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Diphtheria, Tetanus, and Pertussis: Recommendations for Vaccine Use

Recommendations of the Immunization Practices Advisory Committee (ACIP) of the U.S. Public Health Service*

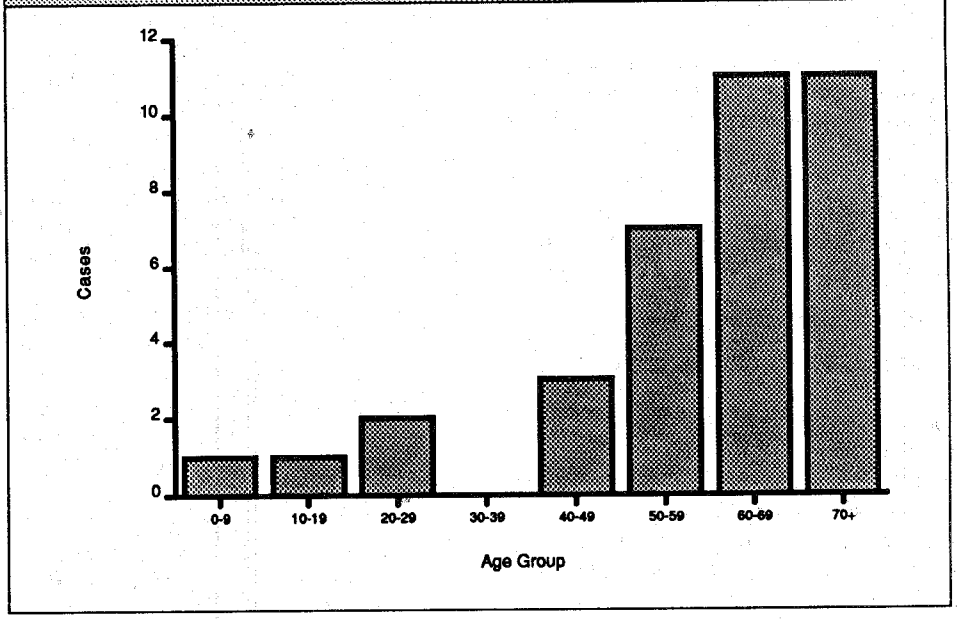
Editor's note: The following is a summary of ACIP recommendations regarding diphtheria, tetanus and whole-cell pertussis vaccine. Recommendations for the use of the newer acellular pertussis vaccines will be contained in next month's issue of the Bulletin.

Preparations Used for Vaccination

The following preparations are currently available in the United States:

- Diphtheria and Tetanus Toxoids and Pertussis Vaccine Adsorbed (DTP) and Diphtheria and Tetanus Toxoids Adsorbed (DT) (for pediatric use) are for use among infants and children <7 years of age. Each 0.5-mL dose is formulated to contain 6.7-12.5 limit of flocculation (Lf) units of diphtheria toxoid, 5 Lf units of tetanus toxoid, and 16 opacity units of pertussis vaccine. A single human immunizing dose of DTP contains an estimated 4-12 protective units of pertussis vaccine.
- Tetanus and Diphtheria Toxoids Adsorbed for Adult Use (Td) is for use among persons ≥7 years of age. Each 0.5-mL dose is formulated to contain 2-10 Lf units of tetanus toxoid and 2 Lf units of diphtheria toxoid.
- Pertussis Vaccine Adsorbed (P),§ Tetanus Toxoid (fluid), Tetanus Toxoid Adsorbed (T), and Diphtheria Toxoid Adsorbed (D)¶ (for pediatric use), are single-antigen products for use in special instances when combined antigen preparations are not indicated.

Figure 1. Reported Cases of Tetanus (N=36) in Virginia, by Age Group, 1972-1991



Vaccine Usage

The standard, single-dose volume of each of DTP, DT, Td, single-antigen adsorbed preparations of pertussis vaccine, tetanus toxoid, and diphtheria toxoid, and of the fluid tetanus toxoid is 0.5 mL. Adsorbed preparations should be administered intramuscularly (IM). Vaccine administration by jet injection may be associated with more frequent local reactions.

Primary Vaccination

Children 6 weeks through 6 years old (up to the seventh birthday). Table 1 details a routine vaccination schedule for children <7 years of age. Individual circumstances may warrant giving the first three doses at 6, 10, and 14 weeks of age to provide protection as early as possible, especially during pertussis outbreaks.

Children ≥7 years of age and adults. Table 2 details a routine vaccination schedule for persons ≥7 years of age. Because

Table 1. Routine DTP Vaccination Schedule Summary for Children <7 Years of Age

Dose	Customary age	Age/Interval	Product
Primary 1	2 months	6 week old or older	DTP†
Primary 2	4 months	4-8 weeks after first dose*	DTP†
Primary 3	6 months	4-8 weeks after second dose*	DTP†
Primary 4	15 months	6-12 months after third dose*	DTP†
Booster	4-6 years old, before entering kindergarten or elementary school (not necessary if fourth primary vaccinating dose administered after fourth birthday)		DTP†
Additional boosters.		Every 10 years after last dose	Td

*Prolonging the interval does not require restarting series.
†Use DT if pertussis vaccine is contraindicated. If the child is ≥1 year of age at the time that primary dose three is due, a third dose 6-12 months after the second completes primary vaccination with DT.

the severity of pertussis decreases with age, and because the vaccine may cause side effects and adverse reactions, pertussis vaccination has not been recommended for children after their seventh birthday or for adults. Td rather than DT is the preparation of choice for vaccination of all persons ≥7 years of age because side effects from higher doses of diphtheria toxoid are more common than they are among younger children.

Interruption of primary vaccination schedule. Interrupting the recommended schedule or delaying subsequent doses does not lead to a reduction in the level of immunity reached on completion of the primary series. Therefore, there is no need to restart a series if more than the recommended time between doses has elapsed.

Booster Vaccination

Children 4-6 years old (up to the seventh birthday). Those who received all four primary vaccination doses before their fourth birthday should receive a fifth dose of DTP before entering kindergarten or elementary school. This booster dose is not necessary if the fourth dose in the primary series was given on or after the fourth birthday.

Children ≥7 years of age and adults. Tetanus toxoid should be given with diphtheria toxoid as Td every 10 years. If a dose is given sooner as part of wound management, the next booster is not needed until 10 years thereafter (See Tetanus Prophylaxis in Wound Management). More frequent boosters are not indicated and can result in an increased occurrence and severity of adverse reactions. One means of ensuring that persons receive boosters every 10 years is to vaccinate them routinely at mid-decade ages, i.e., 15 years old, 25 years old, 35 years old, etc.

Special Considerations

Children with contraindications to pertussis vaccination. For children <7 years of age with a contraindication to pertussis vaccine (see Precautions and Contraindications), DT should be used instead of DTP. To ensure that there will be no interference with the response to DT antigens from maternal antibodies, previously unvaccinated children who receive their first DT dose when <1 year of age should receive a total of four doses of DT as the primary series, the first three doses at 4- to 8-week intervals and the fourth dose 6-12 months later (similar to the recommended DTP schedule) (Table 1). If additional doses of pertussis vaccine become contraindicated after a DTP series is begun in the first year of life, DT should be substituted for each of the remaining scheduled DTP doses.

Unvaccinated children ≥1 year of age for whom pertussis vaccine is contraindicated should receive two doses of DT 4-8 weeks apart, followed by a third dose 6-12 months later to complete the primary series. Children who have already received one or two doses of DT or DTP after their first birthday and for whom further pertussis vaccine is contraindicated should receive a total of three doses of a preparation containing diphtheria and tetanus toxoids appropriate for age, with the third dose administered 6-12 months after the second dose.

Children who complete a primary series of DT before their fourth birthday should receive a fifth dose of DT before entering kindergarten or elementary school. This dose is not necessary if the fourth dose of the primary series was given after the fourth birthday.

Pertussis vaccination for persons ≥7 years of age. Routine vaccination against pertussis is not currently recommended for persons ≥7 years of age. It should be noted, however, that adolescents and adults with waning immunity, whether derived from disease or vaccination, are a major reservoir for transmission of pertussis. For this reason it is possible that booster doses of acellular pertussis vaccine will be recommended in the future for persons ages ≥7 years of age.

Persons who have recovered from tetanus or diphtheria. Tetanus or diphtheria infection may not confer immunity; therefore, active vaccination should be initiated at the time of recovery from the illness, and arrangements made to ensure that all doses of a primary series are administered on schedule.

Children who have recovered from pertussis. Children who have recovered from satisfactorily documented pertussis do not need pertussis vaccine. Satisfactory documentation includes recovery of *B. pertussis* on culture or typical symptoms and clinical course when epidemiologically linked to a culture-proven case, as may occur during outbreaks. When such confirmation of the diagnosis is lacking, DTP vaccination should be completed, because a presumed pertussis syndrome may have been caused by other *Bordetella* species, *Chlamydia*, or certain viruses.

Prevention of neonatal tetanus. A previously unvaccinated pregnant woman whose child might be born under unhygienic circumstances (without sterile technique) should receive two doses of Td 4-8 weeks apart before delivery, preferably during the last two trimesters. Pregnant women in similar circumstances who have not had a complete vaccination series should complete the three-dose series. Those vaccinated more than 10 years previously should have a booster dose. No evidence exists to indicate that tetanus and diphtheria toxoids administered during pregnancy are teratogenic.

Adult vaccination with Td. The proportions of persons lacking protective levels of circulating antitoxins against diphtheria and tetanus increase with age; at least 40% of those ≥60 years of age may lack protection. Every visit of an adult to a health-care provider should be regarded as an opportunity to assess the person's vaccination status and, if indicated, to provide protection against tetanus and diphtheria. Adults with uncertain histories of a complete primary vaccination series should receive a primary series using the combined Td toxoid. To ensure continued protection, booster doses of Td should be given every 10 years.

Use of Single-Antigen Preparations

A single-antigen adsorbed pertussis vaccine preparation can be used to com-

plete vaccination against pertussis for children <7 years of age who have received fewer than the recommended number of doses of pertussis vaccine but have received the recommended number of doses of diphtheria and tetanus toxoids for their age. Alternately, DTP can be used, although the total number of doses of diphtheria and tetanus toxoids should not exceed six each before the seventh birthday.

Available data do not indicate substantially more adverse reactions following receipt of Td than following receipt of single-antigen, adsorbed tetanus toxoid. Furthermore, adults may be even less likely to have adequate levels of diphtheria antitoxin than of tetanus antitoxin. The routine use of Td in all medical settings, including office practices, clinics, and emergency rooms, for all persons ≥7 years of age who need primary vaccination or booster doses will improve levels of protection against both tetanus and diphtheria, especially among adults.

Side Effects and Adverse Reactions Following DTP Vaccination

Local reactions (generally erythema and induration with or without tenderness) are common after the administration of vaccines containing diphtheria, tetanus, or pertussis antigens. Occasionally, a nodule may be palpable at the injection site of adsorbed products for several weeks. Sterile abscesses at the injection site have been reported rarely (6-10/million doses of DTP). Mild systemic reactions such as fever, drowsiness, fretfulness, and anorexia occur frequently. These reactions are substantially more common following the administration of DTP than of DT, but they are self-limited and can be safely managed with symptomatic treatment.

Acetaminophen is frequently given by physicians to lessen fever and irritability associated with DTP vaccination, and it may be useful in preventing seizures among febrile-convulsion-prone children. However, fever that does not begin until ≥24 hours after vaccination or persists for more than 24 hours after vaccination should not be assumed to be due to DTP vaccination. These new or persistent fevers should be evaluated for other causes so that treatment is not delayed for serious conditions such as otitis media or meningitis. Moderate-to-severe systemic events include high fever (i.e., temperature of ≥40.5 C [105 F]); persistent, inconsolable crying lasting ≥3 hours; collapse (hypotonic-hyporesponsive episode); or short-lived convulsions (usually febrile). These events occur infrequently and appear to be without sequelae. Other more severe neurologic events, such as a prolonged convulsion or encephalopathy, although rare, have been reported in temporal association with DTP administration.

Approximate rates for the occurrence of adverse events following receipt of DTP vaccine (regardless of dose number in the series or age of the child) are shown in Table 3.

Concern about the possible role of pertussis vaccine in causing neurologic reactions has been present since the earliest days of vaccine use. Rare but serious acute neurologic illnesses, including encephalitis/encephalopathy and prolonged convulsions, have been anecdotally reported following receipt of whole-cell pertussis vaccine given as DTP vaccine. Whether pertussis vaccine causes or is only coincidentally related to such illnesses or reveals an inevitable event has been difficult to determine conclusively for the following reasons: a) serious acute neurologic illnesses often occur or become manifest among children during the first year of life irrespective of vaccination; b) there is no specific clinical sign, pathological finding, or laboratory test which can determine whether the illness is caused by the DTP vaccine; c) it may be difficult to determine with certainty whether infants <6 months of age are neurologically normal, which complicates assessment of whether vaccinees were already neurologically impaired before receiving DTP vaccine; and d) because these events are exceedingly rare, appropriately designed large studies are needed to address the question.

To determine whether DTP vaccine causes serious neurologic illness and brain damage, the National Childhood Encephalopathy Study (NCES) was undertaken during 1976-1979 in Great Britain. A causal relation between receipt of DTP vaccine and permanent neurologic injury was suggested. The estimated attributable risk for DTP vaccine was 1:330,000 doses with a wide confidence interval.

The methods and results of the NCES have been thoroughly scrutinized since publication of the study. This reassessment by multiple groups has determined that the number of patients was too small and their classification subject to enough uncertainty to preclude drawing valid conclusions about whether a causal relation exists between pertussis vaccine and permanent neurologic damage. Subsequent studies have failed to provide evidence to support a causal relation between DTP vaccination and either serious acute neurologic illness or permanent neurologic injury.

The NCES was the basis of prior ACIP statements suggesting that on rare occasions DTP vaccine could cause brain damage. However, on the basis of a more detailed review of the NCES data as well as data from other studies, the ACIP has revised its earlier view and now concludes:

- Although DTP may rarely produce symptoms that some have classified as acute encephalopathy, a causal relation between DTP vaccine and permanent brain damage has not been demonstrated. If the vaccine ever causes brain damage, the occurrence of such an event must be exceedingly rare. A similar conclusion has been reached by the Committee on Infectious Diseases of the American Academy of Pediatrics, the Child Neurology Society, the Canadian National Advisory Committee on Immunization, the British Joint Committee on Vaccination and Immunization, the British Pediatric Association, and the Institute of Medicine.
- The risk estimate from the NCES study of 1:330,000 for brain damage should no longer be considered valid on the basis of continuing analyses of the NCES and other studies.

In addition to these considerations, acute neurologic manifestations related to DTP vaccine are mainly febrile seizures. In an individual case, the role of pertussis vaccine as a cause of serious acute neurologic illness or permanent brain damage is impossible to determine on the basis of clinical or laboratory findings. Anecdotal

Table 2. Routine DTP Vaccination Schedule Summary for Persons ≥7 Years of Age

Dose	Age/interval	Product
Primary 1	First dose	Td
Primary 2	4-8 weeks after first dose*	Td
Primary 3	6-12 months after second dose*	Td
Booster	Every 10 years after last dose	Td

*Prolonging the interval does not require restarting series.

reports of DTP-induced acute neurologic disorders with or without permanent brain damage can have one of several alternate explanations. When children who experience acute, severe central-nervous system disorders in association with DTP vaccination are studied promptly and carefully, an alternate cause is often found.

Reduced Dosage Schedules or Multiple Small Doses of DTP

The ACIP recommends giving only full doses (0.5 mL) of DTP vaccine; if a specific contraindication to DTP exists, the vaccine should not be given.

Concern about adverse events following pertussis vaccine has led some practitioners to reduce the volume of DTP vaccine administered to <0.5 mL/dose in an attempt to reduce side effects. No evidence exists to show that this decreases the frequency of uncommon severe adverse events, such as seizures and hypotonic-hyporesponsive episodes.

The use of an increased number of reduced-volume doses of DTP in order to equal the total volume of the five recommended doses of DTP vaccine is not recommended. Whether this practice reduces the likelihood of vaccine-related adverse events is unknown. In addition, the likelihood of a temporally associated but etiologically unrelated event may be enhanced by increasing the number of vaccinations.

Precautions and Contraindications

General Considerations

The decision to administer or delay DTP vaccination because of a current or recent febrile illness depends largely on the severity of the symptoms and their etiology. Although a moderate or severe febrile illness is sufficient reason to postpone vaccination, minor illnesses such as mild upper-respiratory infections with or without low-grade fever are not contraindications. If ongoing medical care cannot be assured, taking every opportunity to provide appropriate vaccinations is particularly important.

Children with moderate or severe illnesses with or without fever can receive DTP as soon as they have recovered. Waiting a short period before administering DTP vaccine avoids superimposing the adverse effects of the vaccination on the underlying illness or mistakenly attributing a manifestation of the underlying illness to vaccination.

Routine physical examinations or temperature measurements are not prerequisites for vaccinating infants and children who appear to be in good health. Appropriate immunization practice includes asking the parent or guardian if the child is ill, postponing DTP vaccination for those with moderate or severe acute illnesses, and vaccinating those without contraindications or precautionary circumstances.

When an infant or child returns for the next dose of DTP, the parent should always be questioned about any adverse events that might have occurred following the previous dose.

A history of prematurity generally is not a reason to defer vaccination. Preterm infants should be vaccinated according to their chronological age from birth.

Immunosuppressive therapies, including irradiation, antimetabolites, alkylating agents, cytotoxic drugs, and corticosteroids (used in greater than physiologic doses), may reduce the immune response to vaccines. Short-term (<2-week) corticosteroid therapy or intra-articular, bursal, or tendon injections with corticosteroids should not be immunosuppressive. Although no specific studies with pertussis vaccine are available, if immunosuppressive therapy will be discontinued shortly it is reasonable to defer vaccination until the patient has been off therapy for 1 month; otherwise, the patient should be vaccinated while still on therapy.

Table 3. Adverse Events* Occurring Within 48 Hours of DTP Vaccinations

Events	Frequency†
Local	
redness	1/3 doses
swelling	2/5 doses
pain	1/2 doses
Systemic	
fever ≥38 C (100.4 F)	1/2 doses
drowsiness	1/3 doses
fretfulness	1/2 doses
vomiting	1/15 doses
anorexia	1/5 doses
persistent, inconsolable crying (duration ≥3 hours)	1/100 doses
fever ≥40.5 C (≥105 F)	1/330 doses
collapse (hypotonic-hyporesponsive episode)	1/1,750 doses
convulsions (with or without fever)	1/1,750 doses

*From Cody CL, Baraff LJ, Cherry JD, et al., 1981 (*42*).
†Rate per total number of doses regardless of dose number in DTP series.

Special Considerations for Preparations Containing Pertussis Vaccine

Precautions and contraindications guidelines that were previously published regarding the use of pertussis vaccine were based on three assumptions about the risks of pertussis vaccination that are not supported by available data: a) that the vaccine on rare occasions caused acute encephalopathy resulting in permanent brain damage; b) that pertussis vaccine aggravated preexisting central nervous system disease; and c) that certain nonencephalitic reactions are predictive of more severe reactions with subsequent doses. In addition, children from whom pertussis vaccine was withheld were thought to be well protected by herd immunity, a belief that is no longer valid. The current revised ACIP recommendations reflect better understanding of the risks associated not only with pertussis vaccine but also with pertussis disease.

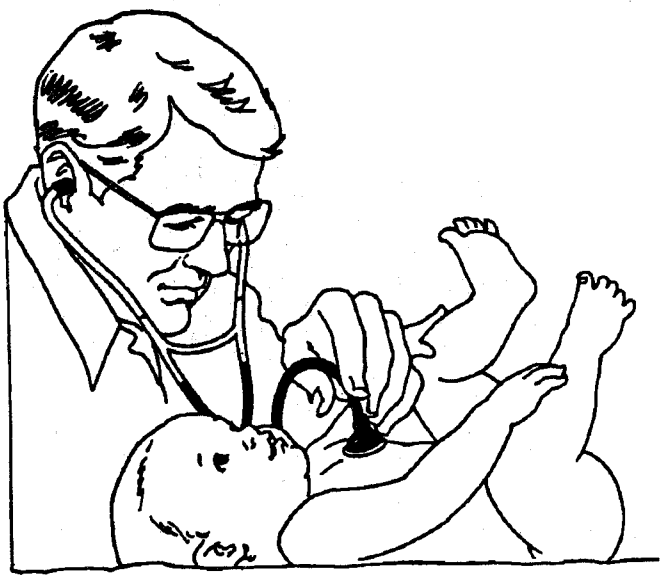
Contraindications. If any of the following events occur in temporal relationship to the administration of DTP, further vaccination with DTP is contraindicated:

- An immediate anaphylactic reaction. The rarity of such reactions to DTP is such that they have not been adequately studied. Because of uncertainty as to which component of the vaccine might be responsible, no further vaccination with any of the three antigens in DTP should be carried out. Alternatively, because of the importance of tetanus vaccination, such individuals may be referred for evaluation by an allergist and desensitized to tetanus toxoid if specific allergy can be demonstrated.
- Encephalopathy (not due to another identifiable cause). This is defined as an acute, severe central nervous system disorder occurring within 7 days following vaccination, and generally consisting of major alterations in consciousness, unresponsiveness, generalized or focal seizures that persist more than a few hours, with failure to recover within 24 hours. Even though causation by DTP cannot be established, no subsequent

doses of pertussis vaccine should be given. It may be desirable to delay for months before administering the balance of the doses of DT necessary to complete the primary schedule. Such a delay allows time for the child's neurologic status to clarify.

Precautions (Warnings). If any of the following events occur in temporal relation to receipt of DTP, the decision to give subsequent doses of vaccine containing the pertussis component should be carefully considered. Although these events were considered absolute contraindications in previous ACIP recommendations, there may be circumstances, such as a high incidence of pertussis, in which the potential benefits outweigh possible risks, particularly because these events are not associated with permanent sequelae. The following events were previously considered contraindications and are now considered precautions:

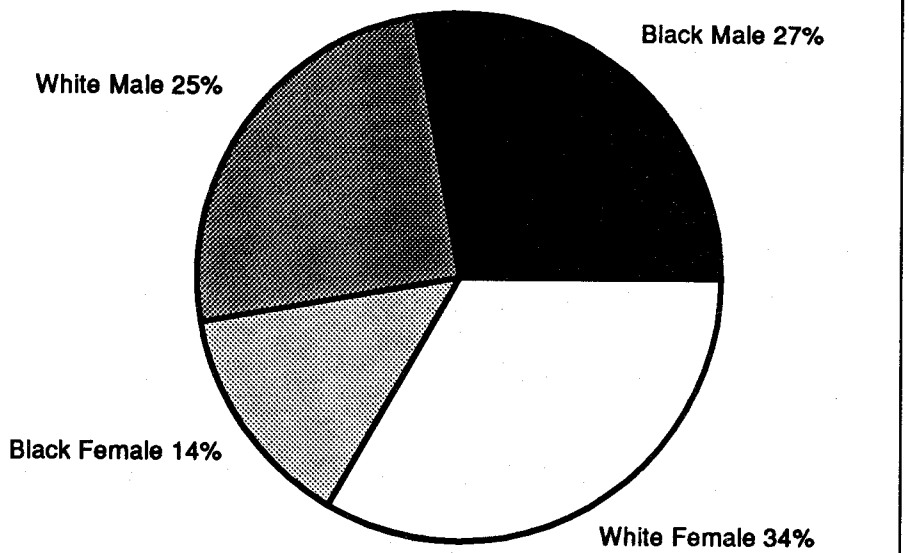
- Temperature of ≥40.5 C (105 F) within 48 hours not due to another identifiable cause. Such a temperature is considered a precaution because of the likelihood that fever following a subsequent dose of DTP vaccine also will be high. Because such febrile reactions are usually attributed to the pertussis component, vaccination with DT should not be discontinued.
- Collapse or shock-like state (hypotonic-hyporesponsive episode) within 48 hours. Although these uncommon events have not been recognized to cause death nor to induce permanent neurological sequelae, it is prudent to continue vaccination with DT, omitting the pertussis component.
- Persistent, inconsolable crying lasting ≥3 hours, occurring within 48 hours. Follow-up of infants who have cried inconsolably following DTP vaccination has indicated that this reaction, though unpleasant, is without long-term sequelae and not associated with other reactions of greater significance. Inconsolable crying occurs most frequently following the first dose and is less frequently reported following subsequent doses of DTP vaccine. However, crying for >30 minutes following DTP vaccination can be a predictor of increased likelihood of recurrence of persistent crying following subsequent doses. Children with persistent crying have had a higher rate of substantial local reactions than children who had other DTP-associated reactions (including high fever, seizures, and hypotonic-hyporesponsive episodes), suggesting that prolonged crying was really a pain reaction.
- Convulsions with or without fever occurring within 3 days. Short-lived convulsions, with or without fever, have not been shown to cause permanent sequelae. Furthermore, the occurrence of prolonged febrile seizures (i.e., status epilepticus**), irrespective of their cause, involving an otherwise normal child does not substantially increase the risk for subsequent febrile (brief or prolonged) or afebrile seizures. The risk is significantly increased (p=0.018) only among those children who are neurologically abnormal before their episode of status epilepticus. Accordingly, although a convulsion following DTP vaccination has previously been considered a contraindication to further doses, under certain circumstances subsequent doses may be indicated, particularly if the risk of pertussis in the community is high. If a child has a seizure following the first or second dose of DTP, it is desirable to delay subsequent doses until the child's neurologic status is better defined. By the end of the first year of life, the presence of an underlying neurologic disorder has usually been determined, and appropriate treatment instituted. DT vaccine should not be administered before a decision has been made about whether to restart the DTP series. Regardless of which vaccine is given, it is prudent also to administer acetaminophen, 15 mg/kg of body weight, at the time of vaccination and every 4 hours subsequently for 24 hours.



Vaccination of infants and young children who have underlying neurologic disorders. Infants and children with recognized, possible, or potential underlying neurologic conditions present a unique problem. They seem to be at increased risk for the appearance of manifestations of the underlying neurologic disorder within 2-3 days after vaccination. However, more prolonged manifestations or increased progression of the disorder, or exacerbation of the disorder have not been recognized. In addition, most neurologic conditions in infancy and young childhood are associated with evolving, changing neurological findings. Functional abnormalities are often unmasked by progressive neurologic development. Thus, confusion over the interpretation of progressive neurologic signs may arise when DTP vaccination or any other therapeutic or preventive measure is carried out.

Protection against diphtheria, tetanus, and pertussis is as important for children with neurologic disabilities as for other children. Such protection may be even more important for neurologically disabled children. They often receive custodial care or attend special schools where the risk of pertussis is greater because DTP vaccination is avoided for fear of adverse reactions. Also, if pertussis affects a neurologically disabled child who has difficulty in handling secretions and in cooperating with symptomatic care, it may aggravate preexisting neurologic problems because of anoxia, intracerebral hemorrhages, and other manifestations of the disease. Whether and when to administer DTP to children with proven or suspected underlying neurologic disorders must be decided on an individual basis. Important consid-

Figure 2. Reported Cases of Tetanus (N=36) in Virginia, by Race and Sex, 1972-1991



erations include the current local incidence of pertussis, the near absence of diphtheria in the United States, and the low risk of infection with *Clostridium tetani*. On the basis of these considerations and the nature of the child's disorder, the following approaches are recommended:

- Infants and children with previous convulsions. Infants and young children who have had prior seizures, whether febrile or afebrile, appear to be at increased risk for seizures following DTP vaccination than children and infants without these histories. A convulsion within 3 days of DTP vaccination in a child with a history of convulsions may be initiated by fever caused by the vaccine in a child prone to febrile seizures, may be induced by the pertussis component, or may be unrelated to the vaccination. As noted earlier, current evidence indicates that seizures following DTP vaccination do not cause permanent brain damage. Among infants and children with a history of previous seizures, it is prudent to delay DTP vaccination until the child's status has been fully assessed, a treatment regimen established, and the condition stabilized. It should be noted, however, that delaying DTP vaccination until the second 6 months of life will increase the risk of febrile seizures among persons who are predisposed. When DTP or DT is given, acetaminophen, 15 mg/kg, should also be given at the time of the vaccination and every 4 hours for the ensuing 24 hours.
- Infants as yet unvaccinated who are suspected of having underlying neurologic disease. It is prudent to delay initiation of vaccination with DTP or DT (but not other vaccines) until further observation and study have clarified the child's neurologic status and the effect of treatment. The decision as to whether to begin vaccination with DTP or DT should be made no later than the child's first birthday.
- Children who have not received a complete series of vaccine and who have a neurologic event occurring between doses. Infants and children who have received ≥one dose of DTP and who experience a neurologic disorder (e.g., a seizure, for example) not temporally associated with vaccination, but before the next scheduled dose, present a special management challenge. If the seizure or other disorder occurs before the first birthday and before completion of the first three doses of the primary series of DTP, further doses of DTP or DT (but not other vaccines) should be deferred until the infant's status has been clarified. The decision whether to use DTP or DT to complete the series should be made no later than the child's first birthday, and should take into consideration the nature of the child's problem and the benefits and possible risks of the vaccine. If the seizure or other disorder occurs after the first birthday, the child's neurologic status should be evaluated to ensure that the disorder is stable before a subsequent dose of DTP is given. (See the following #4)
- Infants and children with stable neurologic conditions. Infants and children with stable neurologic conditions, including well-controlled seizures, may be vaccinated. The occurrence of single seizures (temporally unassociated with DTP) do not contraindicate DTP vaccination, particularly if the seizures can be satisfactorily explained. Parents of infants and children with histories of convulsions should be informed of the increased risk of postvaccination seizures. Acetaminophen, 15 mg/kg, every 4 hours for 24 hours, should be given to children with such histories to reduce the possibility of postvaccination fever.
- Children with resolved or corrected neurologic disorders. DTP vaccination is recommended for infants with certain neurologic problems, such as neonatal hypocalcemic tetany or hydrocephalus (following placement of a shunt and without seizures), that have been corrected or have clearly subsided without residua.

Vaccination of infants and young children who have a family history of convulsion or other central nervous system disorders. A family history of convulsions or other central nervous disorders is not a contraindication to pertussis vaccination. Acetaminophen should be given at the time of DTP vaccination and every 4 hours for 24 hours to reduce the possibility of postvaccination fever.

Preparations Containing Diphtheria Toxoid and Tetanus Toxoid

The only contraindication to tetanus and diphtheria toxoids is a history of a neurologic or severe hypersensitivity reaction following a previous dose. Vaccination with tetanus and diphtheria toxoids is not known to be associated with an increased risk of convulsions. Local side effects alone do not preclude continued use. If an anaphylactic reaction to a previous dose of tetanus toxoid is suspected, intradermal skin testing with appropriately diluted tetanus toxoid may be useful before a decision is made to discontinue tetanus toxoid vaccination. In one study, 94 of 95 persons with histories of anaphylactic symptoms following a previous dose of tetanus toxoid were nonreactive following intradermal testing and tolerated further tetanus toxoid challenge without incident. One person had erythema and induration immediately following skin testing, but tolerated a full IM dose without adverse effects. Mild, nonspecific skin-test reactivity to tetanus toxoid, particularly if used undiluted, appears to be fairly common.

Most vaccinees develop inconsequential cutaneous delayed hypersensitivity to the toxoid.

Persons who experienced Arthus-type hypersensitivity reactions or a temperature of >103 F (39.4 C) following a prior dose of tetanus toxoid usually have high serum tetanus antitoxin levels and should not be given even emergency doses of Td more frequently than every 10 years, even if they have a wound that is neither clean nor minor.

If a contraindication to using tetanus toxoid-containing preparations exists for a person who has not completed a primary series of tetanus toxoid immunization and that person has a wound that is neither clean nor minor, only passive immunization should be given using tetanus immune globulin (TIG). (See Tetanus Prophylaxis in Wound Management).

Although no evidence exists that tetanus and diphtheria toxoids are teratogenic, waiting until the second trimester of pregnancy to administer Td is a reasonable precaution for minimizing any concern about the theoretical possibility of such reactions.

Misconceptions Concerning Contraindications to DTP

Some health-care providers inappropriately consider certain conditions or circumstances as contraindications to DTP vaccination. These include the following:

- Soreness, redness, or swelling at the DTP vaccination site or temperature of <40.5 C (105 F).
- Mild, acute illness with low-grade fever or mild diarrheal illness affecting an otherwise healthy child.
- Current antimicrobial therapy or the convalescent phase of an acute illness.
- Recent exposure to an infectious disease.
- Prematurity. The appropriate age for initiating vaccination among the prematurely born infant is the usual chronological age from birth. Full doses (0.5 mL) of vaccine should be used.
- History of allergies or relatives with allergies.
- Family history of convulsions.
- Family history of SIDS.
- Family history of an adverse event following DTP vaccination.

Tetanus Prophylaxis in Wound Management

Chemoprophylaxis against tetanus is neither practical nor useful in managing wounds. Wound cleaning, debridement when indicated, and proper immunization are important. The need for tetanus toxoid (active immunization), with or without tetanus immune globulin (TIG) (passive immunization), depends on both the condition of the wound and the patient's vaccination history (Table 4; see also Precautions and Contraindications). Rarely has tetanus occurred among persons with documentation of having received a primary series of toxoid injections.

A thorough attempt must be made to determine whether a patient has completed primary vaccination. Patients with unknown or uncertain previous vaccination histories should be considered to have had no previous tetanus toxoid doses. Persons who had military service since 1941 can be considered to have received at least one dose. Although most people in the military since 1941 may have completed a primary series of tetanus toxoid, this cannot be assumed for each individual. Patients who have not completed a primary series may require tetanus toxoid and passive immunization at the time of wound cleaning and debridement (Table 4).

Available evidence indicates that complete primary vaccination with tetanus toxoid provides long-lasting protection ≥10 years for most recipients. Consequently, after complete primary tetanus vaccination, boosters, even for wound management, need be given only every 10 years when wounds are minor and uncontaminated. For other wounds, a booster is appropriate if the patient has not received tetanus toxoid within the preceding 5 years. Persons who have received at least two doses of tetanus toxoid rapidly develop antitoxin antibodies.

Td is the preferred preparation for active tetanus immunization in wound management of patients ≥7 years of age. Because a large proportion of adults are susceptible, this plan enhances diphtheria protection. Thus, by taking advantage of acute health-care visits, such as for wound management, some patients can be protected who otherwise would remain susceptible. For routine wound management among children <7 years of age who are not adequately vaccinated, DTP should be used instead of single-antigen tetanus toxoid. DT may be used if pertussis vaccine is contraindicated or individual circumstances are such that potential febrile reactions following DTP might confound the management of the patient. For inadequately vaccinated patients of all ages, completion of primary vaccination at the time of discharge or at follow-up visits should be ensured (Tables 1 and 2).

If passive immunization is needed, human TIG is the product of choice. It provides protection longer than antitoxin of animal origin and causes few adverse reactions. The TIG prophylactic dose that is currently recommended for wounds of average severity is 250 units IM. When tetanus toxoid and TIG are given concurrently, separate syringes and separate sites should be used. The ACIP recommends the use of only adsorbed toxoid in this situation.

**Adapted from MMWR 1991;40(No. RR-10):1-28.*

§Distributed by the Division of Biologic Products, Michigan Department of Public Health. Contact Dr. Robert Myers, Chief, Division of Biologic Products, Bureau of Laboratories and Epidemiological Services, Michigan Department of Public Health, Lansing, Michigan 48909 (telephone: (517) 335-8120).

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***Any seizure lasting 30 minutes or recurrent seizures lasting a total of 30 minutes without the child fully regaining consciousness.*

Table 4. Summary Guide to Tetanus Prophylaxis in Routine Wound Management

History of adsorbed tetanus toxoid (doses)	Clean, minor wounds		All other wounds*	
	Td(†)	TIG	Td(†)	TIG
Unknown or < three	Yes	No	Yes	Yes
≥ Three (§)	No(¶)	No	No(**)	No

*Such as, but not limited to, wounds contaminated with dirt, feces, soil, and saliva; puncture wounds; avulsions; and wounds resulting from missiles, crushing, burns and frostbite.
†For children <7 years old; DTP (DT, if pertussis vaccine is contraindicated) is preferred to tetanus toxoid alone. For persons ≥7 years of age, Td is preferred to tetanus toxoid alone.
§If only three doses of *fluid* toxoid have been received, then a fourth dose of toxoid, preferably an adsorbed toxoid, should be given.
¶Yes, if >10 years since last dose.
**Yes, if >5 years since last dose. (More frequent boosters are not needed and can accentuate side effects.)

Cases of Selected Notifiable Diseases, Virginia, October 1 through October 31, 1992.

Disease	Total Cases Reported This Month						Total Cases Reported to Date in Virginia		
	State	Regions					This Yr	Last Yr	5 Yr Avg
		NW	N	SW	C	E			
AIDS	84	1	23	7	21	32	561	596	390
Campylobacter	55	8	14	10	10	13	547	526	541
Gonorrhea*	781	-	-	-	-	-	13567	15276	13593
Hepatitis A	15	1	8	2	1	3	101	156	244
Hepatitis B	12	1	2	3	1	5	158	184	259
Hepatitis NANB	2	0	0	1	0	1	30	25	47
Influenza	1	0	0	1	0	0	128	690	1431
Kawasaki Syndrome	0	0	0	0	0	0	20	23	20
Legionellosis	4	0	0	2	1	1	18	13	11
Lyme Disease	5	0	0	1	0	4	100	127	66
Measles	0	0	0	0	0	0	15	30	68
Meningitis, Aseptic	36	8	5	2	5	16	232	380	276
Meningitis, Bacterial~	9	2	1	1	1	4	97	111	133
Meningococcal Infections	2	0	0	2	0	0	50	31	48
Mumps	0	0	0	0	0	0	49	55	94
Pertussis	0	0	0	0	0	0	10	20	28
Rabies in Animals	41	13	7	10	4	7	307	221	247
Reye Syndrome	0	0	0	0	0	0	0	2	1
Rocky Mountain Spotted Fever	4	0	1	0	2	1	21	19	19
Rubella	0	0	0	0	0	0	0	0	3
Salmonellosis	73	3	24	12	13	21	793	1103	1335
Shigellosis	21	2	11	0	8	0	198	334	284
Syphilis (1° & 2°)*	59	1	7	10	16	25	623	775	547
Tuberculosis	31	3	9	0	6	13	304	274	320

Localities Reporting Animal Rabies: Alexandria 2 raccoons; Augusta 3 skunks; Brunswick 1 raccoon; Clarke 1 skunk; Cumberland 1 raccoon; Fairfax 1 raccoon, 1 skunk; Floyd 1 skunk; Franklin County 1 skunk; Greene 1 raccoon; Greensville 1 raccoon; Henrico 1 skunk; Henry 1 dog; Isle of Wight 2 raccoons; James City 2 skunks; Loudoun 3 raccoons; Montgomery 1 cat, 1 cow, 1 skunk; Pulaski 2 skunks; Rockbridge 1 raccoon; Rockingham 2 dogs, 2 raccoons; Shenandoah 1 skunk; Spotsylvania 2 skunks; Suffolk 1 raccoon; Virginia Beach 2 raccoons; Wythe 1 cat, 1 dog.
Occupational Illnesses: Asbestosis 9; Carpal Tunnel Syndrome 74; Coal Workers' Pneumoconiosis 20; Loss of Hearing 11; Pesticide Poisoning 1; Repetitive Motion Disorder 3.

*Total now includes military cases to make the data consistent with reports of the other diseases.
~Other than meningococcal

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