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Enhanced culture recovery of *Campylobacter* with modified Cary-Blair medium: a practical field experience

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Abstract:

Modified Cary-Blair medium derived devices have been implemented in many laboratories to optimize culture recovery of common bacterial enteric pathogens. Our analysis constitutes the first report of routine laboratory experience supporting the idea that the use of such devices enhances *Campylobacter* recovery from stools.

Keywords: *Campylobacter*, stool culture, modified Cary-Blair medium

Highlights:

Culture recovery of common enteric bacterial pathogens in stools remains essential.

Modified Cary-Blair medium performance is studied in clinical laboratory conditions.

Collection in modified Cary-Blair medium improves *Campylobacter* detection in stools.

Campylobacter commonly causes gastroenteritis worldwide. As *Campylobacter* are fastidious bacteria, more and more laboratories are adopting specific antigen tests (Fitzgerald *et al.*, 2016) or molecular tests (Zhang *et al.*, 2015) for their detection in stools.

Since increasing antimicrobial resistances are reported in *Campylobacter* (Ge *et al.*, 2013), strain isolation remains essential for antimicrobial susceptibility testing and epidemiologic purposes (Couturier, 2016). The modified Cary-Blair (MCB) medium for transport and preservation was recommended to optimize culture recovery of common bacterial enteric pathogens (*Campylobacter*, *Salmonella* and *Shigella*) in stools (Wang *et al.*, 1983). However, the performance of MCB medium has never been reported in routine clinical laboratory conditions.

In the bacteriology laboratory of the Toulouse University Hospital (France), we retrospectively evaluated the impact of implementation of the MCB medium FecalSwab (Copan, Brescia, Italy) on *Campylobacter*, *Salmonella* and *Shigella* isolation rate from clinical stools. Before 2013, all fecal specimens were collected in dry containers. Since 2013, stools from the Children's Hospital have been collected in FecalSwab devices *i.e.* a tube with 2 mL of MCB medium and a flocced swab, whereas adult specimens were still transported in dry containers. To assess the impact of these changes, we compared the distributions of positive samples for each common enteric bacterial pathogen (*i.e.* *Salmonella*, *Shigella*, and *Campylobacter*) in 2012 and 2014 for children (*i.e.* patients under the age of 15) and adults using the Chi-square test (statistical significance was defined as a p-value < 0.05). Because MCB medium was implemented in mid-2013, we chose to exclude 2013 from our analysis to avoid any bias due to seasonal variation in common enteric bacterial infections.

During the studied periods, fecal samples were inoculated within 24 hours on Campylosel agar plates (bioMérieux, Marcy-l'Etoile, France) incubated in a micro-aerobic atmosphere at $35 \pm 2^\circ\text{C}$ for 48 hours, on Rambach agar plates (VWR International, Radnor, Pennsylvania, USA), Bromocresol Purple agar plates (bioMérieux) and in Selenite broth (Copan) incubated in an aerobic atmosphere at $35 \pm 2^\circ\text{C}$ for 24 hours. The Selenite broth was then subcultured onto a Rambach agar plate incubated in an aerobic atmosphere at $35 \pm 2^\circ\text{C}$ for 24 hours. All

suspected colonies were identified by biochemical analyses (API Campy, bioMérieux, for *Campylobacter* isolates or GN cards on Vitek 2 system bioMérieux, for *Salmonella* and *Shigella*) during both periods.

The number of specimens and patient characteristics (number, age) were comparable in 2012 and 2014 (Table 1). Distribution of pediatric samples positive for *Campylobacter* was significantly different between 2012 and 2014 (2.76%, n = 50 vs. 4.35%, n = 71; p = 0.011) whereas no statistical difference was observed for adults (1.33%, n = 59 vs. 1.62%, n = 65; Table 1). In comparison, the distributions of samples positive for *Salmonella* or *Shigella* were not statistically different between 2012 and 2014 for both children and adults. The distribution of *Campylobacter* species was similar between 2012 and 2014 for both pediatric and adult samples, *C. jejuni* being the most frequently isolated species.

The specific increase in *Campylobacter* recovery in pediatric stools between 2012 and 2014 suggests that collection in FecalSwab improves *Campylobacter* preservation and detection. Indeed, no such trend was observed in adult samples for which dry containers were used for both periods. Of note, no specific *Campylobacter*, *Salmonella* or *Shigella* outbreak was reported during the study. No increase in the incidence of *Campylobacter* infections was reported by the French National Reference Centre for *Campylobacter* between 2012 and 2014, although the number of reported cases increased because of the notification system improvement (King *et al.*, 2012; Van Cauteren *et al.*, 2014). In our study, MCB medium implementation led to a global increase in *Campylobacter* recovery, but it did not enhance the recovery of any specific *Campylobacter* species. This result should be interpreted with caution because of the small numbers of non-*jejuni* *Campylobacter*-positive samples.

The implementation of MCB medium for preservation of pediatric stools up to 24 hours did not lead to an increase in *Salmonella* or *Shigella* recovery, as expected according to the

literature (Altieri *et al.*, 2011). The specific impact on *Campylobacter* detection might be due to its particular fragility compared to other enteric bacterial pathogens.

MCB medium was shown to be suited for *Campylobacter* preservation in studies using turkey cecal specimens (Luechtefeld *et al.*, 1981) and for collection of human stools kept at 4°C prior to evaluation (Wang *et al.*, 1983). Inoculated with ATCC strains, FecalSwab demonstrated better preserving properties than Amies-based medium which is not an MCB derived medium (Hirvonen and Kaukoranta, 2014). In a study including 125 stools analyzed in accordance with current laboratory procedures, FecalSwab was superior to dry container as a transport device, recovering 10 vs. 7 *Campylobacter jejuni* strains (Altieri *et al.*, 2011). Conversely to these early side-by-side studies performed on small cohorts and artificially inoculated stools, our analysis was conducted on several thousand samples over 2 years processed with routine laboratory procedures. Our work constitutes the first report of routine laboratory experience supporting the idea that the implementation of MCB derived devices enhances *Campylobacter* recovery from stools after preservation at room temperature for less than 24 hours.

Table 1: Characteristics of pediatric and adult stool samples collected in 2012 and 2014

	Pediatric stool samples		Adult stool samples	
	2012 Dry containers	2014 MCB medium	2012 Dry containers	2014 Dry containers
Patients				
Number of patients	1319	1250	2895	2612
Mean Age (years)	1.88	2.08	61.81	60.46
Standard deviation for age (years)	3.27	3.49	20.20	20.34
Number of samples	1812	1632	4426	4004
Positive samples				
<i>Campylobacter</i>	50 (2.76 %)	71[*] (4.35 %)	59 (1.33 %)	65 ^{ns} (1.62 %)
among which				
<i>C. jejuni</i>	45	59 ^{ns}	43	51 ^{ns}
<i>C. coli</i>	4	10 ^{ns}	9	7 ^{ns}
<i>C. fetus</i>	-	-	3	3
<i>C. hyointestinalis</i>	-	-	-	1
<i>C. upsaliensis</i>	-	-	1	-
<i>Campylobacter sp.</i>	1	2	3	3
<i>Salmonella</i>	57 (3.15 %)	58 ^{ns} (3.55 %)	24 (0.54 %)	34 ^{ns} (0.85 %)
<i>Shigella</i>	6 (0.33 %)	10 ^{ns} (0.61 %)	7 (0.16 %)	9 ^{ns} (0.22 %)

* Statistical difference ($p < 0.05$) and, ^{ns} No statistical difference between 2012 and 2014 according to Chi-square test.

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The authors declare no conflict of interest.

REFERENCES

- Fitzgerald C, Patrick M, Gonzalez A, Akin J, Polage CR, Wymore K, *et al.* Multicenter evaluation of clinical diagnostic methods for detection and isolation of *Campylobacter* spp. from stool. *J Clin Microbiol* 2016;54:1209. doi:10.1128/JCM.01925-15.
- Zhang H, Morrison S, Tang Y-W. Multiplex PCR tests for detection of pathogens associated with gastroenteritis. *Clin Lab Med* 2015;35:461. doi:10.1016/j.cll.2015.02.006.
- Ge B, Wang F, Sjölund-Karlsson M, McDermott PF. Antimicrobial resistance in *Campylobacter*: susceptibility testing methods and resistance trends. *J Microbiol Methods* 2013;95:57–67. doi:10.1016/j.mimet.2013.06.021.
- Couturier MR. Revisiting the roles of culture and culture-independent detection tests for *Campylobacter*. *J Clin Microbiol* 2016;54:1186. doi:10.1128/JCM.03221-15.
- Wang WL, Reller LB, Smallwood B, Luechtefeld NW, Blaser MJ. Evaluation of transport media for *Campylobacter jejuni* in human fecal specimens. *J Clin Microbiol* 1983;18:803–7.
- King L, Lehours P, De Valk H, Mégraud F. Bilan de la surveillance des infections à *Campylobacter* chez l'homme en France en 2012. France: Institut de Veille Sanitaire; 2012.
- Van Cauteren D, Lehours P, Bessède E, De Valk H, Mégraud F. Bilan de la surveillance des infections à *Campylobacter* chez l'homme en France en 2014. France: Institut de Veille Sanitaire; 2014.
- Altieri A., Bossa M.C., Capalbo F., Di Traglia L., Fontana C. Comparison of the Copan fecal swab to dry containers for collection and transportation of stool samples for detection of bacteria causing gastrointestinal infection. *Clin Microbiol Infect* 2011;17:S108–668. doi:10.1111/j.1469-0691.2011.03558.x.
- Luechtefeld NW, Wang WL, Blaser MJ, Reller LB. Evaluation of transport and storage techniques for isolation of *Campylobacter fetus* subsp. *jejuni* from turkey cecal specimens. *J Clin Microbiol* 1981;13:438.

Hirvonen JJ, Kaukoranta S-S. Comparison of FecalSwab and ESwab devices for storage and transportation of diarrheagenic bacteria. *J Clin Microbiol* 2014;52:2334. doi:10.1128/JCM.00539-14.

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