Sensitivity of COPAN E-swab versus direct inoculation for culture of Neisseria gonorrhoeae (NG)

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**Background**
- Our hospital-based GUM clinic NG cultures used to be directly plated, and portered twice daily to on-site microbiology for incubation.
- In November 2015 service relocation to a city centre hub forced change.
- Samples were then directly plated, incubated on-site for 48-72hrs and then transported in a CO2-enriched environment.
- Retrospective comparison demonstrated significant reductions in culture sensitivity at rectal and pharyngeal sites and a non-significant decline at urogenital sites.
- In 2017 a new method for NG culture transportation, COPAN E-swab, was piloted. E-swabs have the advantage of reduced costs. NG culture sensitivity was evaluated against positive NAAT for:
  a) E-swabs (2017), versus
  b) direct plating and on site incubation (2016), versus
c) direct plating and microbiology incubation (2015)

**Methods**
- 6 month time periods were compared:
  - Jan-June 2015 (direct plating and laboratory incubation)
  - Jan-June 2016 (direct plating and on-site incubation)
  - June - November 2017 (COPAN E-swabs)
- GUMCAD search for all B codes
- NB Indeterminate results
  - If the patient was positive on any other test (NAAT or culture) at any site, then they were included as a positive
  - If everything else was negative then we removed at the start, as no confirmed NAAT positive

**Results**

**Results for patients**
- Culture sensitivity at rectal and pharyngeal sites and a non-significant decline at urogenital sites
- In female urogenital samples, there has been a significant drop in culture sensitivity in 2017, compared with both 2015 and 2016. This may be due to a switch to endocervical sampling only with the introduction of COPAN E-swabs (previously a single plate had been inoculated with both endocervical and urethral sampling), or due to sampling technique errors within the department

**Discussion**
- COPAN E-swabs have the advantage of reduced storage and running costs, and allow plates to be automated within the laboratory
- Overall, there has been a significant drop in culture sensitivity per patient and over all sites sampled from 2015 (direct plating) to 2016 (COPAN E-swab), and from 2016 (direct plating, CO2-enriched transport) to 2017. There was no difference between 2016 and 2017
- At the male urethra there was no significant difference in culture sensitivity between 2015, 2016, or 2017, suggesting that the different culture techniques must be equally sensitive when testing a bacterial load usually found in genital samples
- We plan to make changes within the department and re-evaluate
- With regards to rectal swabs there is significantly lower sensitivity in 2016 than in 2015, but not in 2017 over 2015. As with urethral swabs this suggests COPAN E-swabs, given good smapling technique and threshold bacterial load have the ability to perform as well as the gold standard
- There is a consistent drop in pharyngeal culture sensitivity from 2015 to 2016 to 2017 with significant drops from 2015 to 2016, and 2015 to 2017. With higher numbers we would expect to see a significant difference between 2016 and 2017
- This could be a sampling technique issue, or possibly bacterial load-related. It is possible that there is a poorer performance of COPAN E-swabs with low bacterial loads
- We are investigating whether we can change the settings on our automated e-swab culture instrument, so that a larger inoculum can be sampled. This could, potentially, improve detection rates for samples with low NG bacterial load
- Time from sampling to laboratory has not yet been evaluated, and this may be an important variable

**Conclusion**
- E-swabs did not improve NG culture sensitivities compared to direct plating and on-site incubation (2016)
- Sensitivity was significantly reduced at 66% vs 78% with direct plating and microbiology incubation (2015)
- This was driven by a loss of positive cultures at extra-genital sites and a reduction in female genital tract NG culture sensitivity. The reasons for this are likely to be multifactorial: stopping female urethral sampling and inappropriate clinician sampling techniques. Since moving off the hospital site, we have been unable to maintain our high levels of NG culture sensitivity. The drop in sensitivity is highest in the pharynx, a site where NG resistance often develops. This may affect our ability to detect emerging NG resistance in the future