

Evaluation of the Compact Dry EC culture plates for the diagnosis of urinary tract infections in Harare, Zimbabwe



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BACKGROUND

Data on antimicrobial resistance from low- and middle-income countries (LMICs) are limited. Reasons include poor laboratory capacity and stock management, and challenges meeting cold chain requirements. The Compact Dry EC (CD, Nissui, Japan) culture system has a long shelf life (18 months from manufacture) and does not require refrigeration. It may thus be ideal for LMICs but has not been widely used for testing human samples.

We describe the performance of CD for the diagnosis of urinary tract infections (UTIs) caused by *Enterobacteriaceae* in a LMIC context.

METHODS

A midstream urine sample was collected from adults presenting with UTIs to outpatient clinics in Harare and was inoculated on Brilliance UTI agar (Oxoid, UK), the reference standard.

Growth was interpreted semi-quantitatively:

- 10³-10⁴ CFU/mL,
- 10⁴-10⁵ CFU/mL
- >10⁵CFU/mL.

CD is chromogenic, supports growth of *Enterobacteriaceae*, and allows differentiation between organisms. Because CD is highly sensitive, urine samples were serially diluted at 1:10 for colony counts. CD was inoculated with 1 mL of the 1:10³ and 1:10⁶ urine dilutions. **Figure 1** shows *E. coli* (blue) and other coliforms (pink) at different dilutions. Cultures contaminated on Brilliance UTI agar were excluded from the analysis.

RESULTS

Of 414 samples, 98 (24%), were positive and 316 (76%), were negative by reference standard. 76/98 (78%) samples grew *Escherichia. coli*, 7/98 (7%) other coliforms, and 15/98 (15%) gram-positive organisms (mainly enterococci). 79/83 (95%) of samples growing *Enterobacteriaceae* on the reference standard showed growth on CD at a dilution of 1:10³.

Figure 1. *E. coli* and other coliforms on CD culture plates

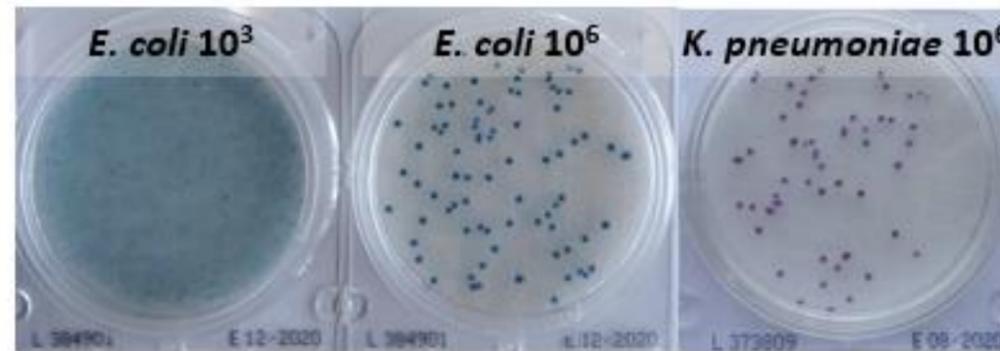


Table 1 Comparison between Compact Dry and Brilliance UTI agar for *Enterobacteriaceae*.

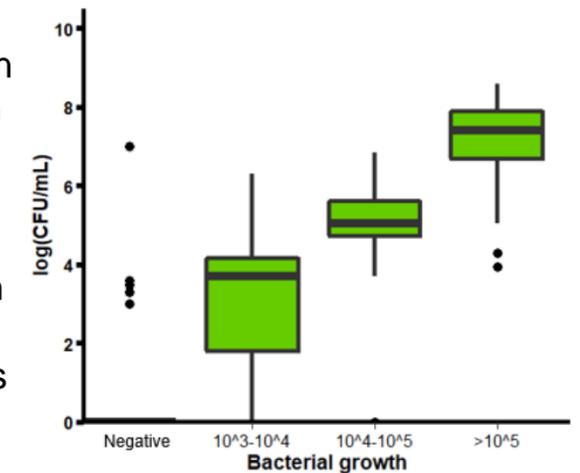
		Brilliance UTI agar			Total	
		Negative	10 ³ -10 ⁴ CFU/mL	10 ⁴ -10 ⁵ CFU/mL		>10 ⁵ CFU/mL
Compact Dry EC	Negative (or 1-4 colonies)	330	3	1	0	334
	5-49 colonies	0	6	3	2	11
	50-250 colonies	0	1	4	2	7
	Semiconfluent growth or >250 colonies	0	0	6	18	24
	Confluent growth	1	0	0	37	38
	Total	331	10	14	59	414

Table 2. Performance of Compact Dry EC and InTray Screen in the detection of *Enterobacteriaceae* vs. with Brilliance UTI agar

	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)
Compact Dry	95% (91-100)	100 (99-100)	99 (96-100)	99 (98-100)

NPV: negative predictive value; PPV: positive predictive value

Figure 2. Comparison of semi-quantitative growth on the Brilliance UTI agar with colony counts on CD



There was a strong correlation between growth on the reference standard and the number of colonies on CD (Spearman's rho=0.86).

CONCLUSIONS

- High sensitivity and specificity of CD for the diagnosis of *Enterobacteriaceae*.
- Several advantages vs. conventional commercial media: long shelf life, storage at room temperature, small size
- CD may be a good alternative for surveillance of antimicrobial resistance in LMICs.

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