Recognition and management of toxic shock syndrome (TSS)

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Background

- Exotoxin-mediated acute severe condition, usually caused by toxin-producing strains of Staph A and group A Strep (aka Strep pyogenes). Exotoxins in bloodstream act as superantigens → T cell activation → massive release of cytokines.

- TSS is usually associated with burns or wounds (including surgical), skin infections e.g. in association with varicella infection or bites, or any other recent infection.

Assessment

TSS should be considered in **any patient with fever and hypotension, whether a rash is obvious or not**. It is often accompanied by a mild prodrome of myalgia and GI upset progressing to agitation, confusion, and lethargy. Milder versions can occur.

CDC (USA) Case Definition 2011

Do not use to clinically rule out TSS - if you are worried it is TSS, investigate appropriately and initiate treatment

I	**Fever:**	≥ 38.9C
II	**Rash:**	Diffuse macular erythroderma ('sunburn')
III	**Hypotension:**	Systolic BP ≤ 5th percentile for age (under 16yrs) – **see BP table** on page 3 or systolic BP ≤ 90mmHg (over 16 years) or orthostatic hypotension, dizziness or syncope

IV **Multisystem dysfunction:** at least three:

A. **Gastrointestinal:** vomiting or diarrhoea at onset of illness.
B. **Muscular:** severe muscle pain, or serum creatine kinase (CK) > 2 x upper limit of normal.
C. **Mucous Membranes:** vaginal, oral or conjunctival redness.
D. **Renal:** Creatinine > 2 x upper limit of normal or pyuria (WBC ≥ 5) in the absence of urinary tract infection.
E. **Hepatic:** Total serum bilirubin or transaminase level > 2 x upper limit of normal.
F. **Haematologic:** Platelets ≤ 100
G. **Central Nervous System:** disorientation or alteration in consciousness but no focal neurological signs at a time when fever and hypotension are absent.

V **Desquamation:** 1 to 2 weeks after the onset of the illness (typically palms and soles)

VI **Evidence against an alternative diagnosis:**
If obtained: negative blood, throat or CSF cultures; if travel history – consider checking for leptospirosis, measles or Rocky Mountain Spotted Fever.

Management pathway for suspected TSS

Call for help, move patient to resus if appears unwell, apply monitoring.
Ensure Senior Clinician (ST4 level +) attends.
Complete full ABCDE assessment

Airway & Breathing

- Assess airway patency and apply high flow oxygen
- Use adjuncts and urgent anaesthetic review for intubation if not maintaining own airway
- Aim sats 94-98 %
- Respiratory support as required

Circulation

- Secure IV or IO access. Aim 2 x access
- Bloods - blood cultures, gas, FBC, U+E, LFT, Bone profile, CRP, coagulation screen, CK
- Resuscitate shock with IV fluids (**10 ml/kg bolus** of balanced **isotonic crystalloid e.g. Hartmann's** or can use **0.9% sodium chloride** if Hartmann's not available)
- Re-assess after fluid bolus and repeat as required to maintain HR / BP / CRT. If >40 ml/kg **seek senior advice urgently**
- Consider early use of inotropes e.g. adrenaline / noradrenaline

Disability & Exposure

- Check blood sugar level
- **Start IV Antibiotics** as soon as possible
- Total duration 10 days

Bacterial swabs for M,C&S
- throat
- burn, wound or skin as appropriate

See BNFc for doses

Use severe infection doses

Review and revise before 72 hours - modify according to sensitivity of organisms grown

IV Ceftriaxone
(or cefotaxime if < 1 month or contraindications)
+ IV Clindamycin

Add IV gentamicin if severe sepsis / requiring critical care

IgE mediated cephalosporin allergy

See BNFc for doses

Use severe infection doses

Review and revise before 72 hours - modify according to sensitivity of organisms grown

IV Teicoplanin + IV Ciprofloxacin + IV Clinidamycin

Add IV gentamicin if severe sepsis / requiring critical care

In severe cases, **intravenous immunoglobulin** can be considered – discuss with microbiology / paediatric infectious diseases team at Evelina Children's Hospital

Additional management:

- Maintenance fluid following resuscitation fluids.
- Reassess the wound / burns site and involve surgical specialty teams. If burns, contact Burns Team at QVH East Grinstead urgently. Tel 01342 414469
    - Identify and decontaminate the site of toxin production.
    - Drain or debride the area, remove foreign material and irrigate copiously.
- Admit to HDU for close monitoring unless requires retrieval to PICU.

Fifth centile systolic BP according to height percentile for children 1 – 17 years

Fifth Percentile Systolic Blood Pressure, Percentile for Height

	5th		25th		50th		75th		95th	
Age, Yrs	M	F	M	F	M	F	M	F	M	F
1	62	66	65	68	67	68	70	71	72	73
2	67	68	70	70	70	71	72	71	74	73
3	68	68	71	71	73	71	76	74	77	76
4	70	71	73	73	75	74	78	74	79	76
5	72	71	76	74	78	76	78	77	80	79
6	73	74	76	76	78	77	81	79	83	81
7	74	76	77	78	79	79	81	79	83	82
8	77	78	80	78	82	81	82	82	84	84
9	77	78	80	81	82	83	85	84	87	86
10	79	80	83	83	85	85	85	86	89	88
11	81	82	85	85	87	85	87	88	89	90
12	83	85	86	87	89	87	91	90	93	92
13	87	87	88	89	90	90	92	92	94	92
14	88	89	91	89	94	92	96	93	98	95
15	92	90	95	92	95	93	97	93	99	95
16	93	91	96	93	98	93	101	96	103	98
17	97	91	98	93	100	93	102	96	104	98

Useful Online Resources:

1. **Toxic shock syndrome - NHS (www.nhs.uk)**
2. **Toxic Shock Syndrome. Symptoms of toxic shock syndrome | Patient**
3. **Invasive group A streptococcal infection and toxic shock syndrome: Treatment and prevention - UpToDate**