

### Introduction

- Bacterial Vaginosis (BV), a low-Lactobacillus state characterized by elevated vaginal pH, associated with incident sexually transmitted infections (STIs).
- Elevated pH may also be associated with certain Lactobacillus species (L. iners).
- L. iners dominated vaginal microbiota associated with incident STI.
- Prior studies found association between Neisseria gonorrhoeae (GC) infection and vaginal pH ≥4.5.
- Increased pH may serve as a cheap, easily accessible biomarker for underlying STI, vaginal dysbiosis and risk of STI acquisition.

### Methods

- Examined the relationship between vaginal pH and infection with Neisseria gonorrhoeae(GC), Chlamydia trachomatis(CT), and Trichomonas vaginalis(TV).
- Inclusion criteria:
  - Adult women age ≥18.
  - Presented to Baltimore City Health Department (BCHD) Sexually Transmitted Infections (STI) clinics from 2005-2016.
  - Reported sexual exposure to GC as reason for presentation.
  - Tested for GC by NAAT or culture and/or CT by NAAT and/or TV by microscopy.
- Had pelvic exam with measurement of vaginal pH and clinical BV determined by Amsel Criteria.
- Documented clinical information: demographics, sexual practices (including # of partners within the 6 months), race, age, HIV.
- Generalized estimating equations (GEE) with a logit link used to explore relationships between vaginal pH and STI, accounting for confounders and repeated within patient measures.

### Results

<table>
<thead>
<tr>
<th>Characteristics At Each Visit</th>
<th>GC pos women</th>
<th>CT pos women</th>
<th>TV pos women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>25.4 (SD 7.04)</td>
<td>23.5 (SD 5.25)</td>
<td>32.3 (SD 10.7)</td>
</tr>
<tr>
<td>Black Race</td>
<td>92.1%</td>
<td>91.5%</td>
<td>95.3%</td>
</tr>
<tr>
<td># partners in prior 6 months</td>
<td>2.01 (SD 2.59)</td>
<td>2.16 (SD 11.6)</td>
<td>2.29 (SD 15.1)</td>
</tr>
<tr>
<td>HIV pos</td>
<td>2.77%</td>
<td>1.36%</td>
<td>3.88%</td>
</tr>
<tr>
<td>BV by Amsel</td>
<td>48.7%</td>
<td>46.6%</td>
<td>41.4%</td>
</tr>
<tr>
<td>Reported Contact</td>
<td>17.8%</td>
<td>13.4%</td>
<td>2.50%</td>
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</tbody>
</table>

### Acknowledgements

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### Conclusions

- Although causality cannot be established without knowing vaginal pH at the time of sexual exposure, the increased odds of 3 STIs in women whose vaginal pH was ≥4.5 at the time of presentation may imply that a high vaginal pH increases risk of STI acquisition and that a normal vaginal pH is protective.
- Elevated vaginal pH is associated with urogenital STI and may serve as a useful biomarker for underlining infection.
- Further prospective studies are required to confirm these findings and to mechanistically define relationships between vaginal pH, resident microbiota, and STI.

### Limitations

- Method of GC testing was non-uniform over time period of the study.
- Women offered CT testing was non consistent across age groups before the standard of care became combined GC/CT NAATs. Before this time younger women were tested more frequently than older women.
- STI exposure was documented by patient report only and subject to recall bias.