

Toxic Shock Syndrome (TSS) Investigation Guideline

CONTENT:

VERSION DATE:

Investigation Protocol:

- | | | |
|------------------------------------------------------------------------------|--|----------------|
| <ul style="list-style-type: none">• Investigation Guideline | | 09/2011 |
| <ul style="list-style-type: none">• Rapid Assessment Worksheet | | 01/2010 |

Attachments:

- | | | |
|--------------------------------------------------------------|--|----------------|
| <ul style="list-style-type: none">• Fact Sheet | | 01/2010 |
|--------------------------------------------------------------|--|----------------|

Date	Replaced	Comments
09/2011	01/2010	BEPHI replaced BSE throughout. Updated to CDC 2011 Case Definition. Updated web links. Addition of notification section.
02/2012	-	Removed references to KS-EDSS.

Toxic Shock Syndrome (TSS)

Disease Management and Investigation Guidelines

CASE DEFINITION (CDC 2011)

Clinical Description for Public Health Surveillance:

An illness with the following clinical manifestations:

- **Fever:** temperature greater than or equal to 102.0°F ($\geq 38.9^{\circ}\text{C}$)
- **Rash:** diffuse macular erythroderma
- **Desquamation:** 1-2 weeks after illness onset
- **Hypotension:** systolic blood pressure less than or equal to 90 mm Hg for adults or less than fifth percentile by age for children aged less than 16 years
- **Multisystem involvement** (three or more of the following organ systems):
 - *Gastrointestinal:* vomiting or diarrhea at onset of illness
 - *Muscular:* severe myalgia or creatine phosphokinase level at least twice the upper limit of normal
 - *Mucous membrane:* vaginal, oropharyngeal, or conjunctival hyperemia
 - *Renal:* blood urea nitrogen or creatinine at least twice the upper limit of normal for laboratory or urinary sediment with pyuria (greater than or equal to 5 leukocytes per high-power field) in the absence of urinary tract infection
 - *Hepatic:* total bilirubin, alanine aminotransferase enzyme, or aspartate aminotransferase enzyme levels at least twice the upper limit of normal
 - *Hematologic:* platelets less than 100,000/mm³
 - *Central nervous system:* disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent.

Laboratory Criteria for Case Classification:

Negative results on the following tests, if obtained:

- Negative blood or cerebrospinal fluid cultures (blood culture may be positive for *Staphylococcus aureus*)
- Negative serologies for Rocky Mountain spotted fever, leptospirosis, or measles

Note: Cultures positive for Group A Streptococcus should be investigated as Streptococcal Toxic Shock Syndrome. Refer to the Streptococcal Invasive Disease Investigation Guideline.

Case Classification:

- **Confirmed:** case which meets the laboratory criteria and in which all five of the clinical findings described above are present, including desquamation, unless the patient dies before desquamation occurs
- **Probable:** case which meets the laboratory criteria and in which four of the five clinical findings described above are present

LABORATORY ANALYSIS

Specimens are not required to be sent to the Kansas Health and Environmental Laboratory (KHEL); but they are equipped to assist with the analysis of *S. aureus* isolates if requested as part of an epidemiological investigation. Additional information can be found on-line at www.kdheks.gov/labs/lab_ref_guide.htm.

EPIDEMIOLOGY

A majority of the early cases of TSS were associated with menstruation and most with vaginal tampon use. Today only 55% of the reported cases are associated with menses. Contraceptive diaphragm or vaginal contraceptive sponge use and infection following childbirth or abortion are additional risk factors. Men and women have also been associated to a growing number of cases where *S. aureus* was isolated from focal lesions of skin, bone, respiratory tract and surgical sites. For one-third of the cases, no source of infection has been found; such cases were often characterized a scant or undetectable rash.

DISEASE OVERVIEW

A. Agent:

Usually exotoxin producing strains of *Staphylococcus aureus*, a bacterium. Most cases associated with toxic shock syndrome toxin 1.

B. Clinical Description:

Acute illness characterized by the sudden onset of a high fever (> 102°F [38.9°C]), myalgia, weakness, vomiting, diarrhea, hypotension, diffuse macular erythroderma, and multi-organ system disorders. During the acute phase of TSS a “sunburn-like” rash is present; 1-2 weeks later, desquamation of the skin occurs, especially on the soles and palms.

C. Reservoirs:

Humans.

D. Mode(s) of Transmission:

S. aureus commonly colonizes skin and mucous membranes in humans. TSS is not transmitted person-to-person but requires a favorable situation to allow the organism to thrive resulting in disease.

E. Incubation Period:

The incubation period ranges from 1-10 days. Post-surgical TSS can be as short as 12 hours. Menses-related cases can occur anytime during menses.

F. Period of Communicability:

Person-to-person transmission does not occur.

G. Susceptibility and Resistance:

Susceptibility to both *S. aureus* is universal. Immunity develops only against specific strains or exotoxins.

H. Treatment:

Treatment includes aggressive fluid replacement therapy and strict management of the respiratory and cardiac systems. Antimicrobial therapy may also be initiated.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

Toxic-shock syndrome, staphylococcal shall be designated as infectious or contagious in their nature, and cases or suspect cases shall be reported within seven days:

1. Health care providers and hospitals: report to the local public health jurisdiction
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below)

**Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Informatics (BEPHI)**

Phone: 1-877-427-7317

Fax: 1-877-427-7318

As a nationally notifiable condition, confirmed and probable toxic-shock syndrome, (Non-strep) cases require a STANDARD report to the Center of Disease Control and Prevention (CDC).

1. STANDARD reporting requires KDHE-BEPHI to file an electronic report for within the next reporting cycle.
 - KDHE-BEPHI will file electronic reports weekly with CDC.
2. **Local public health jurisdiction** will report information requested as soon as possible, ensuring that the electronic form is completed within 7 days of receiving a notification of a Cryptosporidiosis report.

INVESTIGATOR RESPONSIBILITIES

- 1) Use current [case definition](#), to confirm diagnosis with the medical provider.
- 2) Conduct a [case investigation](#) to collect additional epidemiological data as required by current surveillance objectives. *
- 3) Complete all information requested in the Kansas electronic surveillance system.
- 4) Report case information to KDHE using established methods.
- 5) As appropriate, use notification letter(s) and/or the disease fact sheet.

* **Note:** Routine contact investigation is not needed for cases of TSS. Current surveillance objectives depend on the local health department's assistance with confirmation of cases and completion of the supplemental form.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

The [Rapid Assessment Worksheet](#) will help in the confirmation of the case and with the initial organization and the collection of essential data.

Case Investigation

- 1) Contact the medical provider who reported or ordered testing of the case to obtain the following from the patient's medical records.
 - Identify evidence of TSS based on case definition. (Refer to Section 1 of the [Rapid Assessment Worksheet](#) for assistance.)
 - Collect case's demographic data and contacting information (birth date, county, sex, race/ethnicity, address)
 - Record hospitalizations: location and duration of stay
 - Record outcomes: survived or date of death
- 2) Only after the case is determined to be probable or confirmed, collect information on possible risks associated with illness:
 - Post surgery associated infections.
 - Infected wounds or skin rashes or lesions.
 - For women, information related to contraceptive use, product use during concurrent menstruation or associated births or abortions
- 3) Investigate epi-links among cases (clusters, commonalities, etc).
 - For suspected [outbreaks](#) refer to [Managing Special Situations](#).

Contact Investigation

Contact investigation is of no practical value for routine situations.

Case Management

If identified, report on any changes in patient status (i.e., date of death).

Contact Management

None required.

Isolation, Work and Daycare Restrictions

Restrictions as they apply to *S. aureus* infections.

Kansas Food Code 2005: *

- Restrict †, from handling food, food handlers with lesions containing pus or an infected wound that is open and draining and is:
 - On the hands or wrists, unless an impermeable covering such as finger cot or stall protects the lesion and a single-use glove is worn over the impermeable cover, or
 - On exposed portions of the arms, unless the lesions are protected by an impermeable cover, or
 - On other parts of the body, unless the lesion is covered by a dry, durable, tight-fitting bandage.
- Reinstate restricted † individuals after they are symptom free or when they can cover the lesions or wounds as instructed above and have not been associated with food borne illness.
 - If they have been associated with foodborne illness, reinstate after symptom free and with written medical documentation that they are free of the infectious agent of concern.

* *Workers in schools, residential programs, daycare and healthcare facilities that feed, provide oral hygiene, or dispense medications should be subject to the same restrictions as food handlers.*

† Restriction is not allowing the employee to work with food; to clean equipment, utensils or linens; or to un-wrap single-use articles in the food establishment.

- Standard precautions are recommended for many patients with TSS. Contact precautions should be used for patients with abscesses or draining wounds that cannot be covered. Contact precautions are enforced until draining ceases or until the abscess or wound drainage can be contained by a dressing.
- Children with *S. aureus* should not be routinely excluded from child care or school settings. Draining or open abrasions or wounds should be covered with a clean, dry dressing. Routine hand hygiene should be emphasized, especially after handling wound dressings. If the wound or abrasion cannot be covered properly, appropriate restrictions may need to be put into place.

Education

To prevent TSS, the following messages may be delivered to at risk groups:

- Keep all skin wounds clean to prevent infection. This includes:
 - Cuts, punctures or scrapes
 - Burns
 - Sores from shingles or other skin rashes
 - Insect and animal bites
 - Surgical incisions
- Signs and symptoms of infected wounds or surgical incisions that require medical attention can include fever and redness, swelling, heat, or pain at the site. Drainage of cloudy fluid or sudden opening of the wound can also suggest infection.

- Females: follow the directions on package inserts when using tampons, contraceptive diaphragms, and contraceptive sponges.
 - Wash your hands with soap and water before inserting or removing a tampon, diaphragm, or contraceptive sponge.
 - Change your tampon at least every 8 hours or use tampons for only part of the day and use tampons with the lowest absorbency that you need. (The risk of toxic shock syndrome is higher with super-absorbent tampons.)
 - Do not leave your diaphragm or contraceptive sponge in for more than 12 hours.
- Women who are menstruating and develop a high fever with vomiting and diarrhea must discontinue any vaginal tampon use immediately and contact their health care provider.

MANAGING SPECIAL SITUATIONS

A. Outbreak Investigation:

Consider the possibility of an outbreak when there is an unusual clustering of cases in time and/or space.

1. Notify KDHE immediately, 1-877-427-7317.
2. Case finding will be an important part of any investigation.

DATA MANAGEMENT AND REPORTING TO THE KDHE

A. Organize and collect data.

B. Report data via the state electronic surveillance system:

- At a minimum all essential data collected during the investigation that helps to confirm or classify a case (See [Rapid Assessment Worksheet](#) Section 1).

ADDITIONAL INFORMATION / REFERENCES

A. **Treatment / Differential Diagnosis:** American Academy of Pediatrics. 2009 Red Book: Report of the Committee on Infectious Disease, 28th Edition. Illinois, Academy of Pediatrics, 2009.

B. **Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual, 19th Edition. Washington, DC, American Public Health Association, 2009.

C. **Case Definitions:** CDC Division of Public Health Surveillance and Informatics, Available at: www.cdc.gov/osels/ph_surveillance/nndss/casedef/case_definitions.htm

D. **Kansas Regulations/Statutes Related to Infectious Disease:** www.kdheks.gov/epi/regulations.htm

E. **Additional Information (CDC):** www.cdc.gov/health/default.htm

TSS Rapid Assessment Form

(Please refer to the Disease investigation Guideline for additional guidance.)

Section 1

Clinical Case Definition Criteria for TSS (Confirmed= yes to all 5; probable= yes to 4 of the 5 criteria)

Yes No **Fever present (102.0°F [$> 38.9^{\circ}\text{C}$])** Highest temperature measured:

Yes No **Hypotension present** (Systolic ≤ 90 mmHg in adults or $< 5^{\text{th}}$ percentile in children < 16 years; orthostatic drop in diastolic pressure ≥ 15 mmHg from lying to sitting; orthostatic syncope or orthostatic dizziness present)

Systolic Blood pressure (lowest measurement):

Diastolic blood pressure (lowest measurement):

Orthostatic syncope present: Yes No Unknown

Orthostatic dizziness present: Yes No Unknown

Yes No **Diffuse macular erythroderma rash present**

If yes: Generalized Focal Describe:

Yes No **Desquamation: 1-2 weeks after illness onset** (may not occur if patient dies)

If yes, describe:

Yes No **3 or more of the following multi-organ manifestations present:**

Gastrointestinal Symptoms (As shown by one of the following below)

Vomiting at onset of illness

Diarrhea at onset of illness

Muscular involvement (As shown by one of the following below)

Severe myalgia

Creatine phosphokinase (CPK) level $\geq 2x$ normal upper limit, CPK level: IU/L

Mucous membrane involvement (As shown by one of the following below)

Conjunctival hyperemia

Oropharyngeal hyperemia

Vaginal hyperemia

Renal impairment (As shown by one of the following below)

Blood urea nitrogen (BUN) level $\geq 2x$ the normal upper limit, BUN level: mg/dl

Creatinine level $\geq 2x$ the normal upper limit, Creatinine level: mg/dl

No urinary tract infection, but urine sediment with pyuria (≥ 5 WBC/HPF): WBC/HPF

Hepatic involvement (As shown by one of the following below)

Alanine aminotransferase (ALT) $\geq 2x$ the normal upper limit, ALT level: IU/L

Aspartate aminotransferase (AST) $\geq 2x$ the normal upper limit, AST level: IU/L

Total Bilirubin $\geq 2x$ the normal upper limit, Total Bilirubin level: mg/dl

Hematological complications (coagulopathy) ($\leq 100,000/\text{mm}^3$ platelets)

Platelet level (lowest): mm^3

Central nervous system involvement (As shown by one of the following below)

Disorientation

Consciousness alterations w/o focal neurologic signs when fever and hypotension are absent

Laboratory Testing Criteria = titer and culture results should be negative *

Serology, rise in titer to: Rocky Mountain Spotted Fever Leptospirosis Measles

No rise in titer detected Titer results not obtained

CSF cultures: Negative Not done Positive, indicate organism(s):

Throat cultures: Normal Flora Not done Abnormal, indicate organism(s):

Urine cultures: Negative Not done Positive, indicate organism(s):

Blood cultures: Negative Not done Positive, indicate organism(s):

* For TSS cases, *blood cultures* can be *positive for S. aureus*.

If cultures are positive for *Strep Group A (S. pyogenes)* investigate as an STSS case.

If titers indicate RMSF or Measles, investigate using respective Disease Investigation Guidelines.

TSS Rapid Assessment Form

Additional epidemiological data to collect for CONFIRMED and/or PROBABLE cases:

Date of Onset of Symptoms: / / *Review medical charts for first 4 days after day of onset.*

Additional symptoms (the first 4 days of illness) not recorded in Section 1:

Abdominal Pain	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unk	Sore Throat	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unk
Vaginal discharge	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unk	Injected tongue	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unk
Vaginal ulceration	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unk	Cardiac Arrhythmia	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unk
Seizures	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unk	If yes, describe arrhythmia:	

If hospitalized, date of admission: / / Date of hospital discharge: / /

Did the patient survive the infection? Yes No If NO, date of death: / /

Did the patient have surgery 7 days before illness onset? Yes No If YES, date of surgery: / /
Surgery provider:

Additional Laboratory Data (Most abnormal values in the first 4 days of illness)

Obtain copies of the following or record values on the TSS Supplemental Form.

- WBC counts and differentials.
- Liver enzyme test results (AST, ALT, Alkaline phosphatase, Amylase, Bilirubin)
- Urinalysis results (WBC, RBC, Protein)
- Chemistry panels including following values: Calcium, phosphorus, albumin, CPK, BUN, Creatinine
- CPK total and isoenzyme panels (CPK-myocardial band)
- EKG results: Unk Not done Normal Abnormal, describe:
- Chest X-ray results: Unk Not done Normal Abnormal, describe:
- Nose Culture: Unk Not done Done, describe organisms:
- Vaginal Culture: Unk Not done Done, describe organisms:

Examination of bacterial culture results:

1. If *S. aureus* isolated from Vaginal cultures, was it resistant to penicillin and ampicillin only: Yes No Unk
 2. Was patient on antibiotics when **any** culture specimens were collected (including Section 1): Yes No Unk
- Note any specimens that may have been affected by antibiotic use:

For female patients only:

At time of illness, was the patient: Menstruating Postpartum Neither Unknown

If postpartum, outcome of delivery or abortion: Live birth Abortion /stillbirth Induced abortion
 C-section Vaginal birth Unknown

Date of delivery or abortion: / / Location:

If menstruating, date of onset of coincident menstrual period: / /

During period when patient became ill, record products used (mark all that apply):

Tampon Napkin Minipad Sea-sponge Other:

Record product brand(s) and style (absorbency) of each brand used:

If more than one brand, which brand was most frequently used:

How was the information on brand and absorbency obtained (who if any viewed the product packaging):

Has the patient had similar illness during past menstrual periods: Unk No Yes, how many times:

Section 2

Supporting Materials

Supporting Materials are available under attachments:

CLICK HERE TO VIEW ATTACHMENTS

Then double click on the document to open.

Other Options to view attachments:

Go to <View>; <Navigation Pane>; <Attachments>

– OR –

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