Advances in STI diagnostics

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Consultant Senior Lecturer
University of Bristol
Advances in STI diagnostics

• Rapid expansion in on-line STI testing
  • Outstripping NHS expert advice
• Increasing promotion of new and accurate tests to NHS
• How do we afford these?
  • Better use of existing tests
  • Targeted introduction of new tests
STI epidemiology

- Associated
  - Younger age (surrogate for partner change)
  - New sexual partner
  - Social deprivation
  - BME
  - Men who sex with men
  - Unprotected sexual intercourse
Testing low prevalence (risk) populations

• Sensitivity
  Number of positives identified.

• Specificity
  Number of negatives identified.
Testing low prevalence populations

Prevalence = 1%, 1,000 screened

Sensitivity = 99.9%
10 true positives
0 false negative

Specificity = 99%
980 true negatives
10 false positives
Testing low prevalence populations

Prevalence = 1%, 1,000 screened

Sensitivity = 99%
10 true positives
0 false negative

Specificity = 99.9%
989 true negatives
1 false positive
Prevalence 1%, 1,000 screened

• If Sensitivity = 99.9%, specificity = 99%
  Total number of positives = 20
  
  True positives = 10
  Predictive value positive = 50%

• If Sensitivity = 99%, specificity = 99.9%
  Total number of positives = 11

  True positives = 10
  Predictive value positives= 91%
Advances in STI diagnostics - Solutions?

• On line advice about tests through Anglia ICE?
  • Risk based testing algorithm

• Management
  • Embedded advice
  • On-line advice through:
    • Local guidelines
    • Sexual Health website with professional access
  • Telephone advice

• Other?
## STI diagnostics

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(√) Specialist advice

? No or limited information provided on commercial website
## STI diagnostics

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<td>Syphilis</td>
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<td>(√) &amp; ✓</td>
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<tr>
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<td>✓</td>
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<td>✓ &amp; (√)</td>
<td>✓</td>
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<tr>
<td>HIV</td>
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<td>✓</td>
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Commercial testing sites

- https://www.test.me/
- http://www.thesticlinic.com/
Chlamydia

- Common
  - 4-9% young people (under 25) attending health care setting
    - 2-4% sexually active population < 25 yrs
  - Prevalence decreases after age 25 yrs
    - Associated new sexual partner, social deprivation
    - \( \frac{3}{4} \) Testing Primary care \( \geq 25 \) yrs, positivity 1-2%

- Nucleic acid amplification tests
  - Revolutionised management

- Less uncertainty about natural history
Age + STI Positivity Rate %

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<tr>
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<th>S-GP</th>
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<tbody>
<tr>
<td>%</td>
<td>7.8:</td>
<td>543</td>
<td>1593</td>
<td>3512</td>
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<tr>
<td>N</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
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</table>

CT

<25 >25
Chlamydia trachomatis

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Men</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;50% no symptoms</td>
<td>Urethral discharge</td>
<td>Vaginal discharge</td>
</tr>
<tr>
<td></td>
<td>Dysuria</td>
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</tr>
<tr>
<td></td>
<td>Urethral ‘itch’ or ‘discomfort’</td>
<td>Pelvic pain</td>
</tr>
<tr>
<td></td>
<td>Rectal discharge</td>
<td>PCB/ IMB</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td></td>
<td>Rectal bleeding</td>
</tr>
<tr>
<td>Signs</td>
<td><img src="image1.png" alt="Image of signs" /></td>
<td><img src="image2.png" alt="Image of signs" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>70% no symptoms</td>
</tr>
</tbody>
</table>
Chlamydia

• PID
  • 20% (35% 16-24yr old)
• Infertility
  • Tubal factor accounts for 20-30% infertility
    • 30%
  • Male factor
    • Conflicting evidence
• Ectopic pregnancy
  • 5%
• Neonatal – conjunctivitis + pneumonia
• Sexually acquired reactive arthritis

Price M et al HTA report 2016 DOI:10.3310/hta20220
Gottlieb S JID 2010:201 S2:190
Natural history of chlamydia

- Every 1000 CT infections in women aged 16-44 years gives rise to:
  - 171 episodes of PID
  - 73 episodes of salpingitis
  - 5.1 women with TFI at age 44 years.
  - 2.0 ectopic pregnancies

- 1% prevalence need to test 1000 women to prevent 1 PID
Gonorrhoea (NG)

- <1% men and women
  - Low prevalence: all positives confirmed
- Associated with new sexual partner
  - Men who have sex with men
    - Throat and rectal carriage
- Travel abroad
- BME
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<tr>
<td>%</td>
<td>N = 543</td>
<td>1593</td>
<td>3512</td>
<td>3592</td>
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</tbody>
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*CT NG*
## Gonorrhoea

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% no symptoms</td>
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<td>93% No symptoms</td>
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### Signs

- ![Image](image1.png)
- ![Image](image2.png)
### Gonorrhoea

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<tr>
<th>Investigation</th>
<th>First catch urine for NAAT (men)</th>
<th>Endocervical/HVS swab for NAAT (women)</th>
</tr>
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<tbody>
<tr>
<td><strong>Treatment</strong></td>
<td>Ceftriaxone 500mg IM Stat with 2mls 1% lidocaine <strong>AND</strong> Azithromycin 1g Stat PO</td>
<td>Swab for culture (antimicrobial sensitivity testing)</td>
</tr>
<tr>
<td><strong>Contact tracing</strong></td>
<td>Symptomatic: 2 weeks (urethral)</td>
<td>Asymptomatic: 3 months (other sites)</td>
</tr>
</tbody>
</table>
Antimicrobial resistant gonorrhoea

- Increasing over time
- Emergence 3rd generation cephalosporins resistance
**Mycoplasma genitalium**

- 2-3% young people
- 7% young people attending GUM
- Associated new sexual partner
- Associated NGU, cervicitis (PCB) and PID (mild)
  - 5-10% co-infection with chlamydia
- Increases HIV transmission
- NAAT testing available
- Macrolide antimicrobial resistance
  - 20-30% in some centres
  - Azithromycin 1 gram probably causal
    - Extended 3-5 day (2-3g) regimen preferred
- Doxycycline 100mgs bd 7 days 50% effective
  - **No** resistance

Taylor-Robinson Genitourin Med 1995
Trichomonas Vaginalis (TV)

- Women: Is it clinically important?
  - Vaginal discharge
  - 60-80% asymptomatic
  - Associated
    - New sexual partner
    - Older age, BME, social deprivation
    - Premature labour & Increased susceptibility to HIV

- Men
  - NGU
  - Majority asymptomatic
  - On-going transmission
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TV CT NG

TV > CT

TV > CT!
Black Caribbean Ethnicity - Bristol

Montpelier HC
3.9% TV+

Easton FP
3.7% TV+

Hartcliffe HC
3.1% TV+

Lennard Surgery
5.8% TV+
High TV rates: link to deprivation?

Deprivation Index (IMD) by practice fingertips.phe.org.uk
**Ureaplasma urealyticum**

- Associated new sexual partner
- Asymptomatic carriage (10-20%) is common
- Can cause urethritis in men but detection ≠ causal
- Not associated disease in women
- Culture common in Europe does not differentiate from *U. parvum*
- Eradication standard therapy sub-optimal
  - Not associated with persistent NGU

Frolund M Acta Derm Vener 2015
Bacterial vaginosis

• Common cause vaginal discharge
• Polymicrobial anaerobic overgrowth which displaces lactobacilli
  • > 100 bacteria
    • Gardnerella, Prevotella, BVAB, Mobiluncus. M. hominis, Leptotrichia
    • Biofilm associated high pH
  • May be asymptomatic
    • Cyclical variation – more likely around menses
• Associated
  • Other bacterial STIs and HIV
  • Possibly development PID
Bacterial vaginosis

• Diagnosis
  • Gram stain
  • Litmus paper
  • PCR diagnosis
    • Will detect low loads present in normal lactobacilli flora
    • Gardnerella is present in normal flora

• Treatment
  • Metronidazole 400mgs bd 5/7
  • Clindamycin cream
  • Balance Active gel
NGU

- *Chlamydia trachomatis*  15-40%
- *Mycoplasma genitalium*  9-25%
- *Trichomonas vaginalis*  <1-5%
- *Ureaplasma urealyticum*  5-10%
  - Not associated with PID in women
- BV associated bacteria  ?5-10%
  - *Leptotrichia/Sneathia spp, Prevotella*
- Herpes and adenovirus  5%
- No cause identified  30%
NGU

- If suspected refer
- Diagnosis supported by
  - Urethral discharge
  - Presence of threads in FVU
  - Positive LE test FVU test
Urethral Discharge

• Strong association urethritids
 Threads in FVU

- Correlated urethritis
- Poor sensitivity and specificity
Leucocyte esterase test

- Correlated urethritis
  - Not as sensitive as urethral smear
  - Less specific (false positives increased)
Vaginal discharge

- Bacterial vaginosis  30-40%
- Candida           30-40%
- *Trichomonas vaginalis*  <1-5%
- *Chlamydia trachomatis*  1-10%
- *Mycoplasma genitalium*  1-5%
- *Neisseria gonorrhoeae*  <1-5%
- No cause identified  10-20%
# Vaginal Discharge

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<th>Bacterial Vaginosis</th>
<th>Candida</th>
<th>Trichomonas Vaginalis</th>
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<tr>
<td>• Offensive fishy smelling vaginal discharge</td>
<td>• Pruritis</td>
<td>• Offensive discharge</td>
</tr>
<tr>
<td>• Not associated with soreness / itching / irritation</td>
<td>• Soreness</td>
<td>• Itching</td>
</tr>
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<td>• White thick discharge</td>
<td>• Dysuria</td>
</tr>
<tr>
<td></td>
<td>• Superficial dyspareunia</td>
<td></td>
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<tr>
<td>Microscopy – Gram stain</td>
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<td>Wet prep microscopy</td>
</tr>
<tr>
<td>Absence lactobacilli and over growth anaerobes</td>
<td>Candida a spores hyphae</td>
<td>Motile protozoa</td>
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PID

- *Chlamydia trachomatis* 10-35%
- *Mycoplasma genitalium* 5-10%
- *Neisseria gonorrhoeae* <1-5%
- BV associated bacteria >10%?
- No cause identified >50%

- Essentially a clinical diagnosis
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<tr>
<td>HIV</td>
<td>√ Blood</td>
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Why detect and treat STIs?

• To make the patient better!
• To treat and eradicate sexually transmissible infections in index and contact(s)
  • Reduce/prevent morbidity
    • Index case
    • Partners
  • Prevent recurrence
  • Confirmation index is “free from infection”
    • Limited research on this
• Wider public health agenda in STI control
Why detect and treat STIs?

- Avoid harm
  - Selection for antimicrobial resistance
  - Promotion chronic pelvic pain syndrome
- Is it cost effective?