Resource Document 6: Tetanus Immunization

I. Introduction

Attention must be directed to adequate tetanus prophylaxis in the multiply injured patient, particularly if open-extremity trauma is present. The average incubation period for tetanus is 10 days; most often it is four to 21 days. In severe trauma cases, tetanus can appear as early as one to two days. All of the medical profession must be cognizant of this important fact when providing care to the injured patient.

Tetanus immunization depends on the patient's previous immunization status and the tetanus-prone nature of the wound. The following guidelines have been adapted from *A Guide to Prophylaxis Against Tetanus in Wound Management*, prepared by the ACS Committee on Trauma, and information available from the Centers for Disease Control (CDC). Because this information is reviewed and updated as new data become available, the Committee on Trauma recommends contacting the CDC for the latest information and detailed guidelines related to tetanus prophylaxis and immunization for the injured patient.

II. General Principles

A. Individual Assessment

The attending physician must determine the requirements for adequate prophylaxis against tetanus for each injured patient individually.

B. Surgical Wound Care

Regardless of the active immunization status of the patient, meticulous surgical care - including removal of all devitalized tissue and foreign bodies - should be provided immediately for all wounds. If doubt exists about the adequacy of the debridement of the wound or a puncture injury is present, the wound should be left open and not closed by sutures. Such care is essential as part of the prophylaxis against tetanus.

C. Human Tetanus Immune Globulin (TIG)

Passive immunization with 250 units of tetanus immune globuline (TIG), administered intramuscularly, must be considered individually for each patient. TIG provides longer protection than antitoxin of animal origin and causes few adverse reactions. The characteristics of the wound, conditions under which it occurred, its age, TIG treatment, and the previous active immunization status of the patient must be considered (Table 2). When tetanus toxoid and TIG are given concurrently, separate syringes and separate sites should be used.

If the patient has ever received two or more injections of toxoid, TIG is not indicated, unless the wound is judged to be tetanus prone and is more than 24 hours old. Do not administer equine tetanus antitoxin, except when the human toxin is not available, and only if the possibility of tetanus outweighs the potential reactions of horse serum.
D. Documentation

For every injured patient, information about the mechanism of injury, the characteristics of the wound, age, previous active immunization status, history of a neurologic or severe hypersensitivity reaction following a previous immunization treatment, and plans for follow-up should be documented. Each patient must be given a written record describing treatment rendered and follow-up instructions that outline wound care, drug therapy, immunization status, and potential complications. The patient should be referred to a designated physician who will provide comprehensive follow-up care, including completion of active immunizations.

A wallet-sized card documenting the immunization administered and date of immunization should be given to every injured patient. The patient should be instructed to carry the written record at all times and complete active immunization, if indicated. For precise tetanus prophylaxis, an accurate and immediately available history regarding previous active immunization against tetanus is required. Otherwise, rapid laboratory titration is necessary to determine the patient's serum antitoxin level.

E. Antibiotics

The effectiveness of antibiotics for prophylaxis of tetanus is uncertain. In patients who need TIG as part of the treatment to prevent tetanus, and it is not available for any reason, antibiotics like penicillin delay the onset of tetanus. This allows a period of two days in which to obtain the TIG and institute proper passive immunization.

F. Contraindications

The only contraindication to tetanus and diphtheria toxoids in the wounded patient is a history of neurologic or severe hypersensitivity reaction following a previous dose. Local side effects alone do not preclude continued use. If a systemic reaction is suspected to represent allergic hypersensitivity, immunization should be postponed until appropriate skin testing is undertaken at a later time. If a tetanus toxoid-containing preparation is contraindicated, passive immunization against tetanus should be considered for a tetanus-prone wound.

Contraindications to pertussis vaccination in infants and children younger than seven years old include either a previous adverse reaction after DTP or single-antigen pertussis vaccination and/or the presence of a neurologic finding. If such a contraindication to using pertussis vaccine adsorbed (P) exists, diphtheria and tetanus toxoid adsorbed (for pediatric use) (DT) is recommended. A static neurologic condition, such as cerebral palsy or a family history of convulsions or other central nervous system disorders, is not a contraindication to giving vaccines containing the pertussis antigen.

G. Active Immunization for Normal Infants and Children

For children younger than seven years of age, immunization requires four injections of diphtheria and tetanus toxoids and pertussis vaccine adsorbed (DTP). A booster (fifth dose) injection is administered at four to six years of age. Thereafter, a routine booster of tetanus
and diphtheria toxoids adsorbed (Td) is indicated at 10-year intervals.

H. Active Immunization for Adults

Immunization for adults requires at least three injections of Td. An injection of Td should be repeated every 10 years throughout the individual's life, providing no significant reactions to Td have occurred.

I. Active Immunization for Pregnant Women

Neonatal tetanus is preventable by active immunization of the pregnant mother during the first six months of pregnancy, with two injections of Td given two months apart. After delivery and six months after the second dose, the mother should be given the third dose of Td to complete the active immunization.

An injection of Td should be repeated every 10 years throughout life, providing no significant reactions to Td have occurred. In the event that a neonate is born to a nonimmunized mother without obstetric care, the infant should receive 250 units of TIG. Active and passive immunization of the mother also should be initiated.

J. Previously Immunized Individuals

1. Fully immunized

When the attending physician has determined that the patient has been previously and fully immunized, and the last dose of toxoid was given within 10 years:

   a. Administer 0.5 mL of adsorbed toxoid for tetanus-prone wounds, if more than five years has elapsed since the last dose.

   b. This booster may be omitted if excessive toxoid injections have been given before.

2. Partially immunized

When the patient has received two or more injections of toxoid, and the last dose was received more than ten years ago, 0.5 mL of adsorbed toxoid is administered for both tetanus-prone and nontetanus-prone wounds. Passive immunization is not necessary.

K. Individuals Not Adequately Immunized

When the patient has received only one or no prior injections of toxoid or the immunization history is unknown:

1. Nontetanus-prone wounds: Administer 0.5 mL of adsorbed toxoid for nontetanus-prone wounds.
2. Tetanus-Prone wounds

a. Administer 0.5 mL adsorbed toxoid.
b. Administer 250 units TIG.
c. Consider administering antibiotics, although their effectiveness for prophylaxis of tetanus remains unproved.
d. Administer medication using different syringes and sites for injection.

I. Immunization Schedule

1. Adult

a. Three injections of toxoid
b. Booster every 10 years.

2. Children

a. Four injections of DTP
b. Fifth dose at four to six years of age
c. Booster every 10 years.
III. Specific Measures for Patients With Wounds

Recommendations for tetanus prophylaxis are based on (1) condition of the wound, and (2) the patient's immunization history. Table 1 outlines some of the clinical features of wounds that are prone to develop tetanus. A wound with any one of these features is a tetanus-prone wound.

Table 1. Nontetanus- and Tetanus-Prone Wounds

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Nontetanus-Prone Wounds</th>
<th>Tetanus-Prone Wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of wound</td>
<td>≤ 6 hours</td>
<td>&gt; 6 hours</td>
</tr>
<tr>
<td>Configuration</td>
<td>Linear wound</td>
<td>Stellate wound, avulsion, abrasion</td>
</tr>
<tr>
<td>Depth</td>
<td>≤ 1 cm</td>
<td>&gt; 1 cm</td>
</tr>
<tr>
<td>Mechanism of injury</td>
<td>Sharp surface (eg, knife, glass)</td>
<td>Missile, crush, burn frostbite</td>
</tr>
<tr>
<td>Signs of infection</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>Devitalized tissue</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>Contaminants (dirt, feces, soil, saliva, etc)</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>Denervated, and/or ischemic tissue</td>
<td>Absent</td>
<td>Present</td>
</tr>
</tbody>
</table>
Table 2. Summary of Tetanus Prophylaxis for the Injured Patient

<table>
<thead>
<tr>
<th>History of Adsorbed Tetanus Toxoid (Doses)</th>
<th>Nontetanus-Prone Wounds</th>
<th>Tetanus-Prone Wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Td¹ TIG</td>
<td>Td¹ TIG</td>
</tr>
<tr>
<td>Unknown or ≤ three</td>
<td>Yes No</td>
<td>Yes No</td>
</tr>
<tr>
<td>≥ Three²</td>
<td>No³ No</td>
<td>No⁴ No</td>
</tr>
</tbody>
</table>

Key to Table 2

1. For children younger than seven years old: DTP (DT, if pertussis vaccine is contraindicated) is preferred to tetanus toxoid alone. For persons seven years old and older, Td is preferred to tetanus toxoid alone.

2. If only three doses of fluid toxoid have been received, a fourth dose of toxoid, preferably an adsorbed toxoid, should be given.

3. Yes, if more than 10 years since last dose.

4. Yes, if more than five years since last dose. (More frequent boosters are not needed and can accentuate side effects.)

Td  Tetanus and diphtheria toxoids adsorbed - for adult use.

TIG  Tetanus immune globulin - human.