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Increased Recovery of Enteric Pathogens by Use of Both Stool and Rectal Swab Specimens

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During 1984, the recovery of enteric pathogens from patients with acute diarrhea was enhanced by the use of both rectal swab and stool specimens. With 513 patients for whom both methods were used, the overall recovery rate was increased a minimum of about 10%. Almost 50% of the organisms recovered were detected by only one method. For maximum recovery of diarrheal agents, the use of both methods is recommended when possible.

Etiological agents of diarrheal disease are commonly identified using either fresh fecal specimens or rectal swabs. Laboratories which use both types of specimen usually do so to have stool available for parasite studies rather than to attempt parallel isolation of enteric pathogens (12). To determine whether the use of both types of specimen, rather than either single method, would yield an increase in the total recovery of pathogenic organisms, a parallel study of both methods in the same patient group was undertaken.

Between March and December 1984, whenever possible both rectal swabs and fecal specimens were obtained from patients admitted to San Lazaro Hospital, Manila, with acute diarrheal disease. Specimens for bacterial culture were plated within approximately 30 min from the time of collection and analyzed in parallel by standard bacteriological methods for the isolation of *Salmonella* spp., *Shigella* spp., *Vibrio* spp., enterotoxigenic *Escherichia coli*, *Campylobacter jejuni*, *Aeromonas hydrophila*, *Plesiomonas shigelloides*, and *Yersinia enterocolitica* (6, 8, 13, 14). In addition, one rectal swab and a small portion of fresh feces were diluted in sterile saline and stored frozen at −20°C for subsequent rotavirus antigen detection, usually within 1 week, by the Rotazyme enzyme immunoassay technique (Abbott Laboratories, North Chicago, Ill.). *E. coli* isolates were tested for the production of heat-stable and heat-labile enterotoxins at the Armed Forces Research Institute of Medical Sciences using the suckling mouse and Y-1 adrenal cell assays (2, 10). The rate of recovery from patients submitting parallel specimens was also compared with that from patients submitting only rectal swabs during the same period to determine whether a real increase in recovery could be observed with two methods.

The recovery of the various enteric pathogens from rectal swab and stool specimens processed in parallel is shown in Table 1. Almost half the total isolates were recovered only by a single method. Even higher percentages were observed for specific organisms. A comparison of overall recovery rates from patients providing both types of specimen and from patients providing only rectal swab specimens is shown in Table 2. An overall increase in recovery of 10.8% was observed. Even at the higher recovery rate, 35.5% of cases remained undiagnosed as to the specific etiologic agent.

Although many pathogenic organisms are known to cause diarrheal illness (5, 7, 11), in most survey studies a large proportion of specimens remains undiagnosed as to etiology (3, 4, 9). A number of new diagnostic techniques have become available, but there still appears to be a need for improved capability to recover the maximum number of even the more common causative agents. We report here that a simple change in specimen collection procedures can increase the overall yield of pathogenic organisms detected in diarrheic patients. Almost half the pathogens detected in our survey were obtained from only a single type of specimen. This could equate with a real increase in recovery of as much as 25%. In fact, a comparison of the use of both methods versus the use of rectal swabs alone resulted in an observed increase of 10.8%. This likely represents a minimum difference, because most adult patients either could not or would not submit fresh stool. Therefore, a good comparison of the recovery rates of organisms mainly afflicting adults was not made.

TABLE 1. Isolation of various enteric pathogens from rectal swab and stool specimens

Organism	No. (%) isolated from:		
	Stool only	Rectal swab only	Stool and rectal swab
Rotavirus	54 (24.3)	52 (23.4)	116 (52.3)
Shigella spp.	6 (11.5)	13 (25.0)	33 (63.5)
Salmonella spp.	17 (32.1)	11 (20.8)	25 (47.2)
Enterotoxigenic *Escherichia coli*[a]	0	0	6 (100)
Vibrio cholerae El Tor	4 (26.7)	1 (6.7)	10 (66.7)
Non-O1 *Vibrio cholerae*	4 (22.2)	8 (44.4)	6 (33.3)
Vibrio parahaemolyticus	1 (100)	0	0
Other *Vibrio* spp.	4 (44.4)	3 (33.3)	2 (22.2)
Campylobacter jejuni	2 (12.5)	3 (18.8)	11 (68.8)
Aeromonas hydrophila	1 (12.5)	4 (50.0)	3 (37.5)
Plesiomonas shigelloides	0	1 (50.0)	1 (50.0)
All	93 (23.1)	96 (23.9)	213 (53.0)

[a] Isolation of enterotoxigenic *E. coli* was attempted only during the first 2 months of the study.

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TABLE 2. Comparison of recovery rates using both specimen types and rectal swabs only

Patient group (*n*)	No. (%) of specimens from which enteric pathogen(s) was:	
	Recovered	Not recovered
Rectal swab only (1,281)	701 (54.7)	580 (45.3)
Rectal swab + stool (513)	336 (65.5)	177 (34.5)

Most pathogens appear to be equally as likely to be detected by either single method. Perhaps specific strains can be preferentially cultured from one type of specimen. It is more likely, however, that the increased attempt at recovery resulted in a greater chance of detection. Surprisingly, rotavirus detection was equally as likely with either specimen type. We initially expected that feces would be the better sample, because of the large amounts of viral antigen normally shed (1). This question is being investigated, but preliminary evidence suggests that something in stools negative (but positive by rectal swab) for viral antigen blocks detection. This can be demonstrated by dilution of such a stool, resulting in its becoming positive, or by the addition of a negative stool to a known positive stool, which may result in its apparently becoming negative. Perhaps these stool specimens have a large amount of immunoglobulin against rotavirus sufficient to block attachment to the antibody in the assay system. A similar dilution effect was observed by another investigator (J. Escamilla, personal communication).

The most important observation of the study was that the use of both fresh fecal specimens and rectal swabs rather than either alone results in a real increase in recovery of enteric pathogens. Furthermore, fresh stool for ovum and parasite examination is better than rectal swabs alone when parasitic infection is suspected. The major disadvantage is that processing of both types of specimen is more labor intensive and costly, because twice the number of procedures must be undertaken. A potential increase in recovery of causative organisms, possibly as much as 25%, is an important consideration, particularly for laboratories performing prevalence surveys in which maximum recovery is desired to correctly define the local etiological spectrum for at least the pathogens for which detection is attempted.

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