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Culture of Urine Specimens by Use of chromID CPS Elite Medium Can Expedite *Escherichia coli* Identification and Reduce Hands-On Time in the Clinical Laboratory

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Urine is one of the most common specimen types submitted to the clinical microbiology laboratory; the use of chromogenic agar is one method by which the laboratory might expedite culture results and reduce hands-on time and materials required for urine culture analysis. The objective of our study was to compare chromID CPS Elite (bioMérieux), a chromogenic medium, to conventional primary culture medium for evaluation of urine specimens. Remnant urine specimens ($n = 200$) were inoculated into conventional media and into chromID CPS Elite agar (chromID). The time to identification and consumables used were documented for both methods. Clinically significant pathogen(s) were recovered from 51 cultures using conventional media, with *Escherichia coli* being the most frequently recovered organism ($n = 22$). The rate of exact uropathogen agreement between conventional and chromogenic media was 82%, while overall categorical agreement was 83.5% The time interval between plating and final organism identification was decreased with chromID agar versus conventional media for *E. coli* (mean of 24.4 h versus 27.1 h, $P < 0.001$). Using chromID, clinically significant cultures required less hands-on time per culture (mean of 1 min and 2 s [1:02 min]) compared to conventional media (mean of 1:31 min). In addition, fewer consumables (2.4 versus 3.3 sticks and swabs) and rapid biochemical tests (1.0 versus 1.9) were necessary using chromID versus conventional media. Notably, antimicrobial susceptibility testing demonstrated good overall agreement (97.4%) between the chromID and conventional media for all antibiotics tested. chromID CPS Elite is accurate for uropathogen identification, reduces consumable usage, and may expedite the identification of *E. coli* in clinical specimens.

Urinary tract infections (UTIs) are among the most common bacterial infections worldwide (1). Screening urine cultures to identify significant uropathogens can require considerable hands-on time, consumable usage, and biochemical testing. As a result, urine cultures to support a diagnosis of UTI account for a major share of the workload in microbiology laboratories (2), which are facing a shortage of skilled laboratory personnel (3). Thus, there is a need for accurate methods that save time and reduce workload. In addition, there is growing emphasis on expediting culture results from patients with infection; minimizing the window of diagnostic uncertainty is essential to optimize antimicrobial therapy and improve patient outcomes (4).

One approach to streamline urine culture is the rapid identification of organisms from growth on solid agar using matrix-assisted laser desorption ionization time of flight mass spectrometry (MALDI-TOF MS). This method has been shown to be accurate and cost-effective for identification of bacterial and fungal organisms (5–15). However, considerable hands-on time may be necessary upstream of MALDI-TOF MS to isolate significant uropathogens from standard media, particularly for patients with mixed infections.

The majority of complicated and uncomplicated UTIs are caused by *Escherichia coli*, with other organisms, such as *Klebsiella pneumoniae*, *Staphylococcus saprophyticus*, *Enterococcus* spp., and group B streptococci (GBS), contributing a significant portion to the epidemiology of UTIs (16). Because the etiology of the majority of UTIs is limited to a few microorganisms, culture for uropathogens is amenable to the use of chromogenic agar, which may minimize turnaround time and consumable supplies required. Several studies have evaluated commercially available chromogenic agars for identification of common uropathogens (17–20). A recently commercialized chromogenic agar, chromID CPS Elite (chromID) agar (bioMérieux, Durham, NC), facilitates the isolation and identification of several common agents of UTI by their colony characteristics. A major advantage of this medium is the ability to directly identify *E. coli*. In conjunction with Gram stain, the chromID media also permits presumptive identification of *Enterococcus* spp., some members of the *Enterobacteriaceae*, and members of the *Proteeae* group (*Proteus*, *Providencia*, and *Morganella*). For these organisms, definitive identification requires biochemical testing or MALDI-TOF MS analysis. The objective of our study was to compare the performance of chromID to the use of conventional primary culture media for urine specimens. The accuracy of uropathogen detection, hands-on time, the use of consumables, and the time required for identification were assessed for each type of media. In addition, the accuracy of antimicrobial susceptibility testing set up directly from chromogenic agar was evaluated and compared to standard media.

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MATERIALS AND METHODS

Subjects. After approval by the Washington University Institutional Review Board was obtained, 200 deidentified remnant urine specimens submitted to the Barnes-Jewish Hospital Microbiology Laboratory (St. Louis, MO) as part of routine clinical care were randomly selected for inclusion in this study. Twenty specimens per week were evaluated over the course of 10 weeks. For inclusion in the study, specimens had to be processed within 24 h of collection and be submitted in BD urine culture gray-top transport tubes. Basic subject demographics, including sex, age, hospital unit, and inpatient status, were collected.

Culture methods. Urine was plated using a 1-μl calibrated inoculating loop with a cross-streak pattern to conventional blood and MacConkey agars (Hardy, Santa Maria, CA) and to chromID CPS Elite chromogenic agar (bioMérieux). Plates were set up and incubated in batches of five, separated by 30 min each to allow for the accurate time capture of downstream workflow. Cultures were incubated for 22 to 24 h at 35°C in ambient air. Quality control for chromID was performed according to the manufacturer's recommendations.

Organism identification and antimicrobial susceptibility testing. Conventional and chromID media were read and interpreted according to criteria in the standard operating procedure for urine cultures in the clinical microbiology laboratory. The growth of one or two distinct organisms at a threshold of 50,000 CFU/ml was classified as clinically significant growth. The presence of three or more organisms, each exceeding threshold amounts, was classified as contaminated. All workup of clinically significant organisms was performed in accordance with the package insert for the chromID media. Clinically significant organisms were identified using Vitek MS v2.0 (bioMérieux) directly from conventional or chromID media (11–13, 15). During each step of work-up and identification, hands-on time and consumable usage were documented for both conventional and chromogenic methods using a stopwatch.

Antibiotic susceptibility testing (AST), when indicated, was performed directly off routine media or chromID media using Kirby-Bauer disk diffusion in accordance with the laboratory protocol for the organism type. Zone sizes were recorded if needed for discrepant analysis. AST and interpretation of results were performed according to Clinical and Laboratory Standards Institute (CLSI) guidelines (21, 22). All drugs were assessed for category agreement and any errors were categorized.

Comparison of chromID CPS opaque and translucent media. The chromID medium is available in translucent or opaque formats, which are identical in formulation, with the exception of the opacity of the media. For comparison of chromID CPS Elite translucent or opaque agar, a subset of 50 specimens with growth were randomly selected and cultured simultaneously to both the chromID CPS Elite and the chromID CPS Elite OPAQUE media using a 1-μl loop. Organism identification and quantification was performed from each medium type and compared. For comparison of AST, cultures with clinically significant growth were tested directly from the chromID CPS Elite and the chromID CPS Elite OPAQUE media. AST agreement was analyzed by category agreement, as described above.

Statistical analysis. Upon completion of the comparison, statistical analysis was performed to determine the accuracy and assess differences in hands-on time, time to reporting results, and materials used. For accuracy, the categorical agreement of each culture and the exact agreement to a group or species level of each isolate were compared between chromID and conventional media. Categorical agreement was defined as the same classification (clinically significant, contaminated, clinically insignificant, or no growth) between the conventional and chromogenic media for the same specimen. Two-sided *t* tests (paired and unpaired, as appropriate for each comparison) were utilized to compare differences in hands-on time, time to reporting results, and materials used. All analyses were completed using SAS/STAT, version 9.1 of the SAS system.

RESULTS

Subjects. A total of 200 deidentified remnant specimens that had been submitted for urine culture were evaluated. These specimens were collected from subjects that ranged in age from 14 to 100 years (mean, 52 years; median, 54 years), with 60% of the subjects being female. In total, 45% of the specimens were collected from inpatient units.

Accuracy of chromID CPS. The urine specimens were plated on chromID agar, and growth was compared to conventional media as the reference standard method. Of the 200 cultures, 61 were classified by conventional media as having no growth, 72 demonstrated clinically insignificant growth, and 16 were contaminated on conventional agar (Table 1). Compared to conventional media, fewer specimens were classified as contaminated ($n = 12$) or clinically insignificant ($n = 62$) from chromID agar, resulting in a categorical positive agreement of 68.8 and 73.6%, respectively, between the two methods. Overall, clinically significant pathogen(s) were recovered from 51 cultures, with *E. coli* as the most frequently recovered organism ($n = 22$). Members of *Enterobacteriaceae* and the *Proteeae* group represented 11 and 2 specimens, respectively. Gram-positive organisms isolated in significant amounts from conventional media included *Enterococcus* spp. ($n = 6$) and *Staphylococcus* spp. ($n = 2$). Mixed infections were identified in seven significant cultures. Of the 51 clinically significant cultures, chromID classified 45 as significant (88.2% positive categorical agreement) (Table 1). When considering uropathogens exclusively, the rate of exact agreement between conventional and chromogenic media was 82%, and the overall categorical agreement was 83.5%. Although Vitek MS has not been cleared by the U.S. Food and Drug Administration (FDA) for testing directly from chromogenic medium, the results of MALDI-TOF MS testing from this medium agreed with testing from blood or MacConkey agar.

Of the discrepancies between conventional and chromogenic agars, organisms that were not recovered in clinically significant amounts on chromID included group B streptococci (GBS; $n = 1$), *Lactobacillus* ($n = 3$), *E. coli* ($n = 2$), and coagulase-negative staphylococci (CNS; $n = 1$). In one specimen with a mixed infection, *Proteus mirabilis* was isolated from chromID but not from conventional media. Notably, GBS was recovered from five specimens classified as insignificant or contaminated on conventional media but was not recovered in any amount from the corresponding culture on chromogenic media.

Analysis of hands-on time and consumables. Processing time for each specimen and the number of consumables, rapid biochemical tests (catalase, oxidase, and indole), and subculture plates needed for identification was recorded for each medium type. The hands-on time required for work-up of specimens on chromogenic media (mean, 1:02 [min:s]; range, 0:05–3:16) was significantly less for the clinically significant cultures compared to conventional media (mean, 1:31; range, 0:40–4:41) ($P = 0.003$) (Table 2). Of the clinically significant specimens, chromID agar required fewer rapid biochemical tests (mean 1.04 versus 1.92) and required less MALDI-TOF MS analysis for identification (mean, 0.73 versus 1.06) compared to conventional media (Table 2). Most of these differences were attributed to cultures of pure *E. coli*, which had significantly lower hands-on time (mean, 0:20 versus 1:24 m:ss), use of consumables (mean of 0.33 versus 3.33) and rapid biochemical assays (mean, 0.22 versus 2.22), and require-

TABLE 1 Categorical agreement between conventional and chromID media

Category	No. of positive results			% categorical agreement
	Both methods	Conventional only	Chromogenic only	
Clinically significant	45	6	0	88
Gram negative				
Escherichia coli	20	2	0	
Other *Enterobacteriaceae*	11	0	0	
Proteeae	2	0	1	
Pseudomonas aeruginosa	2	0	0	
Gram positive				
Enterococcus spp.	6	0	0	
Staphylococcus spp.	1	1	0	
Group B streptococcus[a]	0	1	0	
Lactobacillus spp.	0	3	0	
Other Gram-positive bacteria	2	0	0	
Yeast	7	0	0	
Total	51	7	1	
Clinically insignificant	53	19	9	74
Contaminated	11	5	1	69
No growth	58	3	23	95

[a] In addition, GBS was noted as an incidental finding in one contaminated and four insignificant cultures.

ment for MALDI-TOF MS identification (mean, 0.11 versus 1.11) compared to conventional media. No significant differences were seen in the need for Gram stains or subcultures for any category of urine culture (Table 2).

For each specimen, the total time from plating to preliminary identification to a genus or group level, final identification, and final report of antimicrobial susceptibility testing was recorded. Importantly, a preliminary identification to a genus level could be obtained for only one significant culture plated to conventional media compared to 17 cultures from chromogenic media (data not shown). A comparison of the time required for final identification of uropathogens in clinically significant cultures found no significant difference between chromID and conventional media (26.6 versus 27.2 h, $P = 0.550$). Comparison of a subset of clinically significant cultures in which growth of pure *E. coli* was identified showed a significant decrease the time to final identification of *E. coli* with chromogenic media compared to conventional media (24.4 h versus 27.1 h, $P = <0.0001$) (Table 3). However, no difference was seen in the time to final report of antimicrobial susceptibility testing results for all cultures, including cultures where *E. coli* was recovered in pure culture (Table 3). Isolates recovered in amounts above threshold for significance, with the exception of CNS, *Lactobacillus* spp., and GBS, were subjected to AST. The results of AST set up directly from chromogenic media were compared to those using standard procedures in which AST media were inoculated from conventional agar. Of the 33 isolates of *Enterobacteriaceae* tested, six minor errors, four major errors, and no very major errors occurred when AST was set up directly from chromogenic media (Table 4). Five of the errors occurred on two isolates, while the other five occurred on five different isolates. For *Enterococcus* spp. ($n = 6$), only four minor errors occurred upon AST with chromID, consisting of one error each for vancomycin, ciprofloxacin, and doxycycline on the same isolate and one error for linezolid on a different isolate. No errors in AST occurred for *Staphylococcus aureus* ($n = 1$) or *Pseudomonas aeruginosa* ($n = 2$).

Comparison of chromID opaque and translucent media. A comparison of a subset of specimens ($n = 50$) was performed for the chromID translucent and opaque media. Using the translucent medium, the specimens were classified as negative ($n = 6$), contaminated ($n = 3$), insignificant ($n = 20$), and clinically significant ($n = 21$) (with growth of *E. coli* [$n = 9$], *Enterococcus* spp. [$n = 5$], *K. pneumoniae* [$n = 3$], *P. mirabilis* [$n = 2$], *P. aeruginosa* [$n = 2$], *Enterobacter cloacae* complex [$n = 1$], *Serratia marcescens* [$n = 1$], *S. aureus* [$n = 1$], and yeast [$n = 1$], with four mixed infections). The culture interpretation for the two media showed 98% categorical agreement, with one specimen classified as insignificant on the translucent media and contaminated on the opaque media (data not shown). In addition, AST for a subset of clinically significant specimens was compared between the chromID translucent and opaque media. The category agreement for AST for all drugs and isolates tested was 100% between the translucent and opaque media (data not shown).

DISCUSSION

The chromID CPS Elite agar demonstrated a high level of agreement with conventional media for culture results and antibiotic susceptibility testing of urine specimens. This is consistent with previous studies of several chromogenic media for urine culture showing that these media are comparable to conventional media for recovery of uropathogens (17, 19, 23, 24). One previous study evaluated the performance of the chromID CPS Elite agar and found that both the opaque and the translucent media were more sensitive for the detection and identification of uropathogens than the previous CPS ID4 medium from the same manufacturer (20). However, the potential impact on the clinical laboratory of utilization of chromogenic medium for urine cultures, such as con-

TABLE 2 Assessment of hands-on time and consumable use for chromID compared to conventional media

Parameter	All cultures			Clinically significant			Cultures with *E. coli*		
	Conventional ($n = 200$)	chromID ($n = 200$)	*P*	Conventional ($n = 51$)	chromID ($n = 45$)	*P*	Conventional ($n = 18$)	chromID ($n = 18$)	*P*
Hands on time (min:s)									
Mean	0:45	0:24	0.029	1:31	1:02	0.003	1:24	0:20	<0.0001
Median	0:13	0:06		1:20	1:11		1:19	0:10	
Range	0:03–30:08	0:02–3:16		0:40–4:41	0:05–3:16		0:57–2:10	0:05–1:59	
Consumables used[a] (*n*)									
Mean	0.99	0.68	0.052	3.33	2.44	0.029	3.33	0.33	<0.0001
Median	0	0		3	2		3	0	
Range	0–8	0–9		1–8	0–9		3–6	0–4	
Gram stains (*n*)									
Mean	0.12	0.16	0.373	0.37	0.62	0.053	0.11	0.00	0.163
Median	0	0		0	1		0	0	
Range	0–2	0–2		0–1	0–2		0–1	0	
Rapid biochemical tests[b] (*n*)									
Mean	0.59	0.29	0.0005	1.92	1.04	<0.0001	2.22	0.22	<0.0001
Median	0	0		2	1		2	0	
Range	0–4	0–4		0–4	0–4		2–4	0–2	
Subculture plates (*n*)									
Mean	0.01	0.03	0.203	0.04	0.09	0.41	0.00	0.06	0.331
Median	0	0		0	0		0	0	
Range	0–1	0–2		0–1	0–2		0	0–1	
Identification by MALDI (*n*)									
Mean	0.30	0.21	0.117	1.06	0.73	0.028	1.11	0.11	<0.0001
Median	0	0		1	1		1	0	
Range	0–2	0–3		0–2	0–3		1–2	0–1	

[a] Consumables include sticks and swabs.
[b] Rapid biochemical tests include catalase, oxidase, and indole tests.

sumable use, processing time, and antibiotic susceptibility testing, were not assessed in these previous investigations.

Altogether, the distribution of uropathogens isolated from urine specimens used in this study was representative of organisms commonly isolated from both complicated and uncomplicated UTIs (16). As expected, the most frequently isolated uropathogen in this study was *E. coli*. Discrepancies were noted in two specimens in which *E. coli* was identified in a significant amount from conventional agar, whereas chromID classified the specimens as contaminated or insignificant. The growth of *E. coli* was noted on the chromogenic agar from both specimens. However, the amount of growth was under the threshold for clinical significance in one specimen. In the other specimen, two additional colony types over threshold were able to be delineated from the distinct colony morphology *E. coli* on the chromogenic media. Thus, this specimen was classified as contaminated. It is likely that these colonies were unable to be differentiated on conventional media, which caused this specimen to be classified as clinically

TABLE 3 Analysis of time to identification and time to final report for chromID and conventional media[a]

Category	Time to identification				Time to final report			
	n	Mean (h)	Median (h)	*P*	*n*	Mean (h)	Median (h)	*P*
All cultures (cultures with no growth excluded)								
Conventional agar	51	27.2	26.8	0.550	139	32.4	24.0	0.341
chromID agar	45	26.6	25.6		118	34.0	24.0	
Clinically significant								
Conventional agar	51	27.2	26.8	0.550	51	46.1	51.8	0.253
chromID agar	45	26.6	25.6		45	48.6	51.7	
E. coli cultures								
Conventional agar	18	27.1	26.9	<0.0001	18	49.1	52.1	0.376
chromID agar	18	24.4	24.0		18	50.3	51.9	

[a] *P* values represent statistical comparisons between conventional agar and chromID agar results. "*n*" indicates the number of cultures in each category.

TABLE 4 Percent categorical agreement between chromID and conventional agar for *Enterobacteriaceae* susceptibility testing according to CLSI criteria

Drug	No. of errors			Frequency	% agreement
	Minor error	Major error	Very major error		
Ampicillin	3	0	0	33	91
Cefazolin	0	1	0	33	97
Cefotetan	0	1	0	33	97
Nitrofurantoin	2	0	0	33	94
Gentamicin	0	1	0	33	97
Trimethoprim-sulfamethoxazole	0	1	0	33	97
Meropenem	0	0	0	33	100
Cefepime	0	0	0	33	100
Ciprofloxacin	0	0	0	33	100
Ceftazidime	1	0	0	33	97
Ceftriaxone	0	0	0	33	100
Piperacillin-tazobactam	0	0	0	33	100

significant growth of *E. coli*. This finding is in keeping with previous studies demonstrating the increased ability of chromogenic media to isolate mixed growth of uropathogens from urine specimens (23, 25). This is further supported in our study by the isolation of *P. mirabilis* from one urine specimen in significant amounts with *E. coli* from chromogenic agar, while *E. coli* alone was isolated from conventional media.

The inhibition of growth of normal periurethral flora by the chromID media may streamline the workflow in clinical microbiology labs by decreasing the number of specimens classified as "clinically insignificant." This was observed in the present study and likely contributed to the significant decrease in hands-on time for work-up for cultures overall. Conversely, inhibition of periurethral flora by the chromID media may also explain why the chromID agar failed to recover above threshold amounts of *Lactobacillus* spp. in three specimens and GBS from one specimen. In addition, chromogenic media failed to isolate GBS in any amount from five specimens in which GBS was noted on conventional media. Previous studies have reported inconsistencies in the ability of chromogenic media to accurately identify GBS from urine specimens (17, 23). This may be a problem for laboratories that report any quantity of bacteriuria with GBS in specimens submitted from women of childbearing age and should be taken into consideration if this medium is used alone for the culture of urine specimens.

While a previous study analyzed the processing time for the chromID CPS4 chromogenic agar, no comparison was made to the processing time for standard media due to differences in protocol (19). Other studies have reported decreased processing time for urine culture work-up with chromogenic media (23, 26). However, the assessment of time saved relied upon extrapolation of hands-on time for all cultures based on a predetermined average work-up time or retrospective analysis of time stamps pulled from a laboratory information system. Recently, laboratory workflows and staffing demands have changed dramatically in clinical microbiology laboratories (3, 27). In the present study, every step of the work-up for each individual specimen was performed by a single technologist and recorded with a stopwatch to specifically and objectively evaluate differences in hands-on time between chromogenic and conventional media. We observed variability for hands-on time between specimens depending on the number and type of organism growth, which reiterates that the use of an estimated processing time for each culture may not be broadly applicable to all urine specimens.

We found that hands-on time for cultures of *E. coli* using chromID was decreased by an average of more than 1 min per specimen, which can be attributed to the ability to directly identify *E. coli* from chromID on the basis of colony appearance with no requirement for Gram stain or biochemical testing. Because *E. coli* represent the vast majority of positive urine cultures, this has the potential to make a substantial difference in processing time for clinical microbiology laboratories. The decreased occurrence of contaminated and insignificant cultures with chromID likely contributed to a significant decrease in the time required for processing chromogenic media for all cultures compared to conventional media. In addition, significant decreases in the use of consumables, rapid biochemical tests, and the need for MALDI-TOF MS for organism identification likely added to the decrease in hands-on time shown for all clinically significant cultures. Using the data collected in this study of an average of 21 s of hands-on time saved per culture with chromID agar, a hypothetical laboratory that processes 50,000 urine cultures per year would save almost 292 h, or 36.5 working days (i.e., 8 h days), of hands-on processing time annually. At an estimated cost of $5 per chromID agar plate versus approximately $0.50 each for blood agar and MacConkey agar plates, this theoretical laboratory would spend an extra $200,000 annually on urine culture media. The data from this study indicate that savings in consumable usage and hands-on time may offset some of the increased cost. Potential additional savings may occur due to downstream effects on patient care or length of stay, although this study does not address patient outcomes. In addition, these costs are only estimates that do not take into account regional variations in pricing and differences in institutional purchasing contracts.

The chromID media permits a preliminary identification of several microorganisms to a genus or group level based on Gram stain and colony appearance. This rapid identification may be advantageous since it may expedite results and decrease uncertainty for the selection of the appropriate antibiotic therapy, particularly for inpatients with complicated UTIs for which therapy can be changed in a timely manner. Notably, a preliminary identification to a genus or group level in this study occurred for 17 specimens plated to chromID, whereas only one specimen from conventional medium was able to be preliminarily identified. Be-

cause of the ability to directly identify *E. coli* from chromogenic media, the time to final identification of *E. coli* was significantly decreased compared to conventional media. However, no difference was noted in the time to final identification of other uropathogens due to the need for Gram stain and further testing for final identification on both media types. In addition, no significant differences were measured for the time to final report of any culture. This is consistent with a previous report in which there was no significant difference demonstrated for turnaround time between pre- and postimplementation of CHROMagar orientation medium for uropathogen identification in a clinical microbiology laboratory (26).

Chromogenic media are not FDA-cleared for performing MALDI-TOF MS or antimicrobial susceptibility testing directly without subculture to conventional media; this has the potential to delay these results by approximately 1 day. An analysis of susceptibility testing set up from chromID demonstrated accurate results, with no very major errors occurring from chromogenic agar; this is in agreement with a previous study of an earlier iteration of the chromID media, the chromID CPS3 agar, which established the validity of AST directly from this media (24). In addition, MALDI-TOF MS identification was successfully and accurately performed directly from the chromID agar.

Although the detailed analyses performed in this study are a strength of this investigation, it is not without limitations. This is a single-center study with a limited sample size. In addition, it is likely that more significant differences would be observed with hands-on time and time to identification for laboratories that rely on conventional biochemical methods rather than MALDI-TOF MS for bacterial identification. Since deidentified specimens were used for analysis, correlation of culture results with clinical presentation or urinalysis was not possible. Lastly, in this sample set, there was a lack of representation of uropathogens that can be important causes of UTI such as *Staphylococcus saprophyticus*, *Aerococcus urinae*, and *Corynebacterium urealyticum*. Thus, the performance of this media for these organisms could not be evaluated.

This study demonstrates that the performance of chromID medium is comparable to conventional media combined with MALDI-TOF MS identification for most common uropathogens. Hands-on time and consumable use were reduced using chromID compared to conventional media for clinically significant cultures, particularly cultures of *E. coli*. This benefit may offset the increased cost of chromogenic media compared to standard culture media (24, 26, 28). While emerging and uncommon uropathogens will likely require conventional methods for identification, chromID CPS Elite agar may be a feasible alternative to conventional media for isolation and identification of most common uropathogens in urine specimens.

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