

DEFINITION

- A reaction to a recent vaccination (immunization)
- Types of Reactions: Local reactions (e.g. pain, swelling, redness), Systemic general reactions (e.g. fever, fussiness, decreased activity) and Anaphylactic reactions are covered.
- Reactions to the following vaccines are covered: COVID-19, Chickenpox (varicella), DTaP (Diphtheria, Tetanus, acellular Pertussis), Haemophilus influenzae type b, Hepatitis A, Hepatitis B, Influenza, MMR (Measles, Mumps, Rubella), Meningococcal, Papillomavirus, Pneumococcal, Polio, Rabies, Rotavirus, Synagis (for RSV), Tuberculosis (BCG vaccine) and Typhoid
- **Also Included:** COVID-19 vaccine answers to common questions and reasons to avoid pre-dosing with fever medicine
- **Updated for COVID-19 Vaccines: November 15, 2021** (version 5)

TRIAGE ASSESSMENT QUESTIONS

Call EMS 911 Now

Difficulty with breathing or swallowing

R/O: anaphylactic reaction

Limp, weak, or not moving

R/O: acute encephalopathy

Unresponsive or difficult to awaken

R/O: acute encephalopathy

Sounds like a life-threatening emergency to the triager

See More Appropriate Protocol

COVID-19 vaccine given recently and now has COVID-19 compatible respiratory symptoms (e.g., runny nose, cough, sore throat, shortness of breath, etc)

Go to Guideline: COVID-19 - Diagnosed or Suspected (Pediatric)

Fever starts over 2 days after the shot and no signs of cellulitis (Exception: MMR or varicella vaccines can cause delayed fever) and 3 months or older

Go to Protocol: Fever - 3 Months or Older (Pediatric)

Go to ED Now

Newborn < 4 weeks with fever 100.4° F (38.0° C) or higher rectally

R/O: sepsis

Go to ED/UCC Now (or to Office with PCP Approval)

Age 4 - 12 weeks old with fever > 102 F (39 C) rectally following vaccine

R/O: sepsis

Age 4 - 12 weeks old with fever 100.4 F (38 C) or higher rectally and begins > 24 hours after shot OR lasts > 48 hours

R/O: sepsis

Age 4 - 12 weeks old with fever 100.4 F (38 C) or higher rectally following vaccine and has other RISK FACTORS for sepsis

Other Risk Factors: Baby acts SICK (not feeding or breathing normally, etc) OR high risk newborn (preterm, on oxygen, etc)

Age 4 - 12 weeks old with fever 100.4 F (38 C) or higher rectally following vaccine and only received Hep B vaccine

Reason: fever rare (3%) with Hep B vaccine

Rotavirus vaccine and vomiting 3 or more times, bloody diarrhea or severe crying

R/O: intussusception

Measles vaccine rash (onset day 6-12) is purple or blood-colored

R/O: purpura or petechiae

Sounds like a severe, unusual systemic reaction to the COVID-19 vaccine to the triager

Child sounds very sick or weak to the triager (Exception: severe local reaction)

Reason: serious complication suspected

Go to Office Now

Fever > 105° F (40.6° C)

R/O: severe reaction

Crying continuously for > 3 hours

R/O: severe reaction or severe pain

Discuss With PCP and Callback by Nurse within 1 Hour

Fever and weak immune system (sickle cell disease, HIV, splenectomy, chemotherapy, organ transplant, chronic oral steroids, etc)

Reason: PCP will decide if vaccine-related fever or needs to be seen

See in Office Today

Over 3 days since shot and general symptoms (such as muscle aches, headache, fussiness, chills) are getting worse

R/O: unrelated cause

Fever present > 3 days

R/O: bacterial superinfection

See in Office Today or Tomorrow

Over 3 days since shot and redness is larger than 2 inches (5 cm) (Note: can be normal after 4th and 5th DTaP)

R/O: low grade infection

Over 3 days since shot and redness at the injection site is getting worse

R/O: low-grade infection

See in Office Within 3 Days

Deep lump (following DTaP at 2-8 weeks) becomes tender to the touch

R/O: bacterial superinfection

Measles vaccine rash (onset day 6-12) persists > 4 days

R/O: wrong diagnosis

Triager thinks child needs to be seen for non-urgent problem

Caller wants child seen for non-urgent problem

Home Care

Age 6 - 12 weeks old with fever > 100.4 F (38 C) rectally starting within 24 hours of vaccine and baby acts WELL (normal suck, alert, etc) and without risk factors for sepsis

Normal immunization reaction

COVID-19 vaccine answers to common questions

HOME CARE ADVICE

Common Vaccine Reactions

1. Reassurance and Education - Normal Reactions:

- Vaccines protect us against serious diseases.
- Having some temporary symptoms from the shot is normal.
- The symptoms mean the vaccine is working. They mean your immune system is building antibodies against the vaccine. The antibodies will protect you against the real disease.
- These brief side effects do not cause any risks to your health.
- There is no need to see your doctor for normal reactions, such as pain, swelling, redness or fever.

2. Vaccine Injection Site Reactions - Treatment:

- Some pain, redness and swelling at the injection site is NORMAL. It means the vaccine is working. Redness does not mean there's any infection.
- **Heat:** For redness and pain, apply a heating pad or a warm wet washcloth to the area for up to 20 minutes. Repeat as needed. Reason: will increase blood flow to the area. It will also speed up healing.
- **Exception:** can use a cold pack if your PCP recommends it, but only on the day of the shot.
- **Massage:** Gently massage the injection site during the first few days. Do so several times a day.
- **No Pain Medicines:** Try not to give any pain medicines for local reactions. Reason: pain medicines may reduce the body's normal immune response. Use local heat instead. The local pain rarely becomes bad.
- **Hives at Injection Site:** If very itchy, can apply a 1% hydrocortisone cream OTC twice daily as needed.

3. Fever with Vaccines - Treatment:

- Fever with vaccines is NORMAL, harmless and probably beneficial. Reason: Fever speeds up your body's immune system.
- Fever with most vaccines begins within 12 hours and lasts 1 or 2 days.
- For low grade fevers 100-102 F (37.8 to 39 C), do not give fever medicines. Reason: Research

has shown these meds may reduce the body's normal immune response.

- For fever above 102 F (39 C), can give medicine for discomfort if needed. Use acetaminophen (See Dosage table).

- **Fluids.** Encourage cool fluids in unlimited amounts. Reason: prevent dehydration. Fluids can also lower high fevers. Age younger than 6 months, only give formula or breastmilk.

- **Clothing.** Dress in normal clothing. For shivering or chills, use a blanket until it stops.

- **Caution:** For babies under 1 year, do not overdress or bundle up. Reason: Babies can get over-heated more easily than older children.

4. **Pre-Dosing with Fever Medicine - Not Recommended:**

- Giving a fever or pain medicine before getting a vaccine is not advised.

- Reason: Only 25% of children will develop a fever. There's no point in treating every child.

- Also, fevers help the body's immune system build antibodies.

- Do not give dose at regular intervals, only if needed.

- Exception: The rare child who had a previous severe reaction may receive pre-dosing. Talk with your child's doctor about this.

5. **General Body Symptoms from the Vaccine - Treatment:**

- General symptoms usually start about 12 to 24 hours after the shot. They mean the immune system is turned on and doing its job.

- General symptoms of feeling sick usually only last for one day, sometimes 2.

- Follow the tips below to help your child feel better.

- *Tiredness:* Encourage your child to rest or even sleep. Reason: The body needs all its energy going towards building antibodies against the vaccine. If we rest, the symptoms may pass sooner.

- *Poor appetite or even nausea:* Drink extra fluids. Stay well hydrated. Reason: Good hydration keeps the body working at peak performance.

- *Chills:* Wrap your child in a blanket. Reason: Warmth speeds up blood flow.

- *Muscle aches:* Take a warm bath or shower.

- *Fussiness:* Younger children may be more fussy than normal. They need extra holding and comforting.

6. **Call Back If:**

- Fever lasts over 3 days

- Redness becomes larger than 2 inches (5 cm)

- Redness gets worse after 3 days

- Your child becomes worse

Specific Reactions by Vaccine Type

1. **COVID-19 Vaccine - Common Harmless Reactions:**

- In children, the side effects are similar to those seen in adults.

- Injection site reactions: Pain and tenderness start within 8 hours (90% of patients). Other local reactions are some swelling (10%) or skin redness (5%). Local symptoms usually last 1 to 3 days. A lymph node in the armpit on that side can also become tender and swollen.

- General body symptoms: Fever (15%), chills (40%), tiredness (70%), muscle aches (50%) and headaches (60%). Some other brief side effects are decreased appetite, nausea, dizziness and increased sleep. General symptoms start at about 24 hours. They usually last 1 day, sometimes 2.

- Vaccines with 2 doses. Symptoms are more frequent after the 2nd vaccine. The above percentages are for the 2nd dose.

- Vaccines with one dose. Side effects were the same type, but a little less frequent.

- The vaccine does not cause any respiratory symptoms such as cough, runny nose, sore throat or shortness of breath.

- It is impossible to get COVID-19 from the vaccine. Reason: There is no live COVID-19 virus in the vaccine.
 - A serious allergic reaction is very rare. It usually occurs within 20 minutes after the shot.
2. **Chickenpox Vaccine:**
 - Pain or swelling at the injection site for 1 to 2 days (in 19% of children with 1st dose; 33% with 2nd dose)
 - Fever lasting 1 to 3 days begins 14 to 28 days after the vaccine (in 10%).
 - Chickenpox-like vaccine rash (usually 2 lesions) at the injection site (in 3%)
 - Chickenpox-like vaccine rash (usually 5 lesions) scattered over the body (in 4%)
 - This mild rash begins 5 to 26 days after the vaccine and usually lasts a few days.
 - Children with these vaccine rashes can go to day care or school. (Reason: for practical purposes, vaccine rashes are not contagious)
 - Exception: avoid school if widespread, weepy lesions (Reason: probably actual chickenpox).
 - Precaution: if vaccine rash contains fluid, cover it with clothing or Band-Aid.
 3. **DTaP or Td Vaccine - Common Harmless Reactions:**
 - Pain, tenderness, swelling and redness at the injection site is the main side effect (in 25% of children).
 - It lasts for 3 to 7 days.
 - A very swollen arm or leg following 4th or 5th DTaP occurs in 3%. There are no complications and future vaccines are safe.
 - Fever (in 25% of children) and lasts for 24 to 48 hours
 - Mild drowsiness (30%), fretfulness (30%) or poor appetite (10%) and lasts for 24 to 48 hours.
 - A painless lump (or nodule) at the DTaP injection site can begin 1 or 2 weeks later. It is harmless and usually will disappear in about 2 months.
 - **Call Back If:** the lump turns red or tender to the touch.
 4. **DTaP Vaccine Reaction - Huge Swelling:**
 - A huge swelling of the entire thigh or upper arm can follow the 4th or 5th dose of DTaP in 3% of children.
 - A large swelling over 4 inches (10 cm) occurs in 5% of children with thigh injections (13% for arm injections). The area of redness is smaller.
 - Redness is also present in 60% of these cases.
 - Most children can still move the arm or leg normally.
 - The large thigh or upper arm swelling resolves without treatment by day 3 (60%) to day 7 (90%).
 - There are no complications and this reaction is not an allergy nor an infection.
 - Future DTaP vaccines are safe to give.
 5. **Haemophilus Influenzae Type B Vaccine (Hib):**
 - No serious reactions reported
 - Sore injection site or mild fever only occurs in 1.5% of children
 6. **Hepatitis A Vaccine:**
 - No serious reactions reported
 - Sore injection occurs in 20% of children, loss of appetite in 10%, and headache in 5%.
 - Usually no fever.
 - If these symptoms occur, they usually last 1-2 days.
 7. **Hepatitis B Virus Vaccine (HBV):**
 - No serious reactions reported
 - Sore injection site occurs in 30% of children and mild fever in 3% of children
 8. **Influenza Virus Vaccine:**
 - **Influenza Vaccine (Injected):**

- Pain, tenderness or swelling at the injection site occurs within 6 to 8 hours in 10% of children.
 - Mild fever under 103° F (39.5° C) occurs in 18% of children. Fevers mainly occur in young children.
 - General reaction: headache, muscle aches, red eyes, nausea
 - If these symptoms occur, they usually last 1 or 2 days.
 - It is impossible to get flu from the injected vaccine. Reason: there is no live influenza virus in the vaccine.
 - Severe allergic reactions are very rare.
 - **Influenza Vaccine (Nasal):**
 - Note: For each influenza season, follow the CDC current recommendations regarding using the nasal flu vaccine.
 - It's an approved option for vaccination of healthy persons age 2 years and older.
 - Congested or runny nose is the main symptom
 - May cause fever especially in younger children
 - Occasionally cough, headache or muscle aches
 - Since the vaccine is made from a live but very weakened virus, your child can develop a mild flu-like illness.
9. **Measles Vaccine:**
- The measles vaccine can cause a fever (10% of children) and rash (5% of children)
 - Onset: 6 to 12 days following the injection.
 - Mild fever under 103° F (39.5°C) in 10% and lasts 2 or 3 days.
 - The mild pink rash is mainly on the trunk and lasts 2 or 3 days.
 - No treatment is necessary. Your child is not contagious.
 - Fact from all research: The MMR vaccine does not cause autism.
 - **Call Back If:**
 - Rash becomes very itchy
 - Rash changes to purple spots
 - Rash lasts over 3 days
10. **Meningococcal Vaccines:**
- No serious reactions
 - Sore injection site for 1 to 2 days occurs in 50%, with limited use of the arm in 15%.
 - Mild fever occurs in 4%, headache in 40% and joint pain in 20%.
 - MenB (optional meningitis vaccine) may also cause nausea, vomiting or diarrhea.
 - These symptoms only last a few days.
 - It is impossible to get meningitis from the vaccine. Reason: there is no live meningococcal bacteria in the vaccine.
 - No serious reactions reported.
11. **Mumps or Rubella Vaccine:**
- There are no reactions except for an occasional sore injection site.
12. **Papillomavirus Vaccine:**
- No serious reactions reported
 - Sore injection site for few days in 90%
 - Redness and swelling at the injection site (in 50%)
 - Fever over 100.4° F (38.0° C) in 10% and fever over 102° F (39° C) in 1- 2%.
 - Headache in 30%
13. **Pneumococcal Vaccine:**
- No serious reactions
 - Pain, tenderness, swelling OR redness at the injection site in 15 - 30%
 - Mild fever under 102° F (39° C) in 15% for 1-2 days

14. **Polio Vaccine:**
 - No serious reactions
 - Polio vaccine by injection occasionally causes some muscle soreness.
15. **Rabies Vaccine:**
 - Several brands of rabies vaccine are available.
 - Reactions may vary between brands.
 - Rabies shots are given on days 0, 3, 7, and 14 following exposure.
 - The following harmless reactions can occur:
 - Pain, redness, swelling or tenderness at the injection site (in 20% adults).
 - Malaise, nausea, headache, abdominal pain, dizziness, muscle aches (in 15% adults).
 - These reactions are uncommon in children.
16. **Rotavirus Vaccine:**
 - Mild diarrhea for 1 to 2 days in 3%
 - Mild vomiting even less common
 - No fever
 - Rare serious reaction: intussusception risk 1 in 100,000 (CDC). Presents with vomiting, bloody diarrhea or severe crying.
17. **Synagis Injection:**
 - Synagis (palivizumab) contains antibodies against RSV and is given IM to high risk preterms
 - No serious reactions
 - Sore injection site is usually mild
18. **BCG Vaccine for Tuberculosis (TB):**
 - A vaccine used to prevent TB in high risk groups or countries. Not used in the US or most of Canada. Note: This is different than the PPD skin test to detect TB.
 - Given into the skin of the right shoulder area.
 - Timing: Mainly given to infants and young children.
 - Normal reaction: After 6 to 8 weeks a blister forms. It gradually enlarges and eventually drains a whitish yellow liquid. The blister then heals over leaving a scar. The raised scar is proof of BCG protection.
 - Abnormal reaction: Abscess (infected lump) occurs in the shoulder or under the arm. Occurs in 1% of patients.
 - **Call Back If:**
 - Blister turns into a large red lump OR
 - Lymph node in the armpit becomes large
19. **Typhoid Vaccine:**
 - **Typhoid (Shot):**
 - Mild redness and swelling at the injection site (in 7%)
 - Fever (in 1%)
 - **Typhoid (Oral):**
 - Fever or headache (in 5%)
 - Abdominal discomfort, nausea or vomiting less commonly

COVID-19 Vaccine Answers to Common Questions

1. **COVID-19 Vaccines - Efficacy and Safety Questions:**
 - **Vaccine Efficacy:** All the vaccines approved by the FDA for use in the US are highly effective at preventing COVID-19. The protection against getting the new variants have gone down some, but most people have mild symptoms or none. The vaccines continue to prevent serious symptoms, complications and the need for hospital or ICU admission, even for the variants. They are much more effective than flu vaccines.
 - **Other Major Benefits:** Vaccines also prevent the rare serious delayed onset complications

from COVID-19 infections that can occur in some unlucky people. One example is multisystem inflammatory syndrome in children (also called MIS-C). Another is "long hauler" symptoms (such as brain fog or chronic breathing problems). Key: Vaccines prevent death from COVID-19 infections.

- **Vaccines and Normal Life:** Having almost everyone vaccinated is the only way we can get back to normal. Normal means no masks, open schools, safe to travel, safe to visit grandparents, less mental health crisis and no deaths from COVID-19.
- **Vaccine Safety:** Very safe. Most people get a sore arm for a few days. About half get some general symptoms for about 24 hours, such as feeling tired and achy. A smaller number have a fever. These are the normal side effects seen with most vaccines and they go away quickly. They show your immune system is working. Serious reactions are extremely rare.
- **Blood Clot Concerns:** Very rare. Occur in about 1 person per million vaccinated people. Blood clots occur much more commonly in people who get the natural COVID-19 infection. (Note: have NOT occurred with Moderna or Pfizer vaccines)
- **Myocarditis Concerns:** Myocarditis is inflammation of the heart muscle. Main symptoms are chest pain and shortness of breath. Symptoms start within 1 week of getting the vaccine. Note to triager: If chest pain is the only symptom, refer to PCP or ED urgently. Very rare side effect of the COVID-19 vaccines. Occurs in about 6 per million vaccinated people. Mainly in teen or young adult males. The symptoms are usually mild and go away quickly. Myocarditis occurs much more commonly in people who get the natural COVID-19 infection. Plus it is more severe in them.
- **Best Vaccine:** Any vaccine approved by the FDA is highly effective and safe. Get the first one that becomes available to you. They will protect you and your family.

2. COVID-19 Vaccines - Protection Questions:

- **Start of Vaccine Protection:** Full protection is reached about 2 weeks after you complete the vaccine series.
- **Duration of Vaccine Protection:** Research data has confirmed that protection is still high at 6 months after completing the vaccine series. Experts predict the protection may last for 12 months or longer, but we need to wait for more data.
- **Booster Shots:** In October 2021, the CDC recommended a booster shot 6 or more months after the Pfizer or Moderna 2nd vaccine. It recommended a booster shot 2 or more months after the Johnson and Johnson vaccine. Initially boosters were given to people with risk factors for severe COVID-19 infections. Soon they will be available to everyone. Experts predict we may need them yearly, just like flu vaccine booster shots. Ongoing studies will tell.
- **COVID-19 Variants and Vaccine Protection:** For now, the current vaccines protect against the current variants in the US. The vaccinated person usually does not get infected. If they do, they develop either a mild illness or an asymptomatic infection. They are protected against serious symptoms and any complications. By contrast, natural immunity does not protect against some of the variants.
- **Re-infections:** Reinfections can occur after natural infections. Vaccination provides much better protection against future infections.
- **Quarantine after Exposure:** If you are vaccinated and 2 weeks have passed since your final dose, you do not have to quarantine for 10 days after close contact with a COVID-19 infected person. However, fully vaccinated people should get tested 5 to 7 days after an exposure to COVID-19. You should also wear a mask (for 14 days) when you are around other people or until you know that your test result is negative.

3. COVID-19 Vaccines - Special Patient Questions:

- **Children and Teens:** Currently approved for 5 years and older. Results: strong protection and also safe (normal side effects). Importance: while most children have mild or asymptomatic infections, they can get rare complications such as MIS-C. Also, they can innocently transmit the disease to others.
- **Pregnant Women:** Vaccines are approved and safe.
- **Breastfeeding Mothers:** Vaccines are approved and safe. Studies show that breastmilk passes antibody protection against COVID-19 to the baby.
- **Underlying High Risk Conditions:** Vaccines are approved and safe. These patients need the

vaccine protection the most. If you have questions about a specific condition, discuss with your doctor.

- **Person Already had the Disease:** Get the vaccine. It provides higher levels of antibodies and better protection than the natural disease. Restriction: not approved until you are over any acute symptoms and the 10 days of isolation have passed.

- Go to CDC website for other questions: <https://www.cdc.gov/coronavirus/2019-ncov/vaccines>.

4. **COVID-19 Vaccines - Vaccine Postponement Questions:**

- **Positive COVID-19 Test:** If your child has a positive COVID-19 test, the vaccine should be postponed until after the 10 day quarantine period is over and the symptoms are improving.

- **Child is Sick and Scheduled for Vaccine:** If your child has symptoms compatible with COVID-19, should get a test before receiving the vaccine. If negative and mild illness (such as isolated runny nose or mild diarrhea), can receive the vaccine. For moderate or severe illness (including a fever), the vaccine should be postponed until fever gone and symptoms are improving.

- **Exposed to COVID-19, But No Symptoms:** If your child has been exposed to COVID-19 and is scheduled for the vaccine, the vaccine should be postponed until after the quarantine period is over.

- **Flu and COVID-19 Vaccines:** Can be given at the same time. No waiting period needed between the 2 shots.

FIRST AID

N/A

BACKGROUND INFORMATION

Matching Pediatric Care Advice (PCA) Handouts for Callers

Detailed home care advice instructions have been written for this protocol. If your software contains them, they can be sent to the caller at the end of your call. Here are the names of the pediatric handouts that are intended for use with this protocol:

- COVID-19 Vaccines - Answers to Common Questions
- Vaccine Reactions - Normal
- Vaccine Concerns - You're Undecided
- Vaccines - Infections They Prevent
- Fever - How to Take the Temperature
- Fever - Facts Versus Myths
- Acetaminophen (Tylenol) Dosage Table - Children
- Ibuprofen (Advil, Motrin) Dosage Table - Children

Types of Vaccine Reactions

- **Local Injection Site Reaction:** Most local swelling, redness and pain at the injection begins within 24 hours of the shot (rarely 24 to 48 hours.) Usually lasts 2 or 3 days. Occasionally, localized hives or itching occurs at the injection site. They usually last less than 24 hours. Localized hives do not mean your child is allergic to the vaccine.

- **Systemic General Reaction:** Fever with most vaccines (e.g., DTaP) usually begins within 24 hours (sometimes 24-48 hours). Headache, myalgias, malaise and poor appetite can also be seen. Systemic symptoms usually last 1 to 3 days. Exception: With live vaccines (MMR and chickenpox), fever and systemic reactions usually begin between 1 and 4 weeks later.

- **Anaphylactic Reaction:** Anaphylactic reactions can occur with any vaccine but they are very rare (1:500,000). In addition, they usually start while the child is still in the office where the injection was given, so calls about them are extremely rare.

Combination Vaccines and Triage - Symptoms Probably From DTaP Component

From a telephone management standpoint, most local and systemic reactions that follow the standard immunizations given at 2, 4 and 6 months, 12-18 months and 4 to 6 years are due to the DTaP vaccine. The nurse usually does not need to know exactly what the patient received but can base her advice upon the caller's description of the reaction and the DTaP care advice. The nurse may need to know the exact vaccine when a single vaccine (such as influenza or rabies) has been given.

Redness at Injection Site is Normal Vaccine Reaction (Rarely Cellulitis)

- Local vaccine reactions are normal and a good sign that the vaccine is working.
- Bacterial superinfections (e.g., cellulitis, lymphangitis, abscess) at the injection site are extremely rare. Abscesses are more common than cellulitis. In the 1993 report by Simon, 8 out of 9 abscesses required surgical drainage. These were caused by nonsterile vaccine injections contaminated with Group A Strep bacteria. To further document how rare bacterial cellulitis is following a vaccine, there have been no culture confirmed cases of vaccine associated bacterial cellulitis reported in the medical literature in over 20 years. UpToDate lists vaccine reactions as a masquerader of cellulitis and not as a potential cause. (April 2021 access).
- Clues from Appearance: Local vaccine reactions usually are blotchy red with indistinct borders.
- Vaccine reactions also are usually mildly tender, sometimes itchy. Cellulitis usually has confluent spreading redness with sharp borders. It also is very tender to the touch.
- Clues from Size of Redness: Redness over 1 inch (2.5 cm) for the first 3 DTaP doses occurs in less than 1% of children. Redness over 2 inches (5 cm) after dose 4 occurs in 3% and after dose 5 in 15%. All of these are normal vaccine reactions, not bacterial cellulitis. (Data from DAPTACEL package insert)
- Clues from Onset: Redness and fever from a vaccine reaction usually begins within 24 hours following the shot (rarely 24-48 hours). Redness and fever from a bacterial infection usually begins more than 48 hours after the shot (Reason: it takes time for the bacteria to become established and multiply).
- Clues from Duration: Redness that is getting worse after 72 hours also could mean that a bacterial infection has occurred. However, this has been reported as a normal finding after COVID-19 vaccine. It's been called "COVID arm".
- Reassurance if no redness: Huge swelling without redness is always an atypical vaccine reaction. Cellulitis always has redness.

Vaccine Injection Site Redness and Pain: Advice to Apply Heat Rather than Cold (Author's reasoning to support this care advice change)

- This protocol now recommends applying warm compresses or a heating pad for local vaccine reactions. This advice applies to local reactions from all injected vaccines. Reason: The goal is to increase blood flow to the injection site. Blood brings lymphocytes and other immune helpers. Warmth may speed up the release of the vaccine into the lymphatic system, making it less concentrated at one site. Heat speeds healing of inflamed tissues.
- Boils and Cellulitis: Skin infections are examples where applying heat is standard advice.
- Sports Injuries and Ice: The advice to treat inflammation with ice or cold compresses comes from how sports injuries are generally treated. But injuries are different. Usually there is some bleeding and cold is thought to prevent the bleeding from recurring. Injuries cause muscle or other tissue damage. Cold is thought to reduce swelling of the damaged tissue. Neither of these reasons apply to vaccine injections. In addition, sports medicine specialists and athletic trainers recommend switching to heat after the first 24 to 48 hours to speed healing.
- Research: There is no study comparing the application of heat versus cold for local vaccine reactions. Facts from pathophysiology and the normal inflammatory response would support the use

of heat.

- Physician Preferences: If the caller states that their PCP recommends treating with cold, the triage nurse should support the PCP's preferred advice. Also, office-based pediatricians and call center medical directors can customize the care advice in this protocol for their facility.

Consultants for Heat versus Cold for Vaccine Injection Site Reactions

This approach of applying heat to local vaccine reactions was reviewed and is supported by the following vaccine specialists:

- Paul Offit MD, Professor of Pediatrics, pediatric infectious disease specialist, medical director of the Vaccine Education Center at Children's Hospital of Philadelphia.
- Sean O'Leary MD, Professor of Pediatrics, pediatric infectious diseases specialist, Children's Hospital Colorado, and Vice Chair of the Committee on Infectious Diseases, American Academy of Pediatrics

Muscle Pain and Site of Vaccine Injection

- Most vaccines are given intramuscular (IM). Part of the local reaction is muscle pain.
- Most shots are given into the vastus lateralis muscle (anterior-lateral thigh). Muscle pain in this site can cause a painful gait (limp). Having the needle touch the femur may contribute.
- After 5 years old, some shots can be given into the deltoid muscle. Muscle pain in this site can cause painful use of the shoulder. Local reactions are worse in the deltoid muscle than the thigh.
- Most muscle pain and any limping resolves in 3 to 5 days.

Anaphylactic Reactions From Vaccines

- A severe life-threatening reaction is called anaphylaxis.
- The main symptoms are difficulty breathing, difficulty swallowing, hypotension (manifested by fainting or too weak to stand)
- Anaphylactic reactions can occur with any vaccine, but they are very rare.
- Incidence is 1 per 500,000 doses of vaccine.
- Most serious anaphylactic reactions to vaccines occur in a physician's office because it's standard practice to observe the child for 20 minutes following injection of a vaccine.
- Such reactions are usually caused by vaccine stabilizers (gelatin) or vaccine components (egg protein), rather than the infectious agent in the vaccine.
- Egg protein is in the influenza vaccine. MMR does not contain significant amounts of egg cross-reacting proteins. Children with egg allergy can receive the MMR vaccine, without any need for prior skin testing. (AAP Red Book). They should receive the influenza vaccine in a medical setting if they ever had an anaphylactic reaction to eggs.
- Vaccines that contain gelatin are MMR, varicella, DTaP, and influenza.
- Gelatin-induced anaphylaxis (very rare) requires strict avoidance of many foods that contain gelatin (e.g., ice cream, yogurt, gel desserts, frostings).
- Reference: Bohlke, K. Pediatrics, 2003.

Frequency of Fevers in Young Babies Following the First Vaccines

- Fevers that occur after immunizations during the first 12 weeks of life can present a dilemma for the telephone triager (Reason: fevers at this age are usually referred in for evaluation)
- These fevers usually have an onset within 24 hours after the vaccine (rarely 48 hours)
- The first series of vaccines can be given between 6 and 8 weeks old
- DTaP vaccine causes a fever in 8% of 2 month olds (Note: from 4 months old onward, it causes a fever in over 20% of children)
- The first Hib vaccine causes a fever in 15% of infants
- The first Pneumococcal vaccine causes a fever in 15% of infants

- The first Hepatitis B vaccine causes a fever in 3% of infants
- When these 4 vaccines are given together as a first dose, a fever occurs in 22% of infants
- Source: Lederle Laboratories data and vaccine package inserts

Management of Fevers in 6 to 8 Week Olds Following the First Vaccines

- The following recommendations come from a survey of 10 pediatric groups in Denver (August 2007)
- See all of these infants: none
- See selected infants: 100%, but criteria varied
- RISK FACTORS for sepsis: Criteria for seeing these infants urgently include baby acts sick or abnormal (e.g., poor suck, decreased movement, not alert, abnormal breathing), systemic symptoms occur (e.g., vomiting), high-risk newborn (preterm or on oxygen), Hep B only vaccine given, fever begins over 24 hours after vaccine injection, fever above 102° F (39° C), OR fever lasts over 48 hours.
- The infants who act normal (feeding adequately and consolable fussiness) don't need to be seen. They can receive acetaminophen for their injection pain or fever if the triage nurse thinks it is necessary.
- Seeing all infants under 12 weeks old with a fever following a vaccine would be over-referral and a disservice to parents. (Reason: 22% of infants and co-payments are expensive).

Non-Immunized or Under- Immunized Children with a Fever: No Impact on Nurse Triage

- Some physicians recommend that "nurses should routinely ask about immunization status on every phone call where the child has a fever". I disagree with this suggestion for the following reasons:
- The immunization status does NOT change office-hours telephone triage about which children need to be seen. Serious symptoms and specific disease complications are thoroughly covered in all protocols. Nurses also can always opt to bring in a child who sounds seriously ill based upon their professional judgment.
- The immunization status, however, may impact the medical work-up of a child who is being evaluated within the office or ED setting. It may change the differential diagnoses for the child's symptoms or what testing might be needed for a febrile child.
- Our main concern is children who have not received their "Meningitis" vaccines (Pneumo, Hib and Meningococcal vaccines). Their risk for sepsis, meningitis, pneumonia and other SBI is higher. The protocols, however, are already structured to detect symptoms of these serious diseases and to send positive children in for evaluations. In addition, even though the bacteremia rate has gone down with vaccines, the protocol continues to include a question for detecting bacteremia, in children who have no symptoms except fever. (See Acute Fever Without a Source down below)
- The main scenario in which knowing the immunization status becomes a factor in telephone triage is for tetanus-prone wounds. This is covered in every injury protocol and discussed in depth in the Background Information of the Skin Trauma protocol. (see Tetanus Risk in Non- and Under-Immunized Children)
- Any child with a measles-like rash is seen whether or not they have received the MMR vaccine. Likewise, any child with varicella complications is seen whether or not they have received the Varicella vaccine.
- Any child with suspected influenza is seen if they develop any signs of complications (e.g., work of breathing or signs of dehydration), whether or not they have received the influenza vaccine
- Trying to cover over the telephone which immunizations the child may or may not have received, can be time-consuming (adding unnecessary time per call and something a parent may not automatically know without looking at a child's immunization record). For the majority of calls, this added time will not change the disposition of the call and is largely non-essential to phone triage.
- For practices that have a different view, offices may need to develop a separate policy for detecting and managing their partially and non-immunized children.

Prophylactic Acetaminophen May Cause Reduced Antibody Response to Vaccine: Avoid Using

- In 2009, a Czech Republic study looked at prophylactic acetaminophen administration after

vaccinations. (Pyrmula 2009)

- The study included 460 healthy children 9-16 weeks and 12-15 months receiving booster vaccinations.
- Children were randomly assigned to 2 groups: those who were given acetaminophen in 3 doses during the 24 hours post-vaccine versus no post-vaccine antipyretic treatment.
- Blood samples were drawn to determine the immunogenicity of vaccinations at 1 month after the injection.
- The study concluded that acetaminophen led to reduced immunogenic responses regardless of the presence of fever.
- In 2018, an Australian study on 3300 children confirmed the Czech study results. Children who received antipyretics after an influenza vaccine had a lower antibody response. (Li-Kim-Moy, *Pediatr Infect Dis J*, 2018).
- Application: This Immunization Reaction protocol has never recommended giving antipyretics prophylactically before receiving vaccines. Antipyretics are only recommended for fever over 102 F or for severe pain following immunizations. Furthermore, it is only recommended as needed based on symptoms, not dosed at regular intervals.
- Summary: No national organization (e.g., the AAP) has changed their recommendations for pre- or post-immunization care based on these 2 studies. For now, this protocol is in compliance with the findings. More research is needed to further confirm that these findings are valid and clinically important.

Vaccines on the Go: a Free App from CHOP

- This is a consumer app for vaccine facts.
- It is evidence-based and up-to-date.
- Source: Children's Hospital of Philadelphia (CHOP) ranked #1 in the US
- Recommend it to your worried callers.

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