

## Evaluation Of Two New Liquid Stuart Swab Transport Systems: Platinum Starswab II(Starplex Scientific) And BBL Cultureswab (Becton Dickinson)

E. Mitchell, M. Berman, and C. C. Ginocchio. North Shore – LIJ Health System Laboratories, Lake Success, NY.

### ABSTRACT

The use of appropriate microbiological specimen collection and transport systems is critical for assuring sample integrity and pathogen isolation. This quantitative study compared the ability of two liquid Stuart transport products, the BBL CultureSwab and the Platinum StarSwab II, to maintain the viability of key aerobic bacteria.

The following organisms were used to evaluate the culture swabs: *Neisseria gonorrhoeae* ATCC 43069, *Haemophilus influenzae* ATCC 10211, *Streptococcus pneumoniae* ATCC 6305, *Streptococcus pyogenes* ATCC 19615, and *Pseudomonas aeruginosa* ATCC 27853. Duplicate swabs of each type were inoculated with 100µL of a 1:10 suspension from a 0.5 McFarland preparation of the test organisms. The swabs were tested at 4 time points (0 hrs, 6 hrs, 24 hrs, and 48 hrs) and at 2 temperatures (4°C and room temperature [RT]). After the appropriate holding times, the swabs were placed into sterile saline, vortexed, and 100µL of this suspension was used to prepare ten fold serial dilutions. 100µL of each serial dilution was plated on appropriate media, incubated and colonies counted.

The number of bacteria recovered (expressed as a % of the number of organisms recovered at time 0 per temperature (RT, 4°C) and per time point (6, 24, and 48 hrs), for the BBL and Starplex swabs (SS) were as follows; *N. gonorrhoeae*: BBL (RT): 1.4, 0.9, 0.3; SS (RT): 0.6, 0, 0; BBL (4°C): 2, 4, 0.5; SS (4°C): 0.8, 0.7, 0.4. *Haemophilus influenzae*: BBL (RT): 27, 5, 1; SS (RT): 0.2, 0, 0; BBL (4°C): 27, 13, 10; SS (4°C): 12, 0.4, 0.4. *Streptococcus pyogenes*: BBL (RT): 100, 27, 18; SS (RT): 15, 5, 0.8; BBL (4°C): 62, 54, 30; SS (4°C): 28, 20, 21. *Streptococcus pneumoniae*: BBL (RT): 61, 6, 0.4; SS (RT): 11, 0.6, 0; BBL (4°C): 86, 67, 72; SS (4°C): 30, 5, 2. *Pseudomonas aeruginosa*: BBL (RT): 56, >100, >100; SS (RT): 28, 4, 0.8; BBL (4°C): >100, >100, >100; SS (4°C): >100, 32, 4.

The BBL CultureSwab demonstrated better recovery of all organisms, at all time points and at both temperatures, when compared to the Starplex Platinum StarSwab II. Both swabs had increased organism recovery when held at 4°C. In contrast, at room temperature and over time, only the BBL swab continued to have detectable growth.

### INTRODUCTION

The appropriate collection, transport and processing of clinical specimens are essential for the recovery of pathogens responsible for the disease process. Sufficient material must be collected to assure complete and accurate examination. Provisions must be made for the prompt delivery of specimens for results to be valid. A variety of transport media have been devised for prolonging the survival of microorganisms when a significant delay occurs between collection and culturing. The media must prove effective in preserving the viability of pathogenic organisms in clinical material.

Two liquid Stuart transport systems, the BBL CultureSwab (Becton Dickinson, Sparks, MD) and Platinum Starswab II (Starplex Scientific, Ontario, Canada) were evaluated for their ability to maintain the viability of some key aerobic bacteria.

### MATERIALS AND METHODS

- The BBL CultureSwab and the Platinum Starswab II were inoculated in duplicate with the following organisms and placed at two temperatures, room temperature (22°C -25°C) and 4°C: *Neisseria gonorrhoeae* ATCC 43069, *Haemophilus influenzae* ATCC 10211, *Streptococcus pneumoniae* ATCC 6305, *Streptococcus pyogenes* ATCC 19615, and *Pseudomonas aeruginosa* ATCC 27853.
- A 0.5 McFarland Standard was prepared from a fresh isolate of each organism using a turbidity meter, and then further diluted to a 1:10 inoculum suspension.
- Duplicate swabs were inoculated with 100 µL of each organism, making sure that the entire volume of the suspension was completely absorbed by the swabs.
- The swabs were tested at 4 time points (0 hrs, 6 hrs, 24 hrs and 48 hrs) and at 2 temperatures (4°C and RT).
- After the appropriate holding times, the swabs were placed into 1ml of sterile saline, vortexed, and 100 µL of this suspension was used to prepare ten fold serial dilutions.
- 100 µL of each serial dilution was plated in duplicate on appropriate media, incubated at 35°C for 48 hrs. Colonies were counted and results were averaged.

### RESULTS

- Both systems had detectable growth at both temperatures and all time points for *Streptococcus pyogenes*.
- Both systems had detectable growth of *Streptococcus pneumoniae* at both temperatures for 6 and 24 hour time points with enhanced growth at 4°C.
- *Pseudomonas aeruginosa* had detectable growth with both systems in 6 hours at room temperature. However, at all other times and temperatures the BBL swab demonstrated overgrowth (>100% recovery).
- The BBL swab demonstrated better recovery of both *Neisseria gonorrhoeae* and *Haemophilus influenzae*, with enhanced recovery at 4°C over time.
- *Neisseria gonorrhoeae* had detectable growth with both systems at 6 hours, but steadily declined over time.

### CONCLUSIONS

- The pre-analytical phase of the laboratory process is critical for maintaining the viability and recovery of bacterial pathogens. Since the majority of swabs being processed in the laboratory are received within a 6 to 24 hour time period, it is essential that the transport system of choice assure specimen integrity and organism isolation with minimal overgrowth.
- Both swabs had increased organism recovery when held at 4°C.
- The low recovery rate for *Neisseria gonorrhoeae* demonstrates that a swab transport system with Liquid Stuart media is not the best system to transport such a fastidious organism.
- Overall, the BBL CultureSwab demonstrated better recovery of all organisms, at all time points and at both temperatures, when compared to the Starplex Scientific Starswab II.

### REFERENCES

- BBL CultureSwab package insert, Becton Dickinson May 2000.
- Starswab II package insert, Starplex Scientific Inc., April 2001.

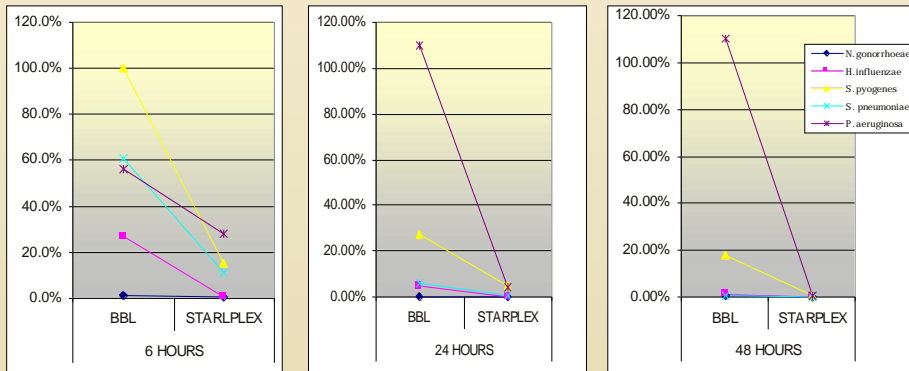


NORTH SHORE  
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HEALTH SYSTEM



**Table I and Graph I ROOM TEMPERATURE**

ORGANISM	6 HOURS		24 HOURS		48 HOURS	
	BBL	STARPLEX	BBL	STARPLEX	BBL	STARPLEX
<i>N. gonorrhoeae</i>	1.4%	0.6%	0.9%	0	0.3%	0
<i>H. influenzae</i>	27%	0.2%	5%	0	1%	0
<i>S. pyogenes</i>	100%	15%	27%	5%	18%	0.8%
<i>S. pneumoniae</i>	61%	11%	6%	0.6%	0.4%	0
<i>P. aeruginosa</i>	56%	28%	>100%	4%	>100%	0.8%



BBL CultureSwab

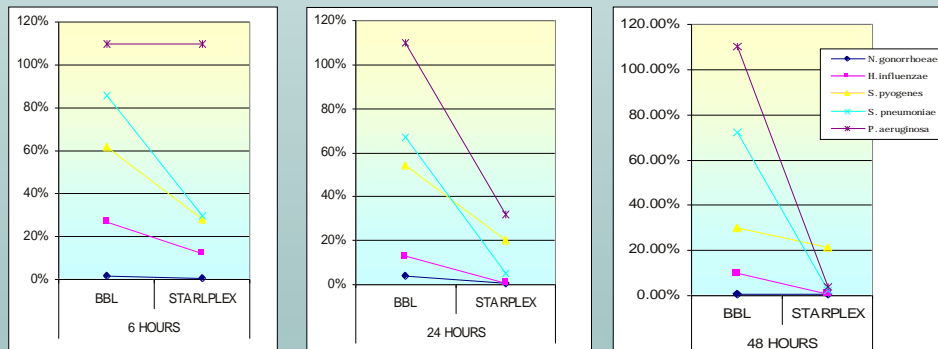


Starplex Starswab II

The average colony counts of recovered organisms as compared to time 0 at room temperature, converted to percentages. Results are an average of duplicate testing.

**Table II and Graph II 4° C**

ORGANISM	6 HOURS		24 HOURS		48 HOURS	
	BBL	STARPLEX	BBL	STARPLEX	BBL	STARPLEX
<i>N. gonorrhoeae</i>	2%	0.8%	4%	0.7%	0.5%	0.4%
<i>H. influenzae</i>	27%	12%	13%	0.4%	10%	0.4%
<i>S. pyogenes</i>	62%	28%	54%	20%	30%	21%
<i>S. pneumoniae</i>	86%	30%	67%	5%	72%	2%
<i>P. aeruginosa</i>	>100%	>100%	>100%	32%	>100%	4%



The average colony counts of recovered organisms as compared to time 0 at 4° C, converted to percentages. Results are an average of duplicate testing.