Comparative Evaluation of Puritan and Copan Liquid Amies Transport System for the Recovery of *Streptococcus pneumoniae* against the CLSI M40A Standard

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Revised Abstract

**Objective:** To assess the performance of two modified liquid Amies transport systems, Puritan Liquid Amies Transport System with a standard flocked swab (P) (Puritan Medical Products Company LLC) and Copan’s E.II (Elution Swab (E) (Copan Diagnostics Inc.)) intended for processing using automated plating systems for the recovery of *Streptococcus pneumoniae*.

**Method:** The CLSI M40A Roll Plate method at room temperature was followed to test the recovery rate and viability for up to 48 hrs of SPN strains acquired from the Toronto Invasive Bacterial Disease Network (TIBDN) stock and other medical laboratories in Ontario. As well, two ATCC reference strains (ATCC 6303 and ATCC 49619) were also tested. At time 0, 24, and 48 hours, the average colony counts were calculated based on triplicate swabs for each organism/dilution/combination. Culture plates were read manually. Results were compared to control plates at zero time. For viability studies to be considered reproducible, there had to be an average ± 2 colony forming units (CFU) following the specific holding time from the specific dilution that yielded zero time-point plates closer to 500 CFU.

**Results:** Of the 21 SPN strains, P recovered 7 after 24 hours and an additional 14 after 48 hrs, whereas E recovered 9 strains at 0 hrs, an additional 8 strains after 24 hours and 4 strains (all mucoid strains including one ATCC strain which was reported to be a mucoid form) after 48 hrs. The concentrations used to inoculate swabs were 106, 105, and 104 CFU/mL.

**Conclusion:** Our study suggests that based on the CLSI M40A standard roll plate protocol the Puritan system appears to outperform the E system. The mucoid strains appear not to be a problem with the E system. This study is recommended to understand the differences in the two transport systems on SPNs.

**Introduction**

Transport system devices continue to undergo improvements in their ability to maximise the absorption of clinical specimen during collection, maintain viability of bacterial pathogens involved in infectious diseases during transport and their subsequent recovery in the laboratory. In recent times flocked swabs have become a subject of great interest. Flocked swabs differ from the traditional fibre wound swabs by nitrile fibres and blends attached perpendicularly to the plastic applicator that prevents entrapment of clinical sample and thus results in greater release and recovery of pathogens when compared to conventional swabs. This present study is an assessment of two brands of flocked swabs in Liquid Amies broth system using one type of an aerobically fastidious organism *Streptococcus pneumoniae* and how well they comply to the CLSI M40A standards. Secondly some obvious physical appearance of these two brands were also noted (Figures 2-4).

**Method**

**Bacterial Strains:**
- *Streptococcus pneumoniae* ATCC 6303 (mucoid strain)
- *Streptococcus pneumoniae* ATCC 49619 (non-mucoid strain)
- *Streptococcus pneumoniae* (18 wild strains)

**Method Continued**

**Organisms**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Media</th>
<th>Inoculum Concentration (µl)</th>
<th>Method</th>
<th>Recovery (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Streptococcus pneumoniae</em> ATCC 6303 (mucoid strain)</td>
<td>McFarland 2 (µl)</td>
<td>10^4, 10^5, 10^6</td>
<td>Puritan Amies Broth Protocol (left)</td>
<td>100%</td>
</tr>
<tr>
<td><em>Streptococcus pneumoniae</em> ATCC 49619 (non-mucoid strain)</td>
<td>McFarland 2 (µl)</td>
<td>10^4, 10^5, 10^6</td>
<td>Puritan Amies Broth Protocol (left)</td>
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**Acknowledgement:** This study was supported by Puritan Medical Products Inc.

**Conclusion**

1. Based on this study, Puritan flocked swabs demonstrated superior absorption and release abilities as evidence by the high counts. Copan E Swabs also demonstrated superior absorption but it is difficult to assess if the E swabs released on the inoculum based on its viability performance.
2. Previous study for this the flocked swabs has impurities in the gels adheres or substandard impurities in the new material which may have some antibacterial effect on SPN or the Copan modified Amies broth formula is not optimal for the growth of these organisms as it prevents the release up to 48ths in most cases.
3. There are numerous other factors, not presently examined which can affect swab performance.
4. This study is not sufficient (24 hrs) for mucoid strains which were not affected by any antibacterial effect due to their polysaccharide capsule.
5. Other studies have also documented the poor recovery of *Streptococcus pneumoniae* with the Copan E swabs system (2).

**Further studies are warranted using more strains both mucoid and non-mucoid.**

**References**

2. Gandhi, B. Comparative, 2006. Comparison of viability performance of a new flocked and swab transport kit compared to a liquid Amies media at ambient temperature. Presented at the 110th General Meeting of the American Society for Microbiology, San Diego, California.