Outbreak of Invasive Group A Streptococcus
Julianne Toop, Canterbury District Health Board
A Webber Training Teleclass

Friday the Thirteenth

An Outbreak of iGAS

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Hosted by Jane Barnett
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The Princess Margaret Hospital

Objectives

- Describe an outbreak of invasive Group A Streptococcus (iGAS)
- Discuss the “Swiss Cheese Model” of system accidents
- Outline a root cause analysis process
- Identify errors in patient safety
- Hypothesize on the spread of infection
- Review the outbreak management

Group A Streptococcus (GAS)

Streptococcus pyogenes
- Gram +ve cocci
- β haemolytic group
- Common human pathogen
  - 15-20%
- Transmission
  - Droplet spread
  - Direct contact

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**Manifestation of GAS**

- **Asymptomatic carriage**
- **Superficial infections**
  - Estimated that more than 10 million mild infections throat and skin occur every year
  - Strep Throat
  - Impetigo
  - Cellulitis
  - Erysipelas
  - Scarlet fever

**Manifestation of GAS cont’d**

- **Post-streptococcal immunological sequelae**
  - Acute rheumatic fever
  - Acute glomerulonephritis
- **Severe Invasive Disease (iGAS)**

**iGAS**

Severe, life-threatening
- isolation of GAS from a normally sterile body site
- 10 to 15% mortality
- 3 categories:
  - Streptococcal toxic shock syndrome (STSS)
  - Necrotizing fasciitis
  - Other
    - Bacteraemia
    - Puerperal Sepsis
    - Pneumonia

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GAS virulence factors

- M Proteins - major cell wall constituent
  - >120 M protein serotypes
  - M types [emm] 1 and 3 especially virulent
- Evade phagocytosis
- Induce tissue destruction
- Trigger host cytokines release Streptolysins
- Pyrogenic exotoxins (superantigens)

Emm 1

- Emm typing
- New Zealand situation
  - 2004 – 7.6%
  - 2005 – 7.3%
  - 2006 – 18.4%
  - 2007 – 15.1%
- Outbreak strain – emm 1

Swiss Cheese model of system accidents

Sentinel Event

- Root Cause Analysis
- Reported to Ministry of Health

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Patient 1 Possible Index Case

5 Leg Ulcers

- Not present at previous admission
  - Low to mod exudate
  - “slough”, “necrotic”, “fragile”
  - No wound swabs
  - Braden Risk Assessment Tool not completed
  - No medical review of wounds
  - Dress every 2 day

48 to 79 hours

- “ Seems to be improving”
- Painful legs = Morphine prescribed
- “Slept well”
- 0800 “unrousable”
- Haematoma L)Leg
  - midcalf to back of knee - ruptured
- Sacral pressure area – new

48 to 79 hours

- Transferred to single room
- No Contact Precautions
- Deceased-1730
- Subsequent blood cultures – GAS

Patient 2 - Admit 2200

Hx

- L) hip hemiarthroplasty
- Dx to LTCF
- ED - 3 days after Dx
  - Increasing confusion
  - Febrile
  - Raised WBC & neutrophils
  - BSL
  - Creps R) base
  - Skin tear L) & R) arm & elbow
  - cleaned and steri strip

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Patient 2
- On admission - Overnight
  - Trying to get out of bed repeatedly
  - Pulling at dressings & bandages
  - Fall – existing skin tear reopened
- Day 1 - improved
- Wounds
  - oozing noted - limited details
- Day 2/3 - Obs not done

Day 4
- 1030
  - “Pt looks unwell”
  - Haematoma L) arm
- 1120
  - Temp 37.5
  - Painful arms
  - Transfer to single room
  - No Contact Precautions
  - Deceased 2020
  - Subsequent blood cultures – GAS

Patient 3
- #L Neck of Femur
- #L distal radius
- Rehabilitation outcome - excellent
  - Independent
  - Cognitively competent

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- Day 15
- 0900 Ward Round
  - T 37.8
  - B/P 80/60
  - P 110
  - O₂ Saturation 70%
- Skin integrity
  - copious dishwater discharge
- Moved to single room
- Deceased 1730

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### Day 12 to 14

- Marked pitting oedema
- **Day 12**
  - leg lesion
- **Day 13**
  - T 37.3
  - R) leg skin
    - "break down"
    - increased serous ooze
  - Morphine
  - "Otherwise well"
- **Day 14**
  - R) leg haematoma

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**Patient**

- **Management Plan 1**
  - **Screening**
    - Pharyngeal swabs
    - Wound swabs
  - **Chemoprophylaxis**

- **Chemoprophylaxis**
  - **For all exposed staff**
    - Including all on call and casual staff
  - **For all patients**
    - Penicillin 500 mg qid 10 days
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Two Ontario outbreaks

LTCF 1
- 3 outbreaks
- First two outbreaks
  - Screening possible contact with positive cases
  - Treat positive cases
- 3rd outbreak
  - All staff and residents screened and treated
  - Screening 1 month later
  - No further cases

LTCF 2
- All staff and pts screened
- Mass antibiotic treatment
- Repeat screening 1 month later
- No further cases

Smith A et al. Mass Antibiotic Treatment for Group A Streptococcus Outbreaks in Two Long-Term Care Facilities. Emerging Infectious Diseases 2003; 9(10):1260-1265

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Management Plan 2
- Infection Control
- Based on transmission
  - Contact
  - Droplet
  - Fomite (rare)

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Norovirus outbreak

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Wound care
- Strict aseptic technique
- Gloves and aprons
- Masks
- Disinfection of dressing trolleys
- No shared tape
- Alert - Treat as suspicious and seek medical advise for any wound with rapidly progressing cellulitis especially with skin blistering and/or necrosis

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Management Plan 3
- Communication
  - Relatives
  - Ward Staff
  - LTCF’s
  - General Practitioners
  - Canterbury District Health Board staff
- Media

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Headlines

Flesh-eating bug kills 3

Screening outcome

- 112 swabs
- 76 [68%] Staff
- 34 [45%] Nursing staff
- 4 [12%] Positive
  - 3 pharyngeal carriage
  - 1 wound infection

Staff Positive results

- Repeat screening
  - 72 hrs post A/B
  - 1 month post A/B
- Family screening
- Positive wound swab

Prevalence of infection or colonization

- Smith A et al.
  - LTCF 1 outbreak 3
    - Residents 2.8%
    - Staff 1.5%
  - LTCF 2
    - Residents 4.7%
    - Staff 1.3%
- TPMH
  - 8.7% Patients
  - 12% or 3.5%

Spread of Infection

- Patient 1
- Staff 1
- Patient 2
- Staff 2, 3, 4
- Patient 3
- Patient 4

Sentinel Event Findings

Clinical practice and knowledge

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Sentinel Event Findings

Environment

Communication

With Thanks to
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The Princess Margaret Hospital

References

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- Smith A et al. Mass Antibiotic Treatment for Group A Streptococcus outbreaks in Two Long-Term Care Facilities. Emerging Infectious Diseases 2003; 9(10):1260-1265

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