

Copan and Starplex Amies with Charcoal Transport Systems – An Evaluation of Organism Recovery

B. GANDHI*, J. TARBUSH, A. SARABIA. MDS LABORATORY SERVICES, TORONTO, ONTARIO, CANADA

ABSTRACT

The objective was to determine the capacity of the Copan Venturi Transystem and Starplex Starswab system maintain the viability of organisms such as *Neisseria gonorrhoeae* (GC), *Streptococcus pneumoniae* (SPN), *Haemophilus influenzae* (HIN), vancomycin-resistant *Enterococcus* (VRE), Group A *Streptococcus* (GAS), methicillin-resistant *Staphylococcus aureus* (MRSA), anaerobes and yeast species. Suspensions of 38 isolates were prepared to match a 0.5 McFarland standard then diluted to produce a 1.0×10^7 CFU/mL density. From this a 0.1mL aliquot was pipetted onto the tip of each swab. Two lots of Copan and Starplex systems were set up in duplicate. After returning all swabs to their corresponding tubes, all transport devices were incubated at room temperature for 0, 24 and 48 hours. After the appropriate holding times, duplicate plates were inoculated and streaked using an automated plate streaker. All plates were read after 48 hours incubation.

Seven out of twelve GC isolates were not recovered in either lot of Starplex system. Eleven out of twelve GC isolates were isolated from both lots of the Copan system. The Copan system yielded approximately twice the amount of growth of each anaerobe at 48 hours incubation as compared to the Starplex system. The recovery of SPN isolates was enhanced in the Starplex system versus the Copan system. All other non-fastidious organisms and *H. influenzae* produced comparable results in both systems. In general, the yield of all organisms was similar between both lots in each product line.

The Copan system appears to be superior to the Starplex system for the recovery of GC. The recovery of anaerobes and SPN was enhanced in the Copan and Starplex systems, respectively. There were no significant differences in the recovery of *H. influenzae* and the other organisms studied.

INTRODUCTION

At MDS laboratories, a large volume of routine swabs are processed each day. Potential delay in processing can result in the loss of viability of significant and fastidious organisms, which, in turn, can have great impact on patient care.

The decision to adopt a particular transport device is made based on a variety of factors, which may include performance (organism viability), convenience, vendor service and cost.

The objective of this study was to compare the ability of Copan Venturi Transystem and Starplex Starswab system to maintain the organism viability. Factors such as growth endpoint scores, organism diversity, swab lot to lot variability was considered.

The following table highlights the fundamental differences between the two brands.

	Starplex	Copan
Media base	Acumedia	Difco
Shelf life improvement	N/A	Flushed with Nitrogen gas*
Swab	Larger swab head	Smaller swab head
Packaging	Front side plastic/backside paper	Both sides plastic*
Agar content	10.0g/1	7.5g/1

* This modification is intended to retard oxygen penetration into the media for improved shelf life and greater stability.

METHOD

The following organisms were evaluated: 1) six wild strains and one ATCC strain of GAS, 2) three wild strains and one ATCC strain of SPN, 3) one ATCC strain of MRSA, 4) three wild strains and two ATCC strains of *Enterococcus*, 5) one ATCC strain of *C. albicans*, 6) one wild strain of *Cryptococcus albidus*, 7) two wild strains and one ATCC strain of HIN, 8) eleven wild strains and one ATCC strain of GC, 9) one ATCC strain of *Clostridium perfringens*, 10) one ATCC strain of *Clostridium sordelli*, 11) one ATCC strain of *Bacteroides uniformis*, 12) one ATCC strain of *Bacteroides thetaiotaomicron*.

- All organisms were harvested from frozen stock cultures and sub-cultured three times prior to testing.
- Working suspensions were made from growth of 18-24 hr cultures (16 hr in the case of *S. pneumoniae*) and adjusted to match 0.5 MacFarland turbidity standard (1.5×10^8 CFU/mL) in 10.0ml saline.
- Gonococcal strains were diluted in Tryptic soy broth rather than saline.
- A further 1:10 dilution was made of the original working suspensions.
- Using an eppendorf pipette, each swab tip was inoculated with the 0.1ml of the adjusted suspension.
- Two different lot numbers of Copan and Starswab were set up in duplicate. (Copan lot A, expiry Oct/31/1998, lot B, expiry Sep/03/1999, Starplex lot A, expiry Feb/02/2000, lot B, expiry Mar/17/2000).
- All transport devices were incubated at room temperature for 0, 24 and 48 hr to simulate transport times.
- Duplicate plates were inoculated and streaked using the Isoplater 80 and incubated under appropriate atmospheric conditions at 35°C.
- Plates were read at 48 hours (bacterial strains) and 72 hours (yeast strains).
- Final growth scores were calculated for each isolate by averaging the growth scores of duplicate plates.

ORGANISM GROWTH SCORING SYSTEM

SCORE	GROWTH DISTRIBUTION
0	No growth.
1	10 or less colonies in Quadrant 1; no growth in higher Quadrants
2	No more than one colony in Quadrant 2; no growth in higher Quadrants.
3	2 to 10 colonies in Quadrant 2; no growth in higher Quadrants.
4	> Rank 3, no more than 1 colony in Quadrant 3, no growth in Quadrant.
5	2 to 10 colonies in Quadrant 3; no growth in Quadrant 4.
6	> Rank 5, no more than 1 colony in Quadrant 4.
7	2 to 10 colonies in Quadrant 4.
8	> 10 colonies in Quadrant 4.

Ref: A statistically valid method for evaluation of aerobic transport devices. D.D. Hardy, J.F. Monthey, C.M. Gosnel and S.D. Stewart. 1991. An ASM general meeting poster.

ACKNOWLEDGMENT: We wish to thank Mr. Norman Sharples and Copan Diagnostic Inc. for financially supporting this poster and for providing the Copan Venturi Transystem. We also thank Mr. Fred Turco for providing the Starplex Starswab system, Starplex Scientific Inc. We are also grateful to Patti Semple and Anusha Gandhi for the artwork and word-processing respectively.

RESULTS

CHARTED RESULTS

DISCUSSION / CONCLUSIONS

When many strains from a diverse group of organisms were used to test the ability of the two transport systems to maintain their viability, the following was found:

- With the same formulation of charcoal Amies medium, (with the exception of agar content), the two systems did not produce identical results.
- The yield of all organisms was similar between both lots in each product line.
- The recovery differences between the two transport devices assessed include increased recovery of GC and anaerobes for Copan swabs and increased recovery of SPN for Starplex swabs.
- Differences in recovery of GC and anaerobes may be due to oxygen retarding technology utilized in the Copan system.
- In a large community based laboratory, increasing the recovery of GC as much as possible is crucial.
- It is interesting to note that for SPN, the recovery from 48 hr swabs was greater than 24 hr swabs.

Since this study was performed, Copan's ability to maintain organism viability has been validated using clinical samples rather than artificially seeded swabs (8).

REFERENCES

- Finn, S., S. E. Farhat, J. Beech, J. McCann, M. Skulnick, and B.B.Diena. 1998. Evaluation of two swab transport systems for the recovery of sixteen bacterial species of clinical significance. Presented at the 98th General Meeting of the American Society for Microbiology, Atlanta, Georgia.
- Hudspeth, M.K., D.M. Citron, and E.J. Goldstein. 1997. Evaluation of a novel specimen transport system (Venturi Transystem) for anaerobic bacteria. *Clinical Infectious Diseases* 25:132-3.
- Perry, J.L., 1997. Assessment of swab transport systems for aerobic and anaerobic organism recovery. *J.Clin. Microbiol.* 35:1269-1271
- Perry, J.L., and J.S. Matthews. 1997. Inhibitory properties of a commercially available swab transport device. Presented at the 97th General Meeting of the American Society for Microbiology, Miami, Florida.
- Thompson, D., and S. French. 1997. Comparison of Amies charcoal transport system versus in-house Amies medium for the recovery of *Neisseria gonorrhoeae*. Presented at Conjoint Meeting on Infectious Diseases, (CACMID) St. John's Newfoundland.
- Starswab Culture Collection Transportation system, Starplex Scientific. Item No. 2155. 1997.
- Copan Venturi Transystem. Copan Diagnostics Inc. Product information brochure.
- Olsen, C.C., J. R. Schwelke, W. H. Benjamin, JR., A. Beverly, and K. B. Waites. 1999. Comparison of direct inoculation and Copan transport systems for isolation of *Neisseria gonorrhoeae* from endocervical specimens.