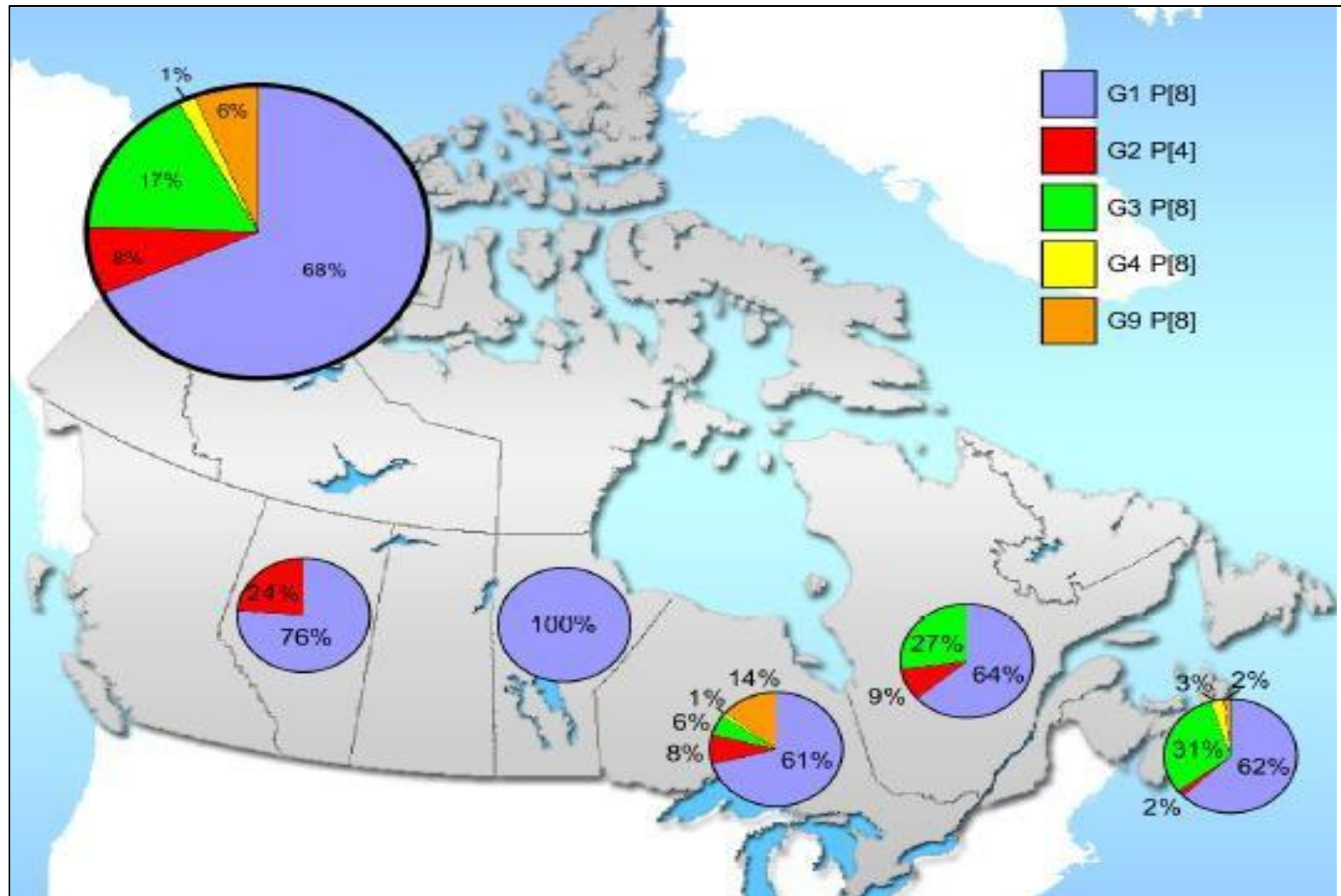
IMPACT surveillance

Seasonality of Rotavirus

Admission by age group 2005-2007

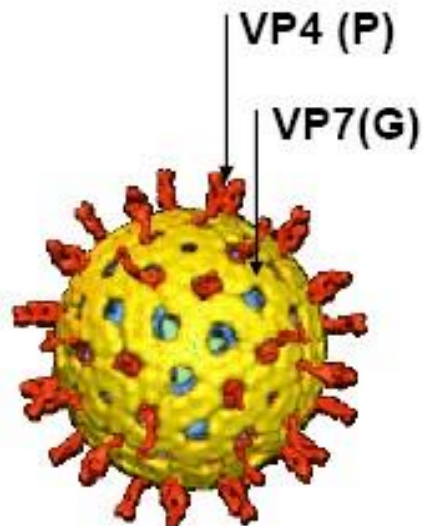


Circulating rotavirus genotypes 2007-2009

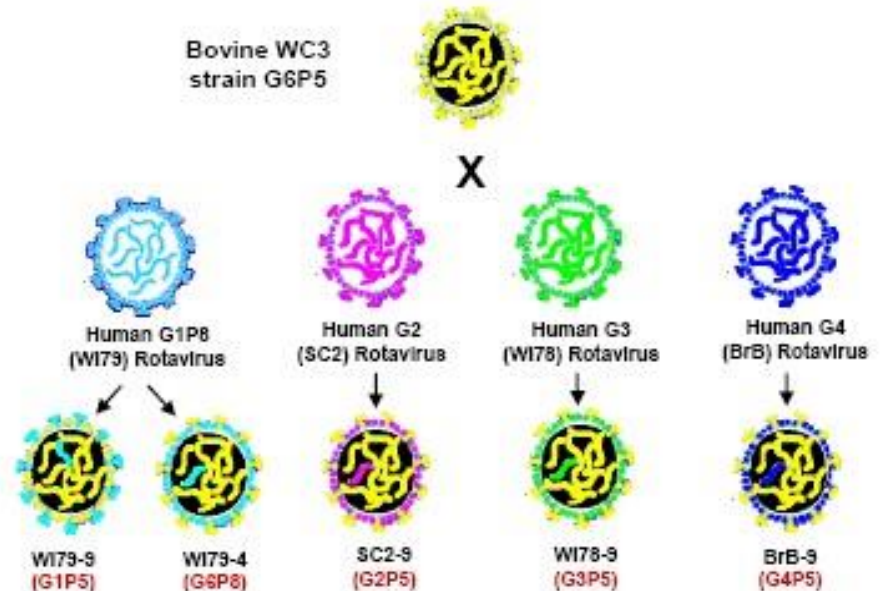


Rotavirus Vaccines

Rotarix™



Rota Teq®



Rotarix™ (GSK)
Public Health

Rota Teq® (Merck)
Public Health

Antigens

live attenuated human rotavirus (G1, P1A[8]) vaccine

live bovine-human reassortant vaccine – (G1, G2, G3, G4, G9 x2 serotypes)

Administration*

Oral, two doses

Oral, three doses

Schedule

(Min/Max parameters)
(Min intervals)

2, 4 months
(6 weeks to 8 months)
(4 weeks)

2, 4, & 6 months
(6 weeks to 8 months)
(4 weeks)

Compatibility

No interference with other live/non-live vaccines

Precaution

Vaccine virus can be excreted in stool
Good hand washing by caregivers recommended

- * First dose must be given before 20 weeks less 1 day of age
- * Final 3rd dose must be given by 8 months plus 0 days of age.

DOSES AND SCHEDULE:

BCCDC CD Immunization Manual

ROTARIX®: 2 doses given as 1.5 mL by mouth at 2 and 4 months of age. ^{A B}

^A The maximum age for the 1st dose of ROTARIX® vaccine is 20 weeks less 1 day of age. There should be an interval of at least 4 weeks between doses. Administer last dose by 8 months plus 0 days of age.

^B For infants in whom the 1st dose of ROTARIX® vaccine is inadvertently administered at age \geq 20 weeks, the rest of the ROTARIX® vaccination series should be completed with a minimum of 4 weeks between doses.

RotaTeq®: 3 doses given as 2 mL by mouth at 2, 4, and 6 months of age. ^{A B}

^A The maximum age for the 1st dose of RotaTeq® vaccine is 20 weeks less 1 day of age. There should be a minimum interval of at least 4 weeks between any two doses.

Administer last dose by 8 months plus 0 days of age.

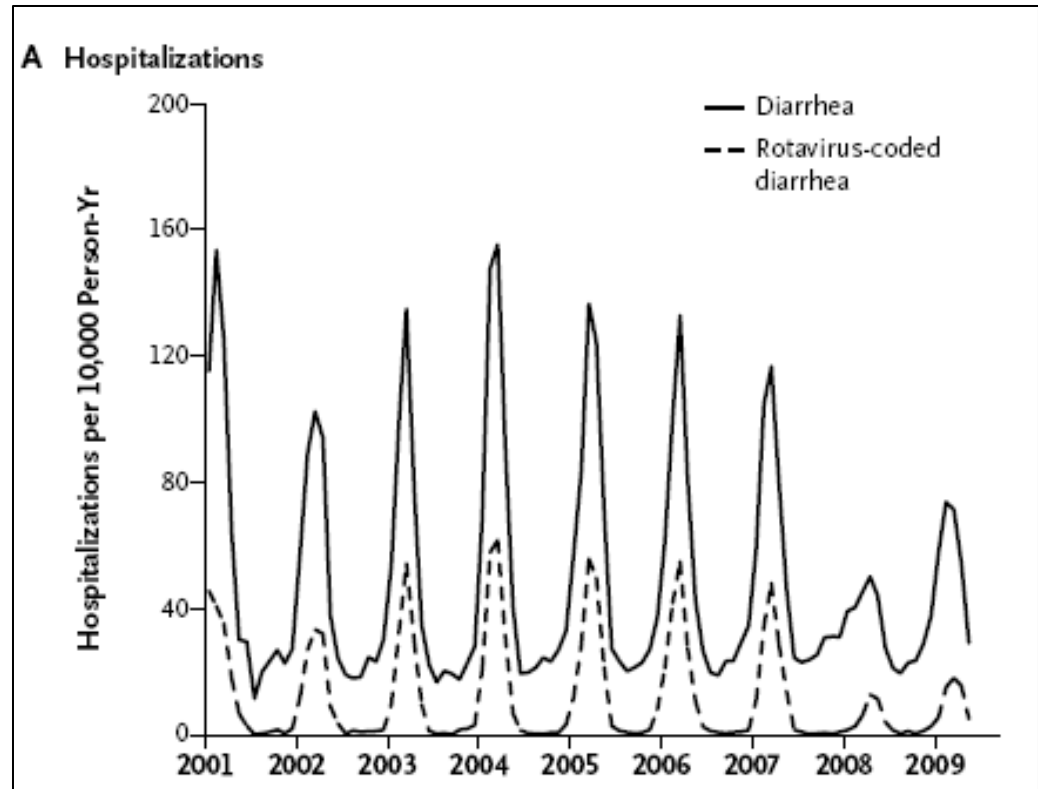
^B For infants in whom the 1st dose of RotaTeq® vaccine is inadvertently administered at age \geq 20 weeks, the rest of the RotaTeq® vaccination series should be completed with a minimum of 4 weeks between doses.

Vaccine effectiveness

	Rotarix™ %	RotaTeq® %
Rota gastroenteritis	87	74
● Medically attended	92	
● Severe	96	98
● Hospitalizations	100	96
All cause GE hospitalizations	75	59

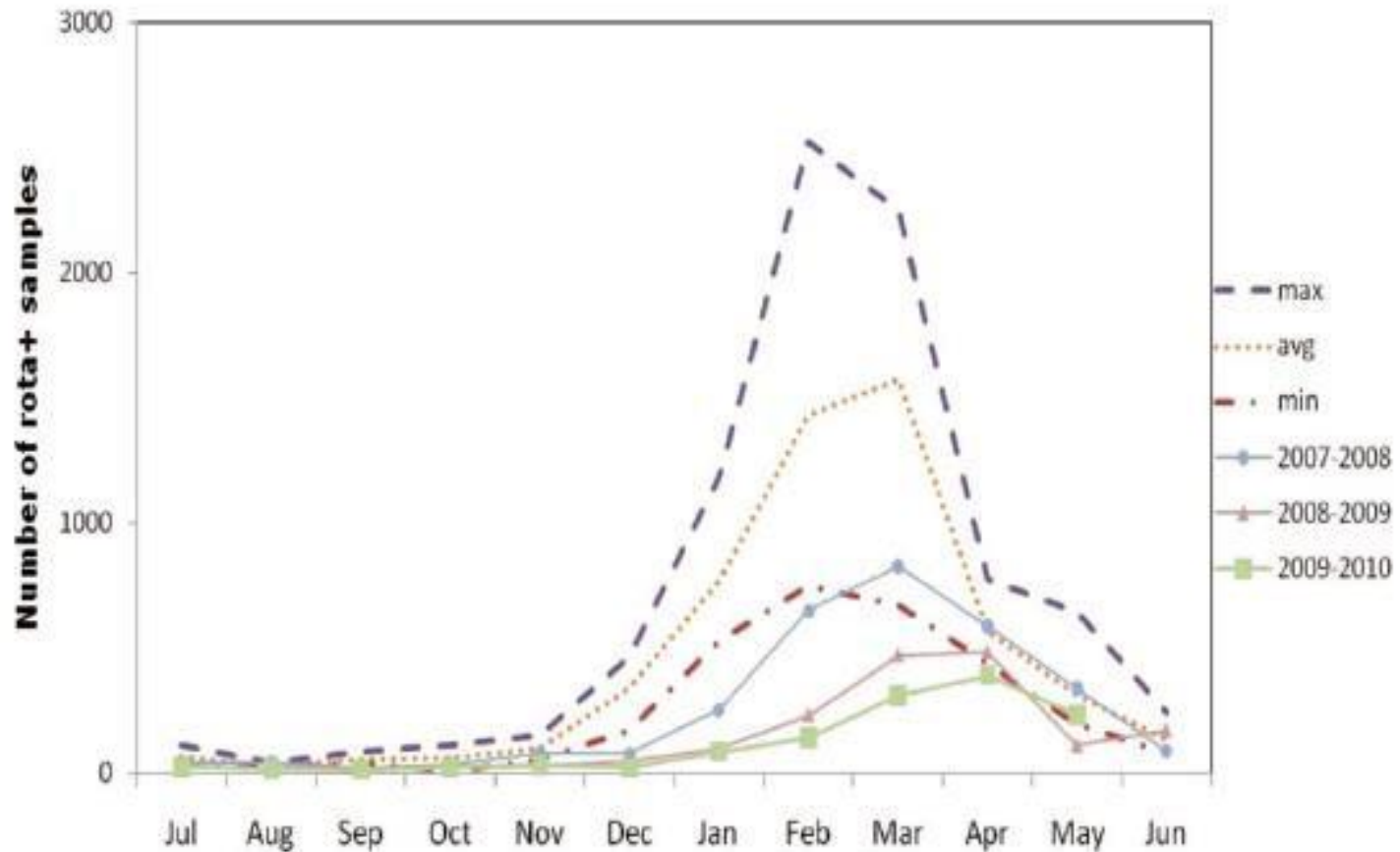
Rotavirus vaccine effectiveness, U.S.

60-75% decrease
in rotavirus
hospitalizations



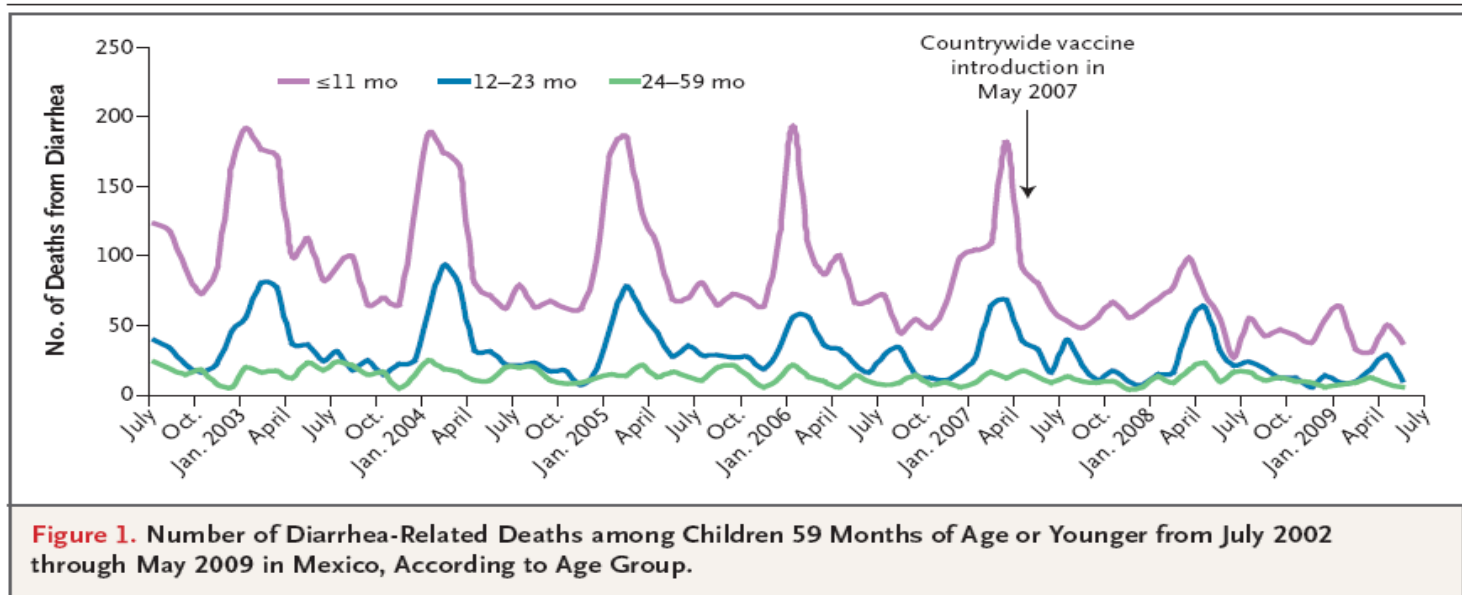
Belgium Report

Effectiveness of Rotavirus Vaccine



Effectiveness of Rotarix™ in preventing diarrhea-related deaths in Mexico

- Rotarix® introduced in 2007:
 - 74% of children ≤ 11 months received ≥ 1 dose by end 2007
- Decrease in diarrhea-related mortality noted in 2008
 - 35% in children < 5 years
 - 41% in infants < 11 months
 - 29% in children 12-23 months
- Reduction in deaths persisted through 2009



Transition from Rotarix to RotaTeq® is a SOFT launch

FAQs:

- Should we save stock of Rotarix™ for those babies who have started their series with this product?
 - **Ideally, infants who begin their series with Rotarix™ will complete their 2 dose series with the same product.** It is important to balance the remaining Rotarix stock on hand to complete the vaccine series in progress **if possible while also eliminating wastage.**
- Will the PARIS Rules to accommodate the product change from Rotarix™ to RotaTeq® be in place?
 - **PARIS Rules, adjustments & scripts are now in place for launch date.**

New PARIS Immunization Rules for Rotavirus

Immunization Plan

- PARIS will automatically plan for 3 doses of Rotavirus as of May 1, 2018
- Rotavirus vaccine doses (generic name) will appear on the Immunization Plan without a brand or trade name displayed

Immunization Validation

- **ROTARIX 2 dose series** will remain **valid in PARIS**.
- **When 2 valid doses of ROTARIX are given a 3rd dose will not be scheduled ...and...**
 - **PARIS** will autogenerate a **Suspension**.
- Clients who receive **only 1 dose of ROTARIX and are still eligible to complete the series**, will have a **Rotavirus vaccine (generic name)** in the plan for **Doses 2 & 3....**

Examples:

- If **ROTARIX** is given for **Dose 2** → **Series is Complete**
- If **ROTATEQ** or an **unknown oral Rotavirus product** is given for **Dose 2** → a **3rd dose** will be scheduled in the **Immunization Plan**

Key Message:

Once a valid series is complete, no further Rotavirus doses will be scheduled in the Immunization Plan

PARIS Example: Imms Plan - 2 month old

Client Immunisation Profile - Imms Rotavirus (Age 0y 2m)

[Expand all](#) [Collapse all](#) [Print](#) [Notify](#) [More actions](#)

Assigned Schedule & Appointment Centres

Immunization Alerts

Planned Immunisations (Planned View)

[Show extended view](#) [Toggle view](#) [Process planned](#) [Show plan debug log](#) [Scheduled](#) [More actions](#)

Antigen	Age Due	Due Date	△	Min Date	Overdue Date
DPTPoHibHepB	2m 0w	24/04/2018		24/04/2018	24/04/2018
Men Conj C	2m 0w	24/04/2018		24/04/2018	24/04/2018
Pneumo Conjugate	2m 0w	24/04/2018		24/04/2018	24/04/2018
Rotavirus	2m 0w	24/04/2018		24/04/2018	24/04/2018
DPTPoHibHepB	4m 0w	24/06/2018		24/06/2018	24/06/2018
Pneumo Conjugate	4m 0w	24/06/2018		24/06/2018	24/06/2018
Rotavirus	4m 0w	24/06/2018		24/06/2018	24/06/2018
DPTPoHibHepB	6m 0w	24/08/2018		24/08/2018	24/08/2018
Rotavirus	6m 0w	24/08/2018		24/08/2018	24/08/2018

Rotavirus (RotaTeq®) schedules and PARIS documentation

- DOB eligibility: Infants due for their 2 month immunizations*
- Routine schedule: three doses at 2, 4 and 6 months
- Min Age for 1st dose = 6 Weeks
- Max Age dose 1st dose* = 20 weeks less 1 day
- Max Age dose 3rd dose* = 8 Months plus 0 days
- **Interchangeability:** If client has received one dose of RotaTeq®
 - 3 doses of rotavirus vaccine are required, ideally series should be completed with the same product. New alert: ROTA (3 dose series)
 - If trade name is unknown - Provide 3 doses of RotaTeq® to complete series
 - It is important to document the trade name
 - Infants presenting late for their 2 month old immunizations can be offered RotaTeq® as long as the max age for Dose #1 parameters are met (i.e., 20 weeks minus 1 day)

Rotavirus vaccines: Reason for Maximum age

- Maximum age criteria 8 months/32 weeks (plus 0 days) for the Rotavirus vaccine vaccine was initiated in 2012
- The maximum age criteria is not based on concerns about adverse events or efficacy when given past this age.

Rationale:

- Manufacturers do not want any temporal vaccine associated risk to be confused with the natural underlying increase risk of intussusception in infants 5 to 10 months of age

RotaTeq[®] Vaccine Precautions

1. Acute gastroenteritis:

- **Moderate to severe gastroenteritis:**

Defer until the condition improves unless deferral will result in scheduling of the first dose at more than 20 weeks less 1 day of age

- **Mild gastroenteritis:** no deferral required

2. Pre-existing chronic gastrointestinal conditions:

- The safety and efficacy of Rotavirus vaccine has not been well established in children with pre-existing chronic gastrointestinal conditions, caution is advised if considering administration to this infant population.

- **Vaccinate** unless infant is **receiving immunosuppressive therapy**

RotaTeq[®] Vaccine Contraindications

Recommended for healthy infants and pre-term infants

- Infants who have had an initial infection with rotavirus should be immunized due to partial immunity only

Contraindicated

- Anaphylactic (allergic) reaction to previous dose or any component of vaccine:
- Immunocompromised infants (e.g. severe combined immunodeficiency disorder (SCID) – refer to HCP most responsible for their care
- Infants with history of intussusception
- Uncorrected congenital malformations of the GI tract (e.g., Meckel's diverticulum)

Document PARIS Alert – Corresponds to the reason: e.g., Immunocompromised
Antigen: ROTA
Alert type: IMMSUP- immunosuppressed

Updates to the Rotavirus Immunization Program

May 2018

BCCDC: Q & A

Click on PDF icon to open document



BCCDC Q & A
Rotarix to RotaTeq

RotaTeq[®] Vaccine Components

- Five, live, rotavirus strains (G1, G2, G3, G4, and P1A)
 - Sucrose, sodium citrate, sodium phosphate monobasic monohydrate, sodium hydroxide, polysorbate 80
 - Fetal bovine serum
 - Low levels of a DNA virus - Porcine circovirus type 1 (PCV-1) and type 2 (PCV-2) are found in all Rotavirus vaccines RotaTeq[®]
 - Porcine circovirus is not pig or other animal material, it is a virus that although found in pigs & pork products **does not cause infection or illness in humans and is a safe vaccine for infants.**
 - Rotavirus vaccines do not contain pig or animal products
 - **Health Canada Rotavirus Q+A:** * To view copy website address in your URL <https://www.canada.ca/en/health-canada/services/drugs-health-products/biologics-radiopharmaceuticals-genetic-therapies/activities/fact-sheets/questions-answers-porcine-circovirus-rotavirus-vaccines.html>
-

Vaccine administration

RotaTeq



Store: 2-8° C, protect from light



RotaTeq[®] Vaccine Administration

Most common side effects reported after taking RotaTeq

- diarrhea, vomiting, fever, runny nose and sore throat,
- wheezing or coughing, and ear infection

Other reported side effects include:

- Kawasaki disease (serious condition affecting the heart)
 - fever, rash, red eyes, red mouth, swollen glands, swollen hands and feet (if untreated, can be life threatening)
- Hives
- RotaTeq[®] Doseage & Administration Videos
 - **RotaTeq: Opening the Packaging**
 - **Ease of Administration**

[https://www.merckvaccines.com/Products/RotaTeq/Pages/dosageandadministration #](https://www.merckvaccines.com/Products/RotaTeq/Pages/dosageandadministration#)

RotaTeq® Vaccine Storage & Administration

Storage:

- **Vaccine = 2.0 mL liquid** in a squeeze tube w/tip
- Store/transport refrigerated between **2° - 8° C**
- **Protect from light** & use as soon as possible

Administration:



- Position infant in a **semi-recumbent or seated** position, and **hold infant firmly**
- Place the tip of tube to **side of mouth**, and **do not insert too deeply**
- Squeeze tube **slowly** to reduce risk of gagging
- Infants **will often gag** due to unfamiliar taste
- The sweet taste can also **stimulate swallowing**
- **Do not re-administer if dose is “spit up”**
- Dispose of tube in biological waste container

Pain Management with administration of RotaTeq[®] oral vaccine

Pain Management at 2, 4, 6 months vaccine visits:

- The RotaTeq[®] vaccine contains sucrose and provides an analgesic benefit to the infant
- **Provide RotaTeq[®] 1-2 minutes before other vaccine injections** to allow for absorption and neurotransmitter response in the infant's brain
- **Breastfeeding:** Encourage moms to breastfeed while their infants are receiving immunizations as **the analgesic effect is several fold greater than with oral sucrose solutions**

Hand Hygiene with oral live vaccines

- **Gloving is not required**
- **Use routine practices:**
 - **Wash your hands before & after administering vaccine**
- **When a direct exposure to vaccine contents occurs:**
 - **Wash hands immediately**
(e.g., child spits up vaccine onto provider's hand)

Viral shedding post immunization

- Vaccine virus shedding occurs following immunization:
 - **Up to 10 -14 days with a peak at 7 days**
 - **Dose 1: 50-80%** of infants will shed virus
 - **Dose 2: 7-18%** of infants will shed virus
 - **Dose 3:**

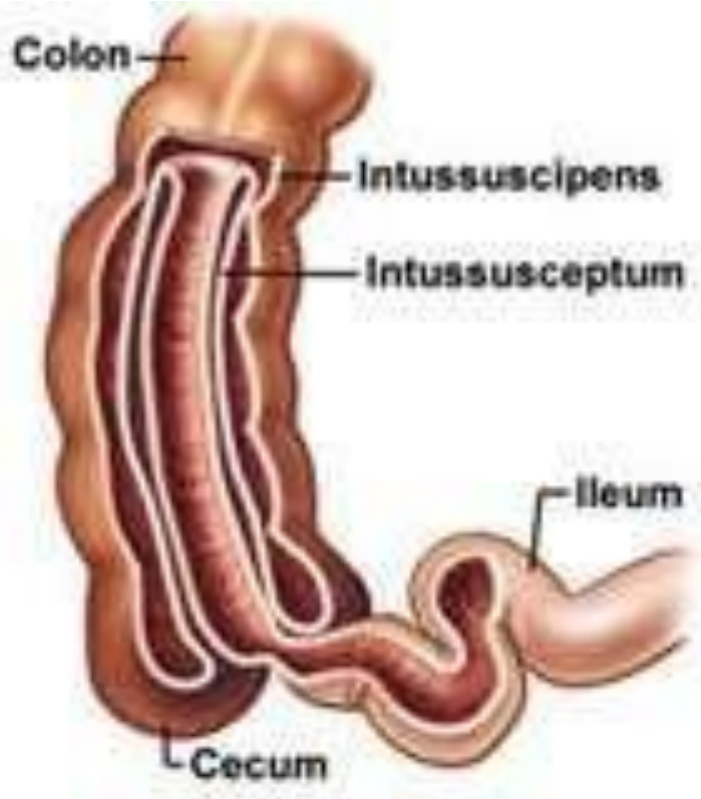


Viral shedding post immunization

Aftercare

- The theoretical risk of vaccine virus transmission should be balanced against wild type rotavirus gastroenteritis where virus is transmitted to 47% of susceptible household contacts
 - Virtually all adults have been infected as children and therefore have some level of immunity
- **Caregivers** should be advised to ensure **good hand washing after diaper changes and before preparing food**
- **Immunocompromised household contacts** – avoid direct contact with stools, especially after first dose
- **Pregnancy** – transmission of vaccine virus to pregnant caregivers is not a concern as most adults are immune

What is intussusception:



- Telescoping (prolapse) of a portion of the intestine within another immediately adjacent portion of intestine
 - Decreases the blood supply to the affected part of the intestine
 - Intestinal obstruction
- Most cases recover completely
- 10% recurrence rate up to 6 months later

Intussusception Study (REST)

- **Rotavirus Efficacy and Safety Trial (REST, Study 006)** a large-scale (**34,837 vaccine** recipients and **34,788 placebo** recipients), placebo-controlled trial.
 - **RotaTeq® did not increase risk of intussusception relative to placebo**
- **Active surveillance employed** to identify potential cases of intussusception at **7, 14, and 42 days** after each dose and **every 6 weeks** thereafter for **1 year after dose one**.
 - There were **no confirmed cases of intussusception during the 42-day period after dose one**, and there was **no clustering of cases** among vaccine recipients at any time period after any dose.
- **Following the 1-year safety follow-up period**
 - **4 cases of intussusception** reported in children who had **received placebo** during the study.

Clinical presentation of intussusception

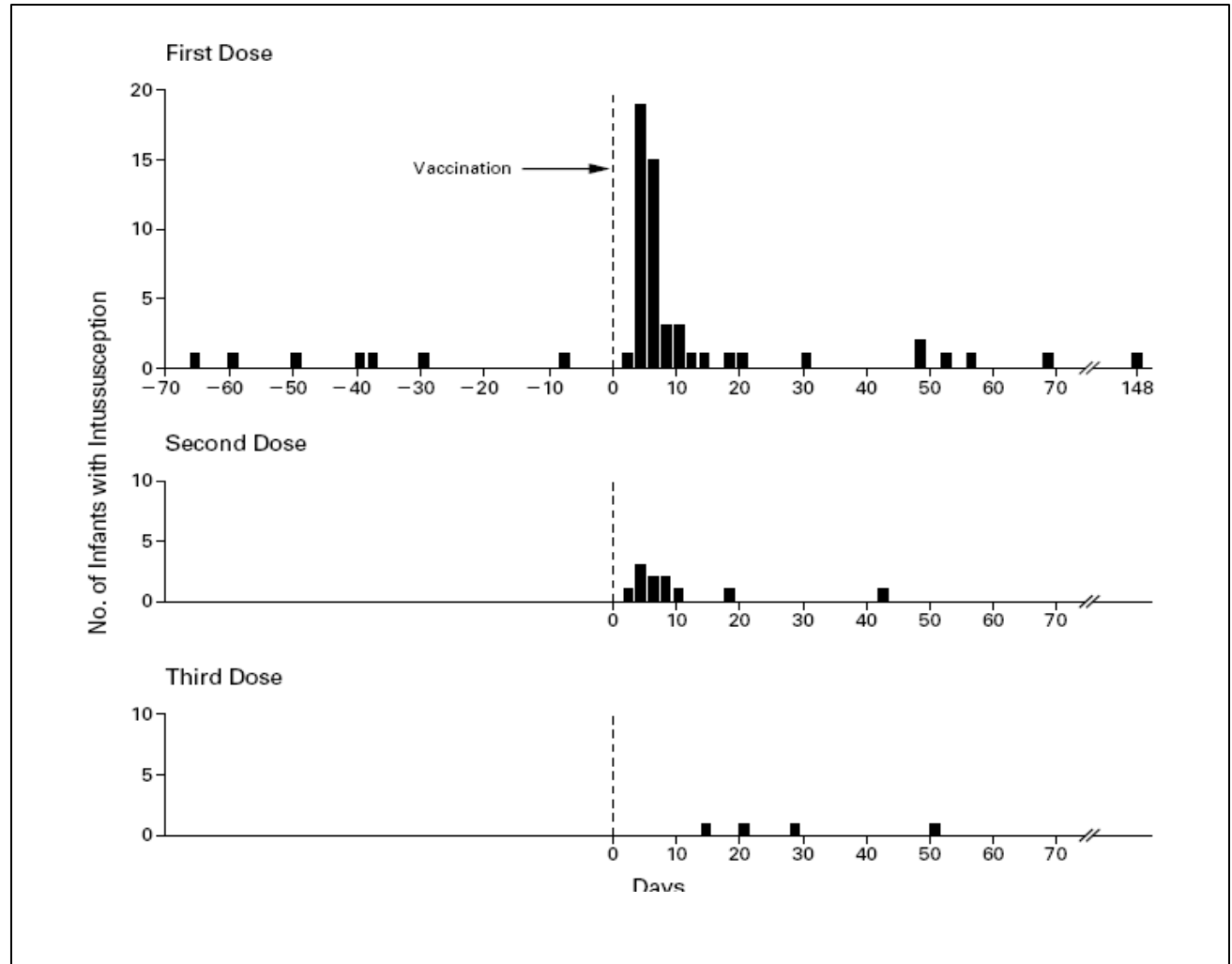
- Most frequent presentation:
 - 5 months to 1 year of age
 - Boys dx with intussusception 3 x more often than girls
- Unknown cause but viral infections are suspected cause
- Symptoms:
 - Pain with **loud crying** and infant will **draw in knees up to the chest** while crying
 - **Pain** with crying is intermittent, but **recurs frequently, increasing in intensity and duration**
 - **Fever** is common
 - Lethargy, pallor & shock
 - **Bloody, mucosy stool** (“red, currant jelly” stool) in approximately 50% of infants

Intussusception following Rotashield[®], a first generation rotavirus vaccine

Estimated risk of
intussusception:
1/10,000 to 1/32,000

OR

10.6 → greatest risk
3 to 14 days
post vaccination



Intussusception data - REST Study placebo-controlled clinical trial 2006

	Relative	RotaTeq[®]	Placebo
	Risk- 95%	n=34,837	n= 34,788
42 days post	1.6 (0.4,6.4)	6	5
365 days post	0.9 (0.4,1.9)	13	15

Rotarix™ and Rota Teq® active intussusception surveillance in Australia

Two active surveillance mechanisms:

- Hospital-based case findings
- Monthly reports from paediatricians
- Evidence suggestive of an elevated risk within 21 days following the first dose only

Intussusception cases following dose 1 in infants 1 to ≤ 3 months

	Rotarix™	Rota Teq®
1-7 days relative risk [RR]	3.5 (95%CI: 0.7, 10.1)	5.3 (95%) CI: 1.1, 15.4
1-21 RR	1.5 (95%CI: 0.4, 3.9)	3.5 (95%) CI: 1.3, 7.6

Post marketing surveillance, summarized

- **Mexico (Rotarix™)**
 - Risk 0-4/100,000 doses [FDA]– alternatively communicated as 1/51,000 vaccinees
 - Highest after first dose and in first 30 days
- **Brazil (Rotarix™)**
 - Small risk of intussusception detected after second dose
 - 1/68,000 vaccinees
- **U.S. (Rota Teq®)**
 - Risk of intussusception not detected
- **Australia (Rotarix™ and Rota Teq®)**
 - Suggestion of elevated risk following first dose

Rotavirus Vaccine Safety

Benefits Far Outweigh the risks

- Extrapolated risk observed in Mexico to US infants (approximate):
 - **Risk:** 0-4 cases per 100,000 infants (50-60 cases of intussusception)
 - **Benefit:** ↓ ER visits/↓hospitalizations by 85%;
40,000- 50,000 hospitalizations prevented annually
- **Natural Rate** of intussusception →34/100,000 in the first year of life (FDA)
- **ACIP Nov 2010:**
 - “Data suggests a **small risk of intussusception caused by rotavirus vaccine** ... and the **benefits of rotavirus vaccination are great, CDC continues to recommend both Rotarix and RotaTeq** to prevent severe rotavirus disease in U.S. infants and children.”
- **BC HealthFile May 2018 states:**
 - In B.C. “**Very rare risk**” of intussusception i.e., about **1-2 cases in 100,000 infants** that receive the vaccine or 1 baby at most per year may be affected.
 - In comparison each year, 1 /4,000 B.C. children under 1 year of age are diagnosed with intussusception without having received the vaccine.

Questions?



Further reading



Rotavirus:

National Advisory Committee on Immunization (NACI). Updated statement on the use of rotavirus vaccines. Canadian Communicable Disease Report. 2010; 36:ACS-4: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/10vol36/acs-4/index-eng.php>

Canadian Paediatric Society – Position Statement – June 30, 2017 and Updated March 23, 2018
LeSaux, Nicole; Candian Paediatric Society, Infectious Diseases & Immunization Committee
<https://www.cps.ca/en/documents/position/rotavirus-vaccines>

General Recommendations on Immunization. Recommendations of the Advisory Committee on Immunization Practices (ACIP). Morbidity and Mortality Weekly Report: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6002a1.htm?s_cid=rr6002a1_w
<https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/rotavirus.html>

Le Saux N, Halperin S, Scheifele D, Vaudry W, Bettinger J. Decreases in hospitalizations: Effect of Rotavirus vaccine programs. Abst. Canadian Immunization Conference. Ottawa, December 2-4, 2014.

Questions and Answers - Porcine Circovirus Found in Rotavirus Vaccines. Health Canada. Retrieved November 9, 2011 from: <http://www.hc-sc.gc.ca/dhp-mps/brgtherap/activit/fs-fi/rotavirus-questions-eng.php>

Patel, M. et al. (2011) Intussusception risk and health benefits of rotavirus vaccination in Mexico and Brazil. *New England Journal of Medicine*, 364(23), 2283-2292

Product Monographs: [www.gsk.ca/english/docs-pdf/Rotarix_PM%20\(2010-02-17\).pdf](http://www.gsk.ca/english/docs-pdf/Rotarix_PM%20(2010-02-17).pdf)
www.merck.com/product/usa/pi_circulars/r/rotateq/rotateq_pi.pdf

General Immunization Information

www.immunizebc.ca – Public and professional Rotavirus Q+As and other immunization information