

Centers for Disease Control and Prevention
National Center for Immunization and Respiratory Diseases



Tetanus, Diphtheria, and Pertussis and Tdap/Td Vaccines

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Chapters 7, 16, 21

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Diphtheria

- A toxin-mediated disease caused by *Corynebacterium diphtheriae*
- Usually produces exudate and membrane involving pharynx and tonsils
- Complications attributable to toxin – severity generally related to extent of local disease

Tetanus

- A toxin-mediated disease caused by *Clostridium tetani*
- Infectious from environment, not contagious
- Most common form is generalized tetanus: descending symptoms of trismus (lockjaw), difficulty swallowing, muscle rigidity, spasms
- Complications caused by spasms, asphyxia, or nosocomial

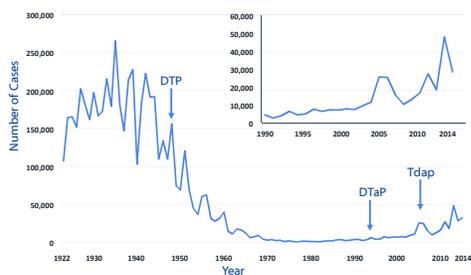
Pertussis

- Highly contagious respiratory infection caused by *Bordetella pertussis*
- Insidious onset, similar to minor upper respiratory infection with nonspecific cough
- Fever usually minimal throughout course
- Catarrhal stage 1-2 weeks
- Paroxysmal cough stage 1-6 weeks
- Convalescence weeks to months

Pertussis Facts

- Coughing fits due to pertussis infection can last for up to 10 weeks or more; some people know this disease as the “100 day cough.”

Reported NNDSS pertussis cases 1922-2014



SOURCE: CDC, the National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System and 1922-1949, passive reports to the Public Health Service

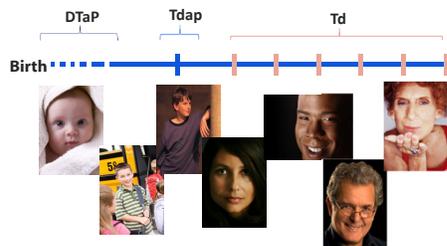
Why Adults Need Pertussis Vaccine

- During 2015, state health departments reported 20,762 cases of pertussis
 - This represents a 37% decrease compared to 32,971 cases reported during 2014
- Infection may be asymptomatic, or may present as classic pertussis
- Disease often milder than in infants and children
 - Persons with mild disease may transmit the infection
- Older persons and household contacts often source of infection

Pertussis Complications Among Adults

- Difficulty sleeping
- Urinary incontinence
- Pneumonia
- Rib fracture
- Plus:
 - Medical costs
 - Missed school and work
 - Impact on public health system

Vaccinate Throughout a Lifetime!



Tdap Vaccination Rates

- Among adults for whom Tdap vaccination could be assessed, coverage in the past ten years:
 - 26.6% among adults ≥19 years (a 3.4 percentage point increase compared with 2015)
 - 28.0% among adults 19-64 years (a 3.3 percentage point increase compared with 2015)
 - 20.4% among adults ≥65 years (a 3.9 percentage point increase compared with 2015)
- Whites had higher Tdap coverage across all age groups compared with blacks, Hispanics, and Asians and these vaccination differences increased for blacks only compared with differences measured in 2015

Vaccination Coverage Among Adults in the United States, National Health Interview Survey, 2016
www.cdc.gov/nchs/data/tables/2016/2016.html#tetanus

Tdap Vaccines

- 2 products available licensed for single use with different age indications
 - Less diphtheria toxoid and acellular pertussis antigen than DTaP
 - Lowercase letters = less antigen!
- Boostrix (GlaxoSmithKline)
 - FDA approved for persons 10 years of age and older
- Adacel (Sanofi Pasteur)
 - FDA approved for persons 10 through 64 years of age

Tdap/Td Vaccination Recommendations

- Persons 19 years of age and older, *who have not previously been vaccinated with Tdap*, should receive a single, lifetime dose of Tdap*
 - Persons with unknown vaccination status should be vaccinated
 - Adolescent dose counts as the one, lifetime dose
- If indicated, Tdap should not be delayed; administer regardless of when the last tetanus- and diphtheria-containing vaccine was given
- Td should be administered every 10 years after Tdap

Interval of Tdap After Td

- When Tdap was licensed, the safety of administering a dose of Tdap at intervals <5 years after Td or pediatric DTP/DTaP had not been studied
- Evaluations of the safety of administering Tdap at intervals <5 years after Td, including as short as 18 months, suggest that the safety of much shorter intervals is acceptable
 - Adverse events were limited to local reactions, including pain (68%–83%), erythema (20%–25%), and swelling (19%–38%).
- ACIP concluded that although longer intervals between Td and Tdap vaccination could decrease the occurrence of local reactions, the benefits of protection against pertussis outweigh

No Additional Doses of Tdap for the General Population

- With the exception of pregnant women, only a single booster dose of Tdap is recommended for persons aged 11 years and older
- ACIP recognizes the increasing burden of pertussis and the need for an effective strategy to reduce this burden.
- A decision analysis model evaluating a routine program of additional doses of Tdap administered at either a 5- or 10-year interval to persons suggested that the reduction in pertussis disease burden attributable to the routine use of a second dose of Tdap would be limited

Tdap For Persons Without History of DTP or DTaP

- All adolescents and adults should have documentation of having received a primary series of DTaP, DTP, DT, or Td
- Persons without documentation who have never been vaccinated or have unknown status should receive a 3-dose primary series
- One dose should be Tdap, preferably the first

Tdap For Persons Without History of DTP or DTaP

- Preferred schedule:
 - Dose 1 Tdap
 - Dose 2 Td at least 4 weeks after dose 1
 - Dose 3 Td at least 6 months after dose 2
 - Booster Td every 10 years

Special Situations

Tdap Recommendations and Pregnant Women

- Administer a dose of Tdap during each pregnancy, irrespective of the patient's prior history of receiving the vaccine
- Tdap should be administered between 27 and 36 weeks gestation, although it may be given at any time during pregnancy.
 - Currently available data suggest that vaccinating earlier in the 27 through 36 week time period will maximize passive antibody transfer to the infant.
- If not administered during pregnancy, for women not previously vaccinated with Tdap, Tdap should be administered immediately postpartum

*Off-label recommendation. MMWR 2013;62(No. 7):131-5

Studies Show Maternal Tdap Vaccination Very Effective in Prevention of Infant Pertussis Infection

	Vaccine effectiveness (95% confidence intervals)	Definitions	
		Infant age at pertussis onset	Mother gestational age received Tdap
United Kingdom			
Observational ¹ , screening method	91% (83%-95%)	<3 mths	at least 28days before birth*
Case-Control ² , retrospective	91% (77%-97%), unadjusted 93% (81%-97%), adjusted ³	<2 mths	Cases: 31.5 wks (range, 28-38) Controls: 33 wks (range, 26-38)
United States			
Cohort ⁴ , retrospective	85% (33%-98%)	<2 mths	27-36 wks
Case-Control ⁵ , retrospective	78% (44%-91%)	<2 mths	27-36 wks

*2012 UK recommendation: Tdap between 28 and 38 weeks

³Adjusted for sex, geographical area, and birth period

¹Amerthalingam G, et al. 2014; ²Dabrera G, et al. 2015; ³Winter K, et al. 2016; ⁴CDC, unpublished

**ACIP Conclusions
Safety of Tdap for Every Pregnancy**

- Data reassuring on 2 doses of Tdap
- Data and experience with tetanus toxoid vaccine suggest no excess risk of adverse events
 - ~5% of women would receive 4 or more doses
- CDC provides ongoing monitoring to address concerns about the safety of Tdap given during subsequent pregnancies

Postpartum Women and Close Contacts of Infants

- Previously unvaccinated EVER or vaccination status unknown—administer Tdap
- Previously vaccinated persons – Tdap is NOT indicated
 - Including mothers, fathers, siblings, and grandparents
 - Any previous, documented dose counts

Tdap and Health Care Personnel



Tdap and Healthcare Personnel (HCP)

- Previously unvaccinated HCP should receive a single dose of Tdap as soon as feasible, regardless of time since last Td dose
- After receipt of 1 dose of Tdap, health care personnel should receive routine Td booster immunizations according to the recommended schedule
- Additional doses of Tdap are not recommended for previously vaccinated HCP*

*Except pregnant women
MMWR 2006;55(9):1711-17

Tetanus Prophylaxis



Tetanus Prophylaxis and Wound Management

- ACIP recommends tetanus-containing vaccine and tetanus immune globulin (TIG) when indicated as part of standard wound management to prevent tetanus
- Tetanus-containing vaccine is indicated as part of wound management if more than 5 years has passed since the tetanus-containing vaccine

Tetanus Prophylaxis and Wound Management

- Persons who have completed the 3-dose primary tetanus vaccination series and a tetanus toxoid-containing vaccine less than 5 years earlier are protected against tetanus and do not require a tetanus toxoid-containing vaccine or TIG as part of wound management
- Persons who have not completed the primary series might require tetanus toxoid-containing vaccine and passive vaccination with TIG at the time of wound management
- Persons with unknown or uncertain previous tetanus vaccination histories should be considered to have had no previous tetanus toxoid-containing vaccine
 - An attempt should be made to determine whether a patient has completed the 3-dose primary tetanus vaccination series
- When both TIG and a tetanus toxoid-containing vaccine are indicated, the products should be administered using separate syringes at different anatomical sites
- Persons with human immunodeficiency virus (HIV) infection or severe immunodeficiency who have contaminated wounds should also receive TIG, regardless of their history of tetanus immunizations

Which Vaccine—Tdap or Td?

- Tdap is preferred for persons who have not previously received Tdap or whose Tdap history is unknown
- If a tetanus toxoid-containing vaccine is indicated for a pregnant woman, Tdap should be used
- For nonpregnant persons with documentation of previous dose of Tdap, Td should be used if a tetanus toxoid-containing vaccine is indicated

Tdap Precautions

- History of Guillain-Barré syndrome within 6 weeks after a prior dose of tetanus toxoid-containing vaccine

- Progressive neurologic disorder until the condition has stabilized

- History of a severe local reaction (Arthus reaction) following a prior dose of a tetanus and/or diphtheria toxoid-containing vaccine

Tdap/Td Adverse Reactions

- Local reactions (pain, redness, swelling)
 - 21%-66%

- Temp of 100.4°F or higher
 - 1.4%

- Adverse reactions occur at approximately the same rate as Td alone (without acellular pertussis vaccine)

Vaccine Storage and Handling

- Store Tdap and Td vaccines in a refrigerator betw 2°C – 8°C (36°F - 46°F)

- Do not freeze the vaccine

- Store Tdap and Td vaccines in:
 - The original packaging with the lids closed
 - A clearly labeled bin and/or area of the storage unit

Tdap (Adacel)

Ages: 7 years through 18 years

Use for: A single dose of one (1) Tdap vaccine for pertussis

Ages: 11 years and older

Use for: A single dose*

*Adacel Tdap is recommended for pregnant women during each pregnancy regardless of previous Tdap vaccination history

Route: Intramuscular (IM) injection

Storage tip: Top of prefilled syringe area contains label

Tdap (Boostrix)

Ages: 7 years through 18 years

Use for: A single dose of one (1) Tdap vaccine for pertussis

Ages: 11 years and older

Use for: A single dose*

*Boostrix Tdap is recommended for pregnant women during each pregnancy regardless of previous Tdap vaccination history

Route: Intramuscular (IM) injection

Read the package insert that accompanies the product to check for the presence of animal origin cell lines.

Td (generic)

Ages: 7 years and older

Use for: Primary series and booster doses for persons previously vaccinated with Tdap

Route: Intramuscular (IM) injection

Vaccine storage label example
Available at www.cdc.gov/vaccines/hqp/admin/storage/guide/vaccine-storage-labels.pdf

What Do You Think?

- A woman delivered her first child yesterday. Her diphtheria, tetanus, and pertussis immunization history is as follows:
 - Completed DTaP series in childhood
 - Received a dose of Tdap vaccine at 14 years of age
 - Did not receive a dose of Tdap vaccine during pregnancy
- Should you administer a dose of Tdap before discharge from the hospital?

- Yes
- No

Questions?