

eMeasure Title	Childhood Immunization Status		
eMeasure Identifier (Measure Authoring Tool)	117	eMeasure Version number	5.1.000
NQF Number	0038	GUID	b2802b7a-3580-4be8-9458-921aea62b78c
Measurement Period	January 1, 20XX through December 31, 20XX		
Measure Steward	National Committee for Quality Assurance		
Measure Developer	National Committee for Quality Assurance		
Endorsed By	National Quality Forum		
Description	Percentage of children 2 years of age who had four diphtheria, tetanus and acellular pertussis (DTaP); three polio (IPV), one measles, mumps and rubella (MMR); three H influenza type B (HiB); three hepatitis B (Hep B); one chicken pox (VZV); four pneumococcal conjugate (PCV); one hepatitis A (Hep A); two or three rotavirus (RV); and two influenza (flu) vaccines by their second birthday		
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Measure Scoring	Proportion		
Measure Type	Process		
Stratification	None		
Risk Adjustment	None		
Rate Aggregation	None		
Rationale	<p>Infants and toddlers are particularly vulnerable to infectious diseases because their immune systems have not built up the necessary defenses to fight infection (Centers for Disease Control and Prevention 2011). Most childhood vaccines are between 90 and 99 percent effective in preventing diseases (HealthyChildren 2011). Immunization is a critical aspect of preventive care for children. Lack of proper immunization leads to an increase in illness, doctor visits and hospitalizations, all of which translate into higher costs. (Tatzlandrew, Brown, and Halpern). Vaccination of each U.S. birth cohort with the current childhood immunization schedule prevents approximately 42,000 deaths and 20 million cases of disease, and saves nearly \$14 billion in direct costs and \$69 billion in societal costs each year (Zhou 2011; Centers for Disease Control and Prevention 2011b).</p> <p>Immunizing a child not only protects that child's health but also the health of the community, especially for those who are not immunized or are unable to be immunized due to other health complications (Centers for Disease Control and Prevention 2009). When the majority of the community is immunized against a disease, other members of the community are also protected because herd immunity shields them. (National Institute of Allergy and Infectious Diseases 2010).</p>		
Clinical Recommendation Statement	Summary of Recommendations for Child/Teen Immunization (Ages birth through 18 years) (Immunization Action Coalition) based on recommendations of the Advisory Committee on Immunization Practices (ACIP, 2012)		

Hepatitis B (HepB)

- Vaccinate all children age 0 through 18 years
- Vaccinate all newborns with monovalent vaccine prior to hospital discharge. Give dose #2 at age 1-2 months and the final dose at age 6-18 months (the last dose in the infant series should not be given earlier than age 24 weeks). After the birth dose, the series may be completed using 2 doses of single-antigen vaccine or up to 3 doses of Comvax(r) (ages 2 months, 4 months 12-15 months) or Pediarix(r) (ages 2 months, 4 months, 6 months), which may result in giving a total of 4 doses of hepatitis B vaccine.
- If mother is HBsAg-positive: give the newborn HBIG + dose #1 within 12 hours of birth; complete series at age 6 months or, if using Comvax(r), at age 12-15 months.
- If mother is HBsAg status is unknown: given the newborn dose #1 within 12 hours of birth. If low birth weight (less than 2000 grams), also give HBIG within 12 hours. For infants weighing 2000 grams or more whose mother is subsequently found to be HBsAg positive, give the infant HBIG ASAP (no later than 7 days of birth) and follow HepB immunization schedule for infants born to HBsAg-positive mothers.

4 Diphtheria, tetanus, acellular pertussis vaccinations (DTaP, DT)

- Give to children at ages 2 months, 4 months, 6 months, 15-18 months, 4-6 years.- May give dose #1 as early as age 6 weeks.
- May give #4 as early as age 12 months if 6 months have elapsed since #3.
- Do not give DTaP/DT to children age 7 years and older.
- If possible, use the same DTaP product for all doses.

Hib (Haemophilus influenzae type b)

- ActHib(r) (PRP-T): give at age 2 months, 4 months, 6 months, 12-15 months (booster dose).
- PedvaxHIB(r) or Comvax(r) (containing PRP-OMP): give at age 2 months, 4 months, 12-15 months (booster dose).
- Dose #1 of Hib vaccine should not be given earlier than age 6 weeks.
- Give final dose (booster dose) no earlier than age 12 months and a minimum of 8 weeks after the previous dose.
- Hib vaccines are interchangeable; however, if different brands of Hib vaccines are administered for dose #1 and dose #2, a total of 3 doses is necessary to complete the primary series in infants.
- Any Hib vaccine may be used for the booster dose.
- Hib is not routinely given to children age 5 years and older.
- Hiberix(r) is approved ONLY for the booster dose at age 12 months through 4 years.

Polio (IPV)

- Give to children at ages 2 months, 4 months, 6-18 months, 4-6 years.
- May give dose #1 as early as age 6 weeks.
- Not routinely recommended for U.S. residents age 18 years and older (except certain travelers).

Measles, mumps, rubella (MMR)

- Give dose #1 at age 12-15 months.
- Give MMR at age 6 through 11 months if traveling internationally; then revaccinate at age 12 months (and at least 4 weeks from previous dose). The dose given at younger than 12 months does not count toward the 2-dose series.
- Give dose #2 at age 4-6 years. Dose #2 may be given earlier if at least 4 weeks since dose #1. For MMRV: dose #2 may be given earlier if at least 3 months since dose #1.
- Give a 2nd dose to all older children and teens with history of only 1 dose.

MMRV may be used in children age 12 months through 12 years. For the first dose of MMR and varicella given at age 12-47 months, either MMR and Varicella (Var) or MMRV may be used. Unless the parent or caregiver expresses a preference for MMRV, CDC recommends that MMR and Var should be given for the first dose in this age group.

Pneumococcal conjugate (PCV13)

- Give at ages 2 months, 4 months, 6 months, 12-15 months.
- Dose #1 may be given as early as age 6 weeks.
- When children are behind on PCV schedule, minimum interval for doses given to children younger than age 12 months is 4 weeks; for doses given at 12 months and older, it is 8 weeks.
- Give 1 dose to unvaccinated healthy children age 24-59 months.
- For high-risk children ages 24-71 months: give 2 doses at least 8 weeks apart if they previously received fewer than 3 doses; give 1 dose at least 8 weeks after the most recent dose if they previously received 3 doses. (High risk: those with sickle cell disease; anatomic or functional asplenia; chronic cardiac, pulmonary, or renal disease; diabetes; cerebrospinal fluid leaks; HIV infection; immunosuppression; diseases associated with immunosuppressive and/or radiation therapy; or who have or will have a cochlear implant.)
- PCV13 is not routinely given to healthy children age 5 years and older.

Varicella (Var)

- Give dose #1 at age 12-15 months.
- Give dose #2 at age 4-6 years. Dose #2 of Var or MMRV may be given earlier if at least 3 months since dose #1.
- Give a 2nd dose to all older children/teens with history of only 1 dose.
- MMRV may be used in children age 12 months through 12 years. For the first dose of MMR and varicella given at age 12-47 months, either MMR and Var or MMRV may be used. Unless the parent or caregiver expresses a preference for MMRV, CDC recommends that MMR and Var should be given for the first dose in this age group.

Hepatitis A (HepA)

- Give 2 doses spaced 6 to 18 months apart to all children at age 1 year (12-23 months).

Rotavirus (RV)

- Rotarix(r) (RV1): give at age 2 months, 4 months.
- RotaTeq(r) (RV5): give at age 2 months, 4 months, 6 months.

	<ul style="list-style-type: none"> - May give dose #1 as early as age 6 weeks. - Give final dose no later than age 8 months 0 days. <p>Influenza (trivalent inactivated influenza (TIV), live attenuated influenza vaccine (LAIV))</p> <ul style="list-style-type: none"> - Vaccinate all children and teens age 6 months through 18 years. - LAIV may be given to healthy, non-pregnant people age 2-49 years. - Give 2 doses, spaced 4 weeks apart, to children age 6 months through 8 years who 1) are first-time vaccinees or 2) failed to receive at least 1 dose of the 2010-2011 vaccine. - For TIV, give 0.25 mL dose to children age 6-35 months and 0.5 mL dose if age 3 years and older. - If LAIV and either MMR, Var, and/or yellow fever vaccine are not given on the same day, space them at least 28 days apart. <p>Technical content reviewed by the Centers for Disease Control and Prevention, January 2012.</p>
Improvement Notation	Higher score equals better quality
Reference	Centers for Disease Control and Prevention. 2011a. "Vaccines & Immunizations: Infants and Toddlers." http://www.cdc.gov/vaccines/parents/infants-toddlers.html
Reference	HealthyChildren. 2011. "Safety & Prevention: Why Immunize Your Child." https://www.healthychildren.org/english/safety-prevention/immunizations/Pages/Why-Immunize-Your-Child.aspx?nfstatus=401&nftoken=00000000-0000-0000-0000-000000000000&nfstatusdescription=ERROR%3a+No+local+token
Reference	Tatzlandrew, E.J., R.E. Brown, and M.T. Halpern. 1994. "A cost-benefit analysis of the measles-mumps-rubella (MMR) vaccine." Arlington: Batelle Medical Technology Assessment and Policy Research Program.
Reference	Zhou, F. 2011. "Updated economic evaluation of the routine childhood immunization schedule in the United States." Presented at the 45th National Immunization Conference. Washington, DC; March 28-31.
Reference	Centers for Disease Control and Prevention. 2011b. "Ten Great Public Health Achievements --- United States, 2001-2010." MMWR 60(19):619-623.
Reference	Centers for Disease Control and Prevention. 2009. "Vaccines & Immunizations: How Vaccines Prevent Disease." http://www.cdc.gov/vaccines/vac-gen/howvpd.htm
Reference	National Institute of Allergy and Infectious Diseases. 2010. "Community Immunity ("Herd" Immunity)." http://www.niaid.nih.gov/topics/pages/communityimmunity.aspx
Reference	Centers for Disease Control and Prevention. 2012. "Recommended Immunization Schedule for Persons Aged 0 Through 6 years - United States, 2012." MMWR 61(05):1-4.
Reference	Immunization Action Coalition. 2012. "Summary of Recommendations for Child/Teen Immunization (Ages birth through 18 years)." http://www.immunize.org/catg.d/p2010.pdf
Definition	Recommended vaccines: Vaccines and the schedule of vaccines as recommended by the Advisory Committee in Immunization Practices (ACIP) for children two years of age. The measure may differ slightly from the ACIP recommendations because the measure focuses on immunizations that are appropriate by age 2. Also, there may be small differences when there are shortages for a particular vaccine.
Guidance	<p>For the MMR, hepatitis B, VZV and hepatitis A vaccines, numerator inclusion criteria include: evidence of receipt of the recommended vaccine; documented history of the illness; or, a seropositive test result for the antigen. For the DTaP, IPV, HiB, pneumococcal conjugate, rotavirus, and influenza vaccines, numerator inclusion criteria include only evidence of receipt of the recommended vaccine. Patients may be included in the numerator for a particular antigen if they had an anaphylactic reaction to the vaccine. Patients may be included in the numerator for the DTaP vaccine if they have encephalopathy. Patients may be included in the numerator for the IPV vaccine if they have had an anaphylactic reaction to streptomycin, polymyxin B, or neomycin. Patients may be included in the numerator for the influenza, MMR, or VZV vaccines if they have cancer of lymphoreticular or histiocytic tissue, multiple myeloma, leukemia, have had an anaphylactic reaction to neomycin, have Immunodeficiency, or have HIV. Patients may be included in the numerator for the hepatitis B vaccine if they have had an anaphylactic reaction to common baker's yeast.</p> <p>The measure allows a grace period by measuring compliance with these recommendations between birth and age two.</p>
Transmission Format	TBD
Initial Population	Children who turn 2 years of age during the measurement period and who have a visit during the measurement period
Denominator	Equals Initial Population
Denominator Exclusions	None
Numerator	Children who have evidence showing they received recommended vaccines, had documented history of the illness, had a seropositive test result, or had an allergic reaction to the vaccine by their second birthday
Numerator Exclusions	Not Applicable
Denominator Exceptions	None

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Population Criteria

- **Initial Population =**
 - AND: "Birthdate : Patient Characteristic Birthdate" >= 1 year(s) starts before start of "Measurement Period"
 - AND: "Birthdate : Patient Characteristic Birthdate" = 2 year(s) starts before end of "Measurement Period"
 - AND: Union of:
 - "Encounter, Performed: Office Visit"
 - "Encounter, Performed: Face-to-Face Interaction"
 - "Encounter, Performed: Home Healthcare Services"
 - "Encounter, Performed: Preventive Care - Established Office Visit, 0 to 17"
 - "Encounter, Performed: Preventive Care- Initial Office Visit, 0 to 17"
 - during "Measurement Period"
- **Denominator =**
 - AND: Initial Population
- **Denominator Exclusions =**
 - None
- **Numerator =**
 - AND: Union of:
 - "Immunization, Administered: DTaP Vaccine" satisfies all:
 - >= 1 day(s) starts after end of ("Immunization, Administered: DTaP Vaccine" >= 1 day(s) starts after end of ("Immunization, Administered: DTaP Vaccine" >= 1 day(s) starts after end of ("Immunization, Administered: DTaP Vaccine" >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")))
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - "Procedure, Performed: DTaP Vaccine Administered" satisfies all:
 - >= 1 day(s) starts after end of ("Procedure, Performed: DTaP Vaccine Administered" >= 1 day(s) starts after end of ("Procedure, Performed: DTaP Vaccine Administered" >= 1 day(s) starts after end of ("Procedure, Performed: DTaP Vaccine Administered" >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")))
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - Union of:
 - "Diagnosis: Anaphylactic Reaction to DTaP Vaccine"
 - "Diagnosis: Encephalopathy due to Childhood Vaccination"
 - <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
 - AND: Union of:
 - "Immunization, Administered: Inactivated Polio Vaccine (IPV)" satisfies all:
 - >= 1 day(s) starts after end of ("Immunization, Administered: Inactivated Polio Vaccine (IPV)" >= 1 day(s) starts after end of ("Immunization, Administered: Inactivated Polio Vaccine (IPV)" >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")))
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - "Procedure, Performed: Inactivated Polio Vaccine (IPV) Administered" satisfies all:
 - >= 1 day(s) starts after end of ("Procedure, Performed: Inactivated Polio Vaccine (IPV) Administered" >= 1 day(s) starts after end of ("Procedure, Performed: Inactivated Polio Vaccine (IPV) Administered" >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")))
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - Union of:
 - "Diagnosis: Anaphylactic Reaction to Inactivated Polio Vaccine (IPV)"
 - "Diagnosis: Anaphylactic Reaction to Streptomycin"
 - "Diagnosis: Anaphylactic Reaction to Polymyxin"
 - "Diagnosis: Anaphylactic Reaction to Neomycin"
 - <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
 - AND:
 - OR: Union of:
 - "Immunization, Administered: Measles, Mumps and Rubella (MMR) Vaccine"
 - "Procedure, Performed: Measles, Mumps and Rubella (MMR) Vaccine Administered"
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - OR: Union of:
 - "Diagnosis: Disorders of the Immune System"
 - "Diagnosis: HIV"

- "Diagnosis: Malignant Neoplasm of Lymphatic and Hematopoietic Tissue"
 - "Diagnosis: Anaphylactic Reaction to Neomycin"
 - <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
 - OR:
 - AND: Union of:
 - "Diagnosis: Measles"
 - "Laboratory Test, Performed: Measles Antibody Test (IgG Antibody Titer) (result >= 1.10)")"
 - "Laboratory Test, Performed: Measles Antibody Test (IgG Antibody presence) (result: Positive Finding)")"
 - <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
 - AND: Union of:
 - "Diagnosis: Mumps"
 - "Laboratory Test, Performed: Mumps Antibody Test (IgG Antibody Titer) (result >= 1.10)")"
 - "Laboratory Test, Performed: Mumps Antibody Test (IgG Antibody presence) (result: Positive Finding)")"
 - <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
 - AND: Union of:
 - "Diagnosis: Rubella"
 - "Laboratory Test, Performed: Rubella Antibody Test (IgG Antibody Titer) (result >= 1.10)")"
 - "Laboratory Test, Performed: Rubella Antibody Test (IgG Antibody presence) (result: Positive Finding)")"
 - <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
- AND: Union of:
 - "Immunization, Administered: Haemophilus Influenzae Type B (HiB) Vaccine" satisfies all:
 - >= 1 day(s) starts after end of ("Immunization, Administered: Haemophilus Influenzae Type B (HiB) Vaccine" >= 1 day(s) starts after end of ("Immunization, Administered: Haemophilus Influenzae Type B (HiB) Vaccine" >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"))
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - "Procedure, Performed: Haemophilus Influenzae Type B (HiB) Vaccine Administered" satisfies all:
 - >= 1 day(s) starts after end of ("Procedure, Performed: Haemophilus Influenzae Type B (HiB) Vaccine Administered" >= 1 day(s) starts after end of ("Procedure, Performed: Haemophilus Influenzae Type B (HiB) Vaccine Administered" >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"))
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - "Diagnosis: Anaphylactic Reaction to Hemophilus Influenza B (HiB) Vaccine" <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
- AND: Union of:
 - "Immunization, Administered: Hepatitis B Vaccine" satisfies all:
 - >= 1 day(s) starts after end of ("Immunization, Administered: Hepatitis B Vaccine" >= 1 day(s) starts after end of "Immunization, Administered: Hepatitis B Vaccine")
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - "Procedure, Performed: Hepatitis B Vaccine Administered" satisfies all:
 - >= 1 day(s) starts after end of ("Procedure, Performed: Hepatitis B Vaccine Administered" >= 1 day(s) starts after end of "Procedure, Performed: Hepatitis B Vaccine Administered")
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - Union of:
 - "Diagnosis: Anaphylactic Reaction to Hepatitis B Vaccine"
 - "Diagnosis: Anaphylactic Reaction to Common Baker's Yeast"
 - "Diagnosis: Hepatitis B"
 - "Laboratory Test, Performed: Hepatitis B Antigen Test (result: Seropositive)")"
 - <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
- AND: Union of:
 - Union of:
 - "Immunization, Administered: Varicella Zoster Vaccine (VZV)")"
 - "Procedure, Performed: Varicella Zoster Vaccine (VZV) Administered")"
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - Union of:
 - "Diagnosis: Disorders of the Immune System"
 - "Diagnosis: HIV"
 - "Diagnosis: Malignant Neoplasm of Lymphatic and Hematopoietic Tissue"
 - "Diagnosis: Anaphylactic Reaction to Neomycin"
 - "Diagnosis: Varicella Zoster"
 - "Laboratory Test, Performed: Varicella Zoster Antibody Test (IgG Antibody Titer) (result >= 1.10)")"
 - "Laboratory Test, Performed: Varicella Zoster Antibody Test (IgG Antibody Presence) (result: Positive Finding)")"
 - <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"

AND: Union of:

- "Immunization, Administered: Pneumococcal Conjugate Vaccine" satisfies all:
 - ≥ 1 day(s) starts after end of ("Immunization, Administered: Pneumococcal Conjugate Vaccine" ≥ 1 day(s) starts after end of ("Immunization, Administered: Pneumococcal Conjugate Vaccine" ≥ 1 day(s) starts after end of ("Immunization, Administered: Pneumococcal Conjugate Vaccine" ≥ 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")))
 - ≤ 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
- "Procedure, Performed: Pneumococcal Conjugate Vaccine Administered" satisfies all:
 - ≥ 1 day(s) starts after end of ("Procedure, Performed: Pneumococcal Conjugate Vaccine Administered" ≥ 1 day(s) starts after end of ("Procedure, Performed: Pneumococcal Conjugate Vaccine Administered" ≥ 1 day(s) starts after end of ("Procedure, Performed: Pneumococcal Conjugate Vaccine Administered" ≥ 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")))
 - ≤ 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
- "Diagnosis: Anaphylactic Reaction to Pneumococcal Conjugate Vaccine" ≤ 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"

o AND: Union of:

- Union of:
 - "Immunization, Administered: Hepatitis A Vaccine"
 - "Procedure, Performed: Hepatitis A Vaccine Administered"
 - ≤ 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
- Union of:
 - "Diagnosis: Anaphylactic Reaction to Hepatitis A Vaccine"
 - "Diagnosis: Hepatitis A"
 - "Laboratory Test, Performed: Hepatitis A Antigen Test (result: Seropositive)"
 - ≤ 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"

o AND:

- OR: Union of:
 - "Immunization, Administered: Rotavirus Vaccine (2 dose schedule)" satisfies all:
 - ≥ 1 day(s) starts after end of ("Immunization, Administered: Rotavirus Vaccine (2 dose schedule)" ≥ 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")
 - ≤ 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - "Procedure, Performed: Rotavirus Vaccine (2 dose schedule) Administered" satisfies all:
 - ≥ 1 day(s) starts after end of ("Procedure, Performed: Rotavirus Vaccine (2 dose schedule) Administered" ≥ 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")
 - ≤ 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - "Diagnosis: Anaphylactic Reaction to Rotavirus Vaccine" ≤ 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
- OR: Union of:
 - $\$RotavirusVaccineDose2Schedule \geq 1$ day(s) starts after end of ($\$RotavirusVaccineDose3Schedule \geq 1$ day(s) starts after end of $\$RotavirusVaccineDose3Schedule$)
 - $\$RotavirusVaccineDose3Schedule \geq 1$ day(s) starts after end of ($\$RotavirusVaccineDose2Schedule \geq 1$ day(s) starts after end of $\$RotavirusVaccineDose3Schedule$)
 - $\$RotavirusVaccineDose3Schedule \geq 1$ day(s) starts after end of ($\$RotavirusVaccineDose3Schedule \geq 1$ day(s) starts after end of $\$RotavirusVaccineDose2Schedule$)
 - $\$RotavirusVaccineAdminDose2Schedule \geq 1$ day(s) starts after end of ($\$RotavirusVaccineAdminDose3Schedule \geq 1$ day(s) starts after end of $\$RotavirusVaccineAdminDose3Schedule$)
 - $\$RotavirusVaccineAdminDose3Schedule \geq 1$ day(s) starts after end of ($\$RotavirusVaccineAdminDose2Schedule \geq 1$ day(s) starts after end of $\$RotavirusVaccineAdminDose3Schedule$)
 - $\$RotavirusVaccineAdminDose3Schedule \geq 1$ day(s) starts after end of ($\$RotavirusVaccineAdminDose3Schedule \geq 1$ day(s) starts after end of $\$RotavirusVaccineAdminDose2Schedule$)
- OR: Union of:
 - "Immunization, Administered: Rotavirus Vaccine (3 dose schedule)" satisfies all:
 - ≥ 1 day(s) starts after end of ("Immunization, Administered: Rotavirus Vaccine (3 dose schedule)" ≥ 1 day(s) starts after end of ("Immunization, Administered: Rotavirus Vaccine (3 dose schedule)" ≥ 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"))
 - ≤ 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - "Procedure, Performed: Rotavirus Vaccine (3 dose schedule) Administered" satisfies all:
 - ≥ 1 day(s) starts after end of ("Procedure, Performed: Rotavirus Vaccine (3 dose schedule) Administered" ≥ 1 day(s) starts after end of ("Procedure, Performed: Rotavirus Vaccine (3 dose schedule) Administered" ≥ 42 day(s)

- ends after start of "Birthdate : Patient Characteristic Birthdate"))
- <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"

- AND: Union of:
 - "Immunization, Administered: Influenza Vaccine" satisfies all:
 - >= 1 day(s) starts after end of ("Immunization, Administered: Influenza Vaccine" >= 180 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - "Procedure, Performed: Influenza Vaccine Administered" satisfies all:
 - >= 1 day(s) starts after end of ("Procedure, Performed: Influenza Vaccine Administered" >= 180 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate")
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - Union of:
 - "Diagnosis: Anaphylactic Reaction to Influenza Vaccine"
 - "Diagnosis: Malignant Neoplasm of Lymphatic and Hematopoietic Tissue"
 - "Diagnosis: Anaphylactic Reaction to Neomycin"
 - <= 730 day(s) starts after start of "Birthdate : Patient Characteristic Birthdate"
- **Numerator Exclusions =**
 - None
- **Denominator Exceptions =**
 - None
- **Stratification =**
 - None

Data Criteria (QDM Variables)

- **\$RotavirusVaccineAdminDose2Schedule =**
 - "Procedure, Performed: Rotavirus Vaccine (2 dose schedule) Administered" satisfies all:
 - >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
- **\$RotavirusVaccineAdminDose3Schedule =**
 - "Procedure, Performed: Rotavirus Vaccine (3 dose schedule) Administered" satisfies all:
 - >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
- **\$RotavirusVaccineDose2Schedule =**
 - "Immunization, Administered: Rotavirus Vaccine (2 dose schedule)" satisfies all:
 - >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
- **\$RotavirusVaccineDose3Schedule =**
 - "Immunization, Administered: Rotavirus Vaccine (3 dose schedule)" satisfies all:
 - >= 42 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"
 - <= 730 day(s) ends after start of "Birthdate : Patient Characteristic Birthdate"

Data Criteria (QDM Data Elements)

- "Diagnosis: Anaphylactic Reaction to Common Baker's Yeast" using "Anaphylactic Reaction to Common Baker's Yeast Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1032)"
- "Diagnosis: Anaphylactic Reaction to DTaP Vaccine" using "Anaphylactic Reaction to DTaP Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1031)"
- "Diagnosis: Anaphylactic Reaction to Hemophilus Influenza B (HiB) Vaccine" using "Anaphylactic Reaction to Hemophilus Influenza B (HiB) Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1030)"
- "Diagnosis: Anaphylactic Reaction to Hepatitis A Vaccine" using "Anaphylactic Reaction to Hepatitis A Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1026)"
- "Diagnosis: Anaphylactic Reaction to Hepatitis B Vaccine" using "Anaphylactic Reaction to Hepatitis B Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1029)"
- "Diagnosis: Anaphylactic Reaction to Inactivated Polio Vaccine (IPV)" using "Anaphylactic Reaction to Inactivated Polio Vaccine (IPV) Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1023)"
- "Diagnosis: Anaphylactic Reaction to Influenza Vaccine" using "Anaphylactic Reaction to Influenza Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1022)"
- "Diagnosis: Anaphylactic Reaction to Neomycin" using "Anaphylactic Reaction to Neomycin Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1024)"
- "Diagnosis: Anaphylactic Reaction to Pneumococcal Conjugate Vaccine" using "Anaphylactic Reaction to Pneumococcal Conjugate Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1027)"
- "Diagnosis: Anaphylactic Reaction to Polymyxin" using "Anaphylactic Reaction to Polymyxin Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1025)"
- "Diagnosis: Anaphylactic Reaction to Rotavirus Vaccine" using "Anaphylactic Reaction to Rotavirus Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1021)"
- "Diagnosis: Anaphylactic Reaction to Streptomycin" using "Anaphylactic Reaction to Streptomycin Grouping Value Set (2.16.840.1.113883.3.464.1003.199.12.1028)"
- "Diagnosis: Disorders of the Immune System" using "Disorders of the Immune System Grouping Value Set (2.16.840.1.113883.3.464.1003.120.12.1001)"
- "Diagnosis: Encephalopathy due to Childhood Vaccination" using "Encephalopathy due to Childhood Vaccination Grouping Value Set (2.16.840.1.113883.3.464.1003.114.12.1007)"
- "Diagnosis: Hepatitis A" using "Hepatitis A Grouping Value Set

- (2.16.840.1.113883.3.464.1003.110.12.1024)"
- "Diagnosis: Hepatitis B" using "Hepatitis B Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1025)"
- "Diagnosis: HIV" using "HIV Grouping Value Set (2.16.840.1.113883.3.464.1003.120.12.1003)"
- "Diagnosis: Malignant Neoplasm of Lymphatic and Hematopoietic Tissue" using "Malignant Neoplasm of Lymphatic and Hematopoietic Tissue Grouping Value Set (2.16.840.1.113883.3.464.1003.108.12.1009)"
- "Diagnosis: Measles" using "Measles Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1053)"
- "Diagnosis: Mumps" using "Mumps Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1032)"
- "Diagnosis: Rubella" using "Rubella Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1037)"
- "Diagnosis: Varicella Zoster" using "Varicella Zoster Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1039)"
- "Encounter, Performed: Face-to-Face Interaction" using "Face-to-Face Interaction Grouping Value Set (2.16.840.1.113883.3.464.1003.101.12.1048)"
- "Encounter, Performed: Home Healthcare Services" using "Home Healthcare Services Grouping Value Set (2.16.840.1.113883.3.464.1003.101.12.1016)"
- "Encounter, Performed: Office Visit" using "Office Visit Grouping Value Set (2.16.840.1.113883.3.464.1003.101.12.1001)"
- "Encounter, Performed: Preventive Care - Established Office Visit, 0 to 17" using "Preventive Care - Established Office Visit, 0 to 17 Grouping Value Set (2.16.840.1.113883.3.464.1003.101.12.1024)"
- "Encounter, Performed: Preventive Care- Initial Office Visit, 0 to 17" using "Preventive Care- Initial Office Visit, 0 to 17 Grouping Value Set (2.16.840.1.113883.3.464.1003.101.12.1022)"
- "Immunization, Administered: DTaP Vaccine" using "DTaP Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1214)"
- "Immunization, Administered: Haemophilus Influenzae Type B (HiB) Vaccine" using "Haemophilus Influenzae Type B (HiB) Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1217)"
- "Immunization, Administered: Hepatitis A Vaccine" using "Hepatitis A Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1215)"
- "Immunization, Administered: Hepatitis B Vaccine" using "Hepatitis B Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1216)"
- "Immunization, Administered: Inactivated Polio Vaccine (IPV)" using "Inactivated Polio Vaccine (IPV) Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1219)"
- "Immunization, Administered: Influenza Vaccine" using "Influenza Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1218)"
- "Immunization, Administered: Measles, Mumps and Rubella (MMR) Vaccine" using "Measles, Mumps and Rubella (MMR) Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1224)"
- "Immunization, Administered: Pneumococcal Conjugate Vaccine" using "Pneumococcal Conjugate Vaccine Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1221)"
- "Immunization, Administered: Rotavirus Vaccine (2 dose schedule)" using "Rotavirus Vaccine (2 dose schedule) Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1222)"
- "Immunization, Administered: Rotavirus Vaccine (3 dose schedule)" using "Rotavirus Vaccine (3 dose schedule) Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1223)"
- "Immunization, Administered: Varicella Zoster Vaccine (VZV) Grouping Value Set (2.16.840.1.113883.3.464.1003.196.12.1170)"
- "Laboratory Test, Performed: Hepatitis A Antigen Test" using "Hepatitis A Antigen Test Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1033)"
- "Laboratory Test, Performed: Hepatitis B Antigen Test" using "Hepatitis B Antigen Test Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1031)"
- "Laboratory Test, Performed: Measles Antibody Test (IgG Antibody presence)" using "Measles Antibody Test (IgG Antibody presence) Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1060)"
- "Laboratory Test, Performed: Measles Antibody Test (IgG Antibody Titer)" using "Measles Antibody Test (IgG Antibody Titer) Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1059)"
- "Laboratory Test, Performed: Mumps Antibody Test (IgG Antibody presence)" using "Mumps Antibody Test (IgG Antibody presence) Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1062)"
- "Laboratory Test, Performed: Mumps Antibody Test (IgG Antibody Titer)" using "Mumps Antibody Test (IgG Antibody Titer) Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1061)"
- "Laboratory Test, Performed: Rubella Antibody Test (IgG Antibody presence)" using "Rubella Antibody Test (IgG Antibody presence) Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1064)"
- "Laboratory Test, Performed: Rubella Antibody Test (IgG Antibody Titer)" using "Rubella Antibody Test (IgG Antibody Titer) Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1063)"
- "Laboratory Test, Performed: Varicella Zoster Antibody Test (IgG Antibody Presence)" using "Varicella Zoster Antibody Test (IgG Antibody Presence) Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1067)"
- "Laboratory Test, Performed: Varicella Zoster Antibody Test (IgG Antibody Titer)" using "Varicella Zoster Antibody Test (IgG Antibody Titer) Grouping Value Set (2.16.840.1.113883.3.464.1003.198.12.1066)"
- "Procedure, Performed: DTaP Vaccine Administered" using "DTaP Vaccine Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1022)"
- "Procedure, Performed: Haemophilus Influenzae Type B (HiB) Vaccine Administered" using "Haemophilus Influenzae Type B (HiB) Vaccine Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1043)"
- "Procedure, Performed: Hepatitis A Vaccine Administered" using "Hepatitis A Vaccine Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1041)"
- "Procedure, Performed: Hepatitis B Vaccine Administered" using "Hepatitis B Vaccine Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1042)"
- "Procedure, Performed: Inactivated Polio Vaccine (IPV) Administered" using "Inactivated Polio Vaccine (IPV) Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1045)"
- "Procedure, Performed: Influenza Vaccine Administered" using "Influenza Vaccine Administered Grouping

Childhood Immunization Status

- Value Set (2.16.840.1.113883.3.464.1003.110.12.1044)"
- "Procedure, Performed: Measles, Mumps and Rubella (MMR) Vaccine Administered" using "Measles, Mumps and Rubella (MMR) Vaccine Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1031)"
- "Procedure, Performed: Pneumococcal Conjugate Vaccine Administered" using "Pneumococcal Conjugate Vaccine Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1046)"
- "Procedure, Performed: Rotavirus Vaccine (2 dose schedule) Administered" using "Rotavirus Vaccine (2 dose schedule) Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1048)"
- "Procedure, Performed: Rotavirus Vaccine (3 dose schedule) Administered" using "Rotavirus Vaccine (3 dose schedule) Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1047)"
- "Procedure, Performed: Varicella Zoster Vaccine (VZV) Administered" using "Varicella Zoster Vaccine (VZV) Administered Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1040)"
- Attribute: "Result: Seropositive" using "Seropositive Grouping Value Set (2.16.840.1.113883.3.464.1003.110.12.1054)"
- Attribute: "Result: Positive Finding" using "Positive Finding Grouping Value Set (2.16.840.1.113883.3.464.1003.121.12.1016)"

Supplemental Data Elements

- "Patient Characteristic Ethnicity: Ethnicity" using "Ethnicity CDCREC Value Set (2.16.840.1.114222.4.11.837)"
- "Patient Characteristic Payer: Payer" using "Payer SOP Value Set (2.16.840.1.114222.4.11.3591)"
- "Patient Characteristic Race: Race" using "Race CDCREC Value Set (2.16.840.1.114222.4.11.836)"
- "Patient Characteristic Sex: ONC Administrative Sex" using "ONC Administrative Sex AdministrativeGender Value Set (2.16.840.1.113762.1.4.1)"

Risk Adjustment Variables

- None

Measure Set	None
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