Comparison of Starplex StarSwab With a New Fisherbrand Amies Agar Gel Transport Swab for the Recovery of Fastidious Aerobic and Anaerobic Bacteria

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ABSTRACT

As a commercial laboratory we receive microbiology specimens that are transported from distant locations resulting in long transport times. We evaluated Starplex StarSwab modified Amies Agar (STAR) and FisherBrand Amies without charcoal (FB) transport swabs for their ability to maintain the viability of a number of clinically important bacteria over time. Organisms tested were *Peptostreptococcus anaerobius* ATCC 27337 (PAN), *Fusobacterium nucleatum* ATCC 25586 (FN), *Streptococcus pyogenes* ATCC 19615 (SPY), *Neisseria gonorrhoeae* ATCC 43069 (NG), *Neisseria meningitidis* ATCC 13090 (NM), *Haemophilus influenzae* ATCC 10211 (HI), *Streptococcus pneumoniae* ATCC 6305 (SPN), *Pseudomonas aeruginosa* ATCC 27853 (PA). An 18 hour growth of the organisms in a suspension equivalent to 0.5 McFarland standard was made using a nephalometer. This 0.5 McFarland suspension was diluted 1:10 in saline to create the inoculum suspension. 8 STAR and FB swabs of each organism were dosed with 100ul of the inoculum suspension. Duplicate swabs were held at room temperature for 0, 6, 24, and 48h and sampled by vortexing the swab in 1 ml of saline, plating the vortexed suspension onto Sheep Blood agar plates, and incubating at 35°C. Survival rates were calculated against the 0 hour swabs. For PAN, the survival rates at 6h were 0% STAR, 99% FB; at 24h, 0% STAR, 8% FB. For FN, survival rates at 6h were 3% STAR, 89% FB; at 24h, 0% STAR, 27% FB; at 48h, 0% STAR, 2% FB. For SPY, survival rates at 6h were 71% STAR, 100% FB; 24h, 50% STAR, 30% FB and at 48h, 53% STAR, and 67% FB. For NG, survival rates at 6h were 10% STAR, 86% FB; at 24h, 0% STAR, 7% FB; at 48 h, 0% STAR, 0.7% FB. For NM, survival rates at 6h were 2% STAR, 48% FB , at 24h 0% STAR, 10% FB; at 48h, 0% STAR, and 2% FB. For HI, the survival rates at 6h were 5% STAR, 69% FB; at 24h, 0.04% STAR, 21% FB and at 48 hr, 0 % STAR, 4% FB. For SPN, survival rates at 6h were 68% STAR, 88% FB; at 24h, 5% STAR, 26% FB and at 48hrs 0.6%STAR, 6% FB. For PA, the survival rates at 6h were 14% STAR, 55% FB, at 24h, >100% STAR, >100% FB, at 48h, >100% STAR, >100% FB. With one exception, StarSwab demonstrated lower recovery rates than the Fisherbrand. Both swabs appeared to support growth of *P. aeruginosa*.

ORGANISMS TESTED

ORGANISMS	SOURCE
Neisseria gonorrhoeae	ATCC 43069
Haemophilus influenzae	ATCC 10211
Streptococcus pyogenes	ATCC 19615
Neisseria menigitidis	ATCC 13090
Streptococcus pneumoniae	ATCC 6305
Pseudomonas aeruginosa	ATCC 27853
Fusobacterium nucleatum	ATCC 25586
Peptostrepococcus anaerobius	ATCC 27337

INTRODUCTION

Many factors play a role in the recovery of bacteria from clinical specimens. These factors range from the types of swabs and transport media used, to the length of transport time. More and more centralized laboratories are being created increasing the transport time of the specimen from the hospital, clinic or physician office to the off-site laboratory. As a commercial laboratory servicing clients far and near, it was important for us to find a transport swab system that would maintain the viability of both aerobic and anaerobic organisms from specimens over a long period of time.

For aerobic organisms we were using the BD Culturette system that was discontinued by BD. For anaerobes we were using the BD Anaerobic Specimen Collector that we wanted to stop using for safety reasons (the collection tube was glass). If possible we wanted to go to one specimen collection system for both anaerobes and aerobes.

In order to choose another swab collection system, we evaluated the Fisherbrand Transport Swabs with Amies without charcoal Agar Gel made for Fisher by Copan Diagnostics Inc. and the latest Starplex Starswab Collection and Transport System made by Starplex Scientific with modified Amies clear. Both swab systems are rayon tipped swabs in polypropylene tubes. Both systems are sealed in a pouch. Additionally, the Fisherbrand transport swab is sealed in a barrier plastic film pouch that retards the entry of oxygen and has been flushed with nitrogen gas to stabilize the Eh potential of the media.

Two commercial transport swab systems were evaluated:

1. Starplex Star Swab with modified Amies

2. Fisherbrand with Amies without charcoal

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METHOD

1. A vial of lyophilized ATCC culture for each organism was reconstituted and cultured onto the appropriate media

   Chocolate
   - *Neisseria menigitidis*
   - *Neisseria gonorrhoeae*
   - *Haemophilus influenzae*

   5% Sheep Blood agar
   - *Streptococcus pneumoniae*
   - *Pseudomonas aeruginosa*
   - *Streptococcus pyogenes*

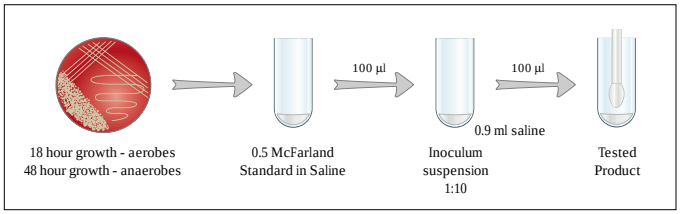
   PRAS Brucella agar
   - *Peptostreptococcus anaerobius*
   - *Fusobacterium nucleatum*

2. A fresh 18 hour growth of the aerobic organisms and a 48 hour growth of the anaerobic organisms was used to make a 0.5 McFarland suspension
3. The 0.5 McFarland suspensions were diluted 1:10 in saline to create the inoculum suspensions.
4. 100 ul of each inoculum suspension was pipetted into 16 sterile tubes, 8 for the Fisherbrand and 8 for the Starswabs, 2 for each of the time points 0 hours, 6 hours, 24 hours and 48 hours
5. 8 Fisherbrand and 8 Starswab transport swabs were placed in the tubes with 100 µl of inoculum suspension.
6. The swabs were placed into the transport media and held at room temperature.
7. The 0 hour swabs were removed immediately and placed in a tube containing 1 ml sterile saline, vortexed for 30 seconds. The swab was squeezed along the side of the tube to remove as much liquid as possible and the swab discarded.
8. 100 ul of the vortex suspension was removed and serially diluted in 0.9 ml of saline to create 10 -1 and 10 -2 dilutions
9. 100 ul from the vortex swab suspension and each serial dilution was spread evenly over the surface the appropriate culture media.
10. These plates were incubated for 24 and 48 hours before counting

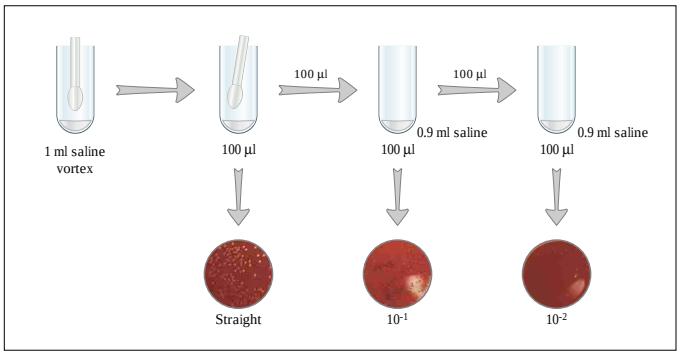
The results were averaged for each serial dilution. The serial dilutions were to obtain colony counts between 30 and 300 CFUs.

12. Survival rates were calculated against the 0 hour swab

1. To make the inoculum suspension for each organism:

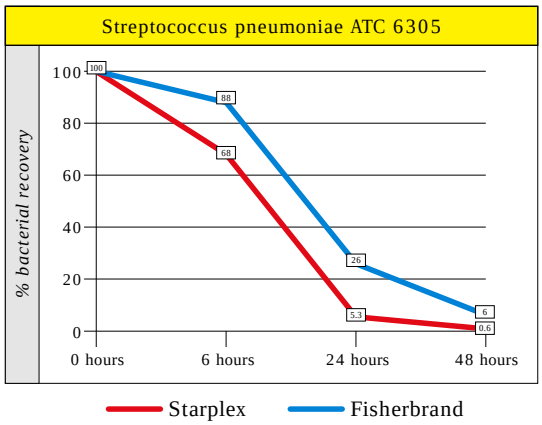


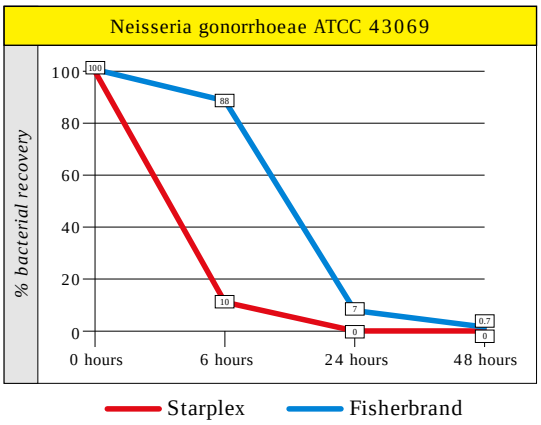
2. Replace swab in transport media.
3. Swabs are incubated at room temperature for 0, 6, 24, and 48 hours.
4. Sample:

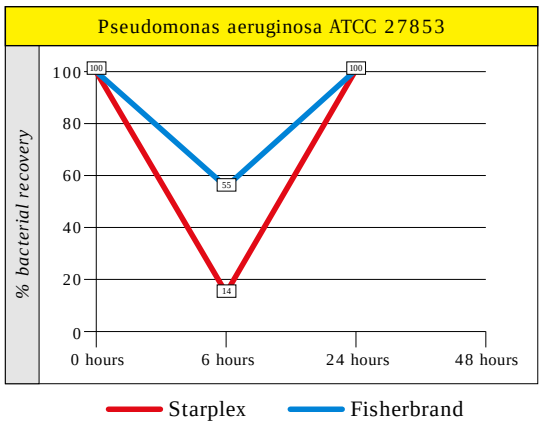


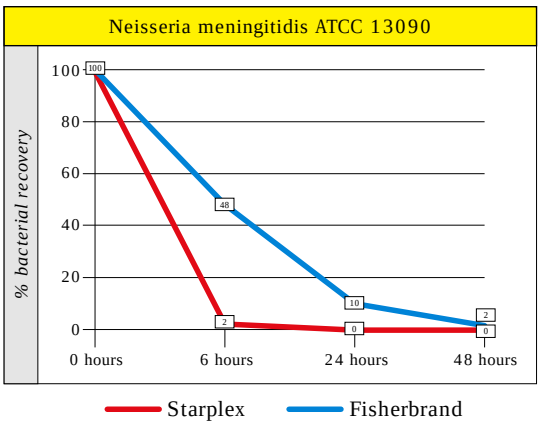
CONCLUSION

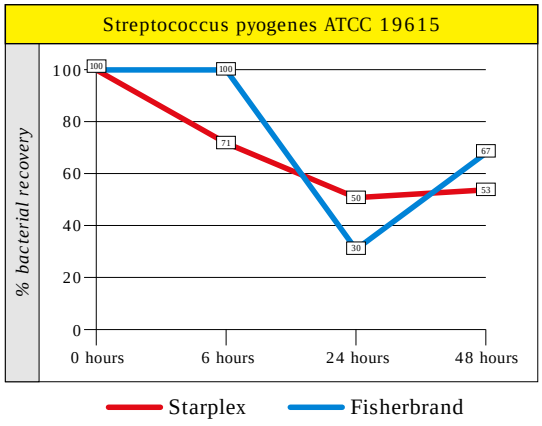
1. By the first reading (6 hours) the Fisherbrand Transport Swab demonstrated a much better recovery rate than the Starswab for all the isolates tested
2. Even though the transport media is a non-nutritive media Pseudomonas aeruginosa grew in both swabs systems. Streptococcus pyogenes also grew in the transport media, although not to the same degree.
3. Because of the overgrowth of these 2 organisms the transport and storage of swabs at 4 degrees C (rather than room temperature) should be evaluated
4. Our evidence supports use of the Fisherbrand Transport Swabs with Amies without charcoal for use as both an aerobic and anaerobic transport swab.

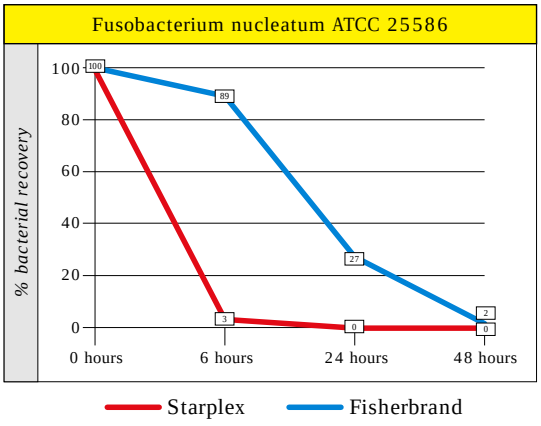

Streptococcus pneumoniae ATC 6305
% bacterial recovery
100
80
60
40
20
0
0 hours
6 hours
24 hours
48 hours
100
88
68
26
5.3
6
0.6
Starplex
Fisherbrand

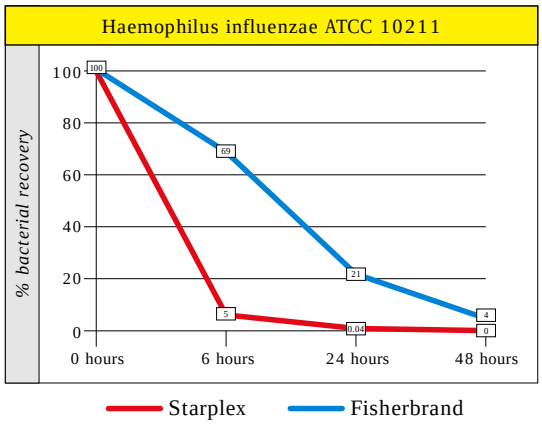

Neisseria gonorrhoeae ATCC 43069
% bacterial recovery
100
80
60
40
20
0
0 hours
6 hours
24 hours
48 hours
100
88
10
7
0
0.7
0
Starplex
Fisherbrand

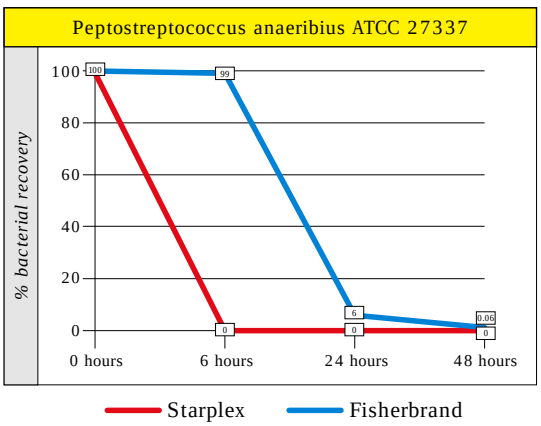

Pseudomonas aeruginosa ATCC 27853
% bacterial recovery
100
80
60
40
20
0
0 hours
6 hours
24 hours
48 hours
100
55
14
100
Starplex
Fisherbrand


Neisseria meningitidis ATCC 13090
% bacterial recovery
100
80
60
40
20
0
0 hours
6 hours
24 hours
48 hours
100
48
2
10
0
2
0
Starplex
Fisherbrand


Streptococcus pyogenes ATCC 19615
% bacterial recovery
100
80
60
40
20
0
0 hours
6 hours
24 hours
48 hours
100
100
71
50
53
30
67
Starplex
Fisherbrand


Fusobacterium nucleatum ATCC 25586
% bacterial recovery
100
80
60
40
20
0
0 hours
6 hours
24 hours
48 hours
100
89
3
27
0
2
0
Starplex
Fisherbrand


Haemophilus influenzae ATCC 10211
% bacterial recovery
100
80
60
40
20
0
0 hours
6 hours
24 hours
48 hours
100
69
5
21
0.04
4
0
Starplex
Fisherbrand


Peptostreptococcus anaeribius ATCC 27337
% bacterial recovery
100
80
60
40
20
0
0 hours
6 hours
24 hours
48 hours
100
99
0
6
0
0.06
0
Starplex
Fisherbrand