

Multisite Prospective Clinical Evaluation of CHROMagar COLOREX *Burkholderia cepacia* Chromogenic Medium

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Background

Burkholderia cepacia complex (BCc) are uncommon but important pathogens in patients with cystic fibrosis (CF). Colonization of the airway is associated with poor prognosis and imparts changes to infection prevention and clinical management of the patient. Current CF Foundation guidelines recommend the use of selective culture medium specific to BCc for routine bacteriologic workup of respiratory specimens from individuals with CF.

The goal of this study was to:

- Compare the performance of CHROMagar COLOREX *B. cepacia* agar to standard *B. cepacia* selective media for the identification of BCc in respiratory specimens collected from individuals with CF.

Methods

A total of 547 respiratory specimens were collected from CF patients at four clinical centers: Children's Wisconsin, Childrens Hospital of Los Angeles, Froedtert/Medical College of Wisconsin and University of Washington Medical Center. All specimens were cultured in accordance with site-specific protocols using *B. cepacia* selective agar (BCSA) or *Pseudomonas cepacia* agar (PCA), in addition to COLOREX *B. cepacia* (COLOREX). Cultures were incubated and examined for 3-5 days. The presence of microbial growth consistent with BCc as well as other non-BCc growth was recorded, and colony identification was performed using MALDI-ToF MS. The limit of detection (LoD) for *B. cepacia* on all three media was compared using a seeded specimen study in pooled respiratory matrix.

N=547 respiratory specimens

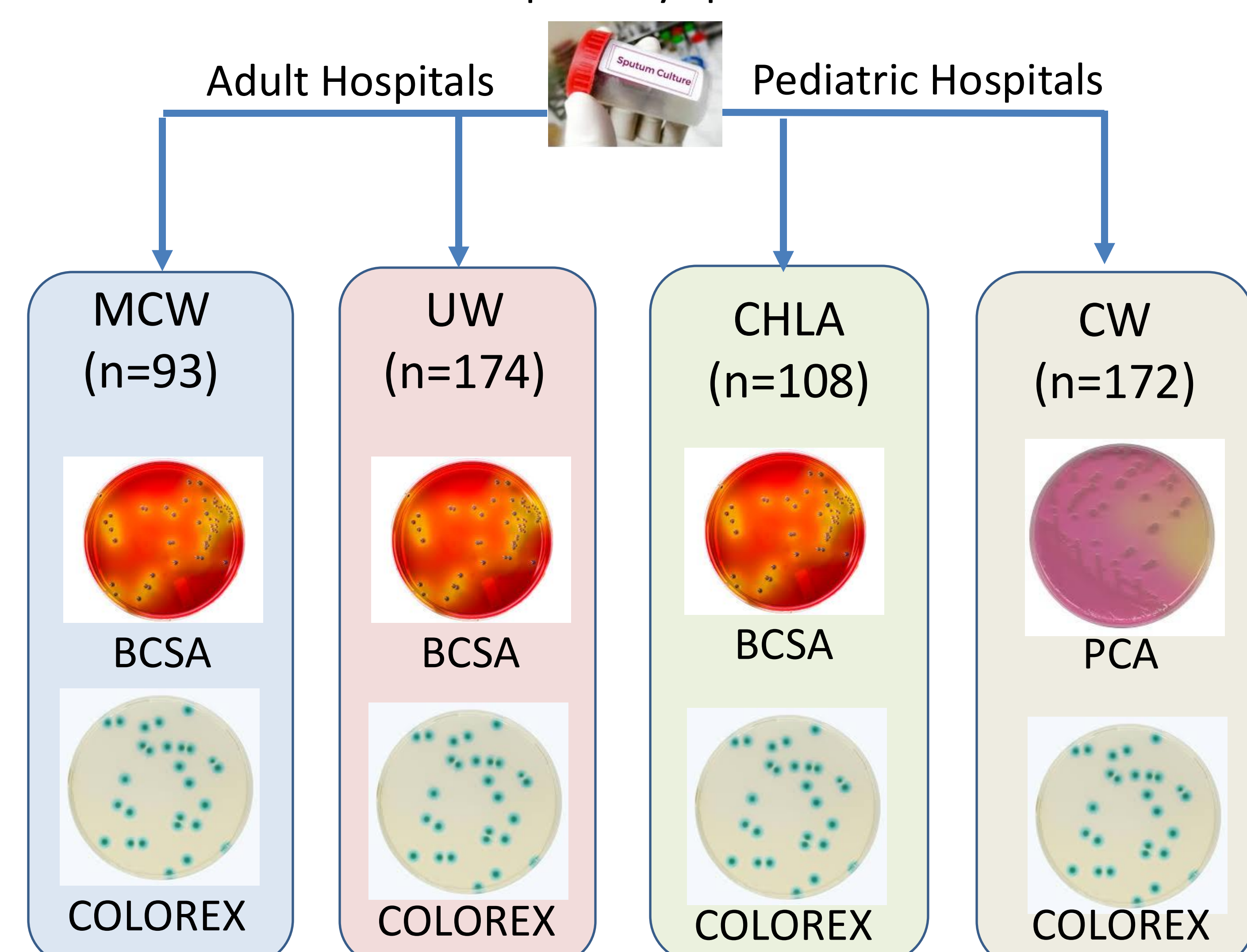


Table 1. Agreement between COLOREX and SOC

Site	COL(+) SOC(+)	COL(+) SOC(-)	COL(-) SOC(+)	COL(-) SOC(-)	Total	Agree %
UW	3	6	4	161	174	94.3%
MCW	1	2	4	86	93	93.5%
CW	0	1	0	171	172	99.4%
CHLA	3	3	4	98	108	93.5%
Total	7	12	12	516	547	95.6%

- Overall agreement between COLOREX and SOC screening medium was 95.6% across all sites and ranged from 93.5% to 99.4% at individual sites. This demonstrates consistent performance across different institutions and patient populations
- The same number of COL(+)/SOC(-) and COL(-)/SOC(+) results were noted and encompasses both false positive and false negative screening results for both media. See Table 2 for sensitivity and specificity calculations

Table 2. Performance of individual screening media^a

Medium	True Pos	False Pos	False Neg	True Neg	Sens	Spec
COLOREX	5	13	1	528	83.3%	97.6%
BCSA	4	17	2	353	66.7%	95.4%
PSA	0	0	0	172	ND	100.0%

^aGold standard was defined as a positive result (characteristic colonies identified as BCc) on either COLOREX or traditional screening medium

- COLOREX demonstrated higher sensitivity and specificity when compared to BCSA
- Two false negative results on BCSA consisted of one culture with no bacterial growth and one culture with 2+ growth of small gray colonies lacking the expected yellow zone of coloration. In both cases the isolate was identified as *B. multivorans* on COLOREX agar.

Table 3. Discordant results – False Negative

ID	COLOREX	BCSA
WDL056	No growth	1 CFU yellow colony at 72h. BCc. Re-streak to COLOREX yielded blue-green colonies at 24h
UW050	3+ blue/green at 72h. <i>B. multivorans</i>	No Growth (See image to right)
UW160	2+ blue/green at 48h. <i>B. multivorans</i>	No Growth



Table 4. Ability of media to suppress non-BCc growth

Medium	Total	Any non-BcC	Yeast
COLOREX	547	42 (7.7%)	17 (3.1%)
BCSA	375	52 (13.9%)	12 (3.2%)
PSA	172	10 (5.8%)	9 (5.2%)

- COLOREX suppressed the growth of all non-BCc organisms, including yeast, as well or better than traditional selective and differential screening media
- Suppression of non-BCc growth may contribute to increased sensitivity for specimens with low numbers of *B. cepacia* and reduce the number of false positive cultures requiring further laboratory confirmation.

Table 5. False positive breakthrough growth

Organism ID	# of FP on BCSA	# of FP on COLOREX
<i>Chryseobacterium spp</i>	7	0
<i>Delftia acidovorans</i>	1	0
<i>Achromobacter xylosoxidans</i>	3	5
<i>Burkholderia gladioli</i>	0	1
<i>Serratia marcescens</i>	0	4
<i>Ralstonia pickettii</i>	2	1
<i>Morganella morganii</i>	1	1
<i>Stenotrophomonas maltophilia</i>	2	0
<i>Acetobacter indonensis</i>	0	1
<i>Strep viridans gr.</i>	1	0

- Fewer colonies with characteristic appearance of BCc but identified as other organisms (i.e., false positive) were observed on COLOREX when compared to BCSA.
- The largest source of false positive results on BCSA were attributable to *Chryseobacterium spp*, while the largest source of false positive result on COLOREX were attributable to *Achromobacter xylosoxidans* and *Serratia marcescens*.

Conclusions

- The chromogenic CHROMagar COLOREX *B. cepacia* agar demonstrated superior sensitivity and specificity when compared to traditional BCSA agar.
- In a low prevalence setting, high specificity is valued to reduce the number of false-positive results requiring additional laboratory confirmation. COLOREX demonstrated superior suppression of non-BCc organisms which may also increase the sensitivity of COLOREX medium for identification of BCc in low concentration specimens
- False positive screening results occur on all screening media; therefore, all characteristic colonies should be confirmed using additional identification methods (e.g., MALDI-ToF)
- COLOREX *B. cepacia* agar provides a reliable method to identify BCc in respiratory specimens