Are *Campylobacter* Cases Low Risk for Public Health Follow-up?

Marilyn B. Lee, ScM,¹ Effie Gournis, MPH,^{2,3} Richard J. Meldrum, PhD¹

ABSTRACT

OBJECTIVES: Most *Campylobacter* cases are treated as low risk enterics (LRE) and receive a mailed letter from Toronto Public Health (TPH) with a questionnaire to gather basic risk information. This study sought to identify reasons why *Campylobacter* cases who were sent this questionnaire did not respond to the letter and to determine whether any of these cases were working in a high-risk occupation.

METHODS: Cases reported to TPH between June 11, 2012 and December 6, 2012 who had not returned the questionnaire within 30 days were telephoned. Participants were asked about awareness of the original letter, reasons for not responding, and whether they worked in a high-risk occupation.

RESULTS: Of the 226 cases identified as not responding to the letter, 172 (76.1%) were reached, and 162 (71.7%) answered the survey questions. The most frequent reason chosen for not responding to the original letter was "forgot" (54.4%). The most common suggestion chosen for ways to encourage response to the original letter was "more information on importance of returning questionnaire" (19.1%). Of the 119 cases with a known occupation, 3 (2.4%) were employed in a sensitive occupation – these include a family physician, a food server, and a line cook. None worked while ill. When prompted with a list of reasons for not returning the questionnaire, the majority of respondents indicated that they "forgot" (54.4%); the next most frequent response was "recovered by illness no longer considered it relevant" (21.5%).

CONCLUSION: To increase response rates in the future, a cover letter should more clearly explain why the response is being solicited by Public Health, even after recovery from the illness, and the form should be simplified for mail return. A very small number of clients originally not reached through the course of the routine LRE program were working in sensitive occupations. Since none reported working while ill, the likelihood of direct or indirect transmission of *Campylobacter* from these three individuals was low. Using a LRE system to monitor a widespread mostly low-morbidity gastroenteric illness can be an effective public health strategy.

KEY WORDS: *Campylobacter*; low risk enterics; telephone survey

La traduction du résumé se trouve à la fin de l'article.

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The high volume of gastroenteric cases reported to Toronto Public Health (TPH) requires that disease investigations of foodborne agents be prioritized through a risk-based system. Individuals considered vulnerable because of age, and cases from potential foodborne agents known to cause serious illness, including verocytotoxigenic *Escherichia coli* and some *Salmonella* variants, are always followed up by telephone. Those infected with *Campylobacter*, *Entamoeba histolytica*, *Giardia*, and *Yersinia*, are treated as low risk enterics (LRE) and receive a mailed letter with a questionnaire to gather basic risk information. Information returned in completed questionnaires is used to identify individuals who may be at higher risk for transmitting infection (e.g., food handlers) and they are immediately contacted by telephone for public health follow-up. This includes confirmation of appropriate treatment and clearance of pathogen shedding in the stool. Given that most information about these low-risk cases is acquired through a passive letter-based system, the extent of risk factors and potential for further transmission is not well understood, as 44% of cases receiving a letter and questionnaire do not respond.¹ It is possible that non-responding cases might work in high-risk occupations where transmission could pose a risk to others. Given that 47% of Toronto LRE cases are from infection with *Campylobacter* bacteria,¹ this study focused on understanding reasons why *Campylobacter* cases did not return their questionnaires, and identifying anyone who was working in a high-risk occupation (i.e., food service or production, day

care, health care provision) and whose lack of reporting represented missed opportunities for public health intervention.¹

METHODS

Campylobacter is a communicable disease reportable to the local Medical Officer of Health under the Ontario Regulations 559/91 and amendments under the Health Protection and Promotion Act. All laboratory-confirmed cases of *Campylobacter* residing in Toronto, aged between 5 and 64 years and with no evidence of attending a day nursery or living in a long-term care home, are mailed letters and questionnaires to assess how they acquired their illness and whether they worked in a high-risk occupation. Any laboratory-confirmed cases who did not respond within 30 days after a letter and questionnaire were mailed by TPH were identified as potential participants in this study.

Author Affiliations

1. School of Occupational and Public Health, Ryerson University, Toronto, ON
2. Toronto Public Health, Communicable Disease Control, Toronto, ON
3. Dalla Lana School of Public Health, University of Toronto, Toronto, ON

Correspondence: Marilyn B. Lee, Professor, School of Occupational and Public Health, Ryerson University, 350 Victoria St., Toronto, ON M5B 2K3, Tel: 416-979-5154, Fax: 416-979-5377, E-mail: marilyn.lee@ryerson.ca

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Conflict of Interest: None to declare.

Table 1. Defined List of Reasons Why Participants Did Not Return the Mailed Questionnaire

Reasons (When Prompted)	No. of Participants (%)
Forgot to return	43 (54.4)
Recovered from illness – no longer considered it relevant	17 (21.5)
Form too complex	8 (10.1)
Not important to return	7 (8.9)
Lost form	2 (2.5)
Illness very mild – did not consider it important	2 (2.5)
English a second language	0
Did not want to disclose personal information	0
Total	79 (99.9)

A list of cases reported to TPH between June 11 and December 6, 2012 as having not returned the questionnaire within 30 days was generated on a weekly basis. A telephone survey, conducted by a research student, was administered to all cases reached during the study period in order to assess: awareness of the letter sent by TPH; reasons for not responding; and whether the client worked in a high-risk occupation. Cases reached by telephone were informed that participation was voluntary and were asked for consent for participation. For all cases <18 years of age, the parent was interviewed; in the absence of the parent, the guardian was interviewed. Authenticity of the call from the local health authority was supported by the caller's knowing the participant's name, postal code, and family doctor's name. Potential participants were called a maximum of 10 times. If the participant worked in a high-risk occupation, they were asked if they were amenable to having a Public Health Investigator call to discuss the matter further. If the participant indicated they had worked at all while ill, they were directed to the general public health information available on the TPH website or by calling the TPH Inquiry Line.

Data were analyzed (Microsoft Excel 2010) and deemed significant at a level of $p < 0.05$.

This project underwent Toronto Public Health's research review process and was approved by the Ryerson University Research Ethics Board, no. REB 2012-057.

RESULTS

Attributes of participants

Campylobacter cases included in this study were reported to TPH between April 3, 2012 and November 5, 2012. There was a total of 226 cases identified as non-responders and available for follow-up (versus 279 cases who had previously responded by mail); 172 (76.1%) cases were successfully reached by telephone. One hundred and sixty-two questionnaires were completed (71.7%) with 10 cases declining to answer the questionnaire, giving a cooperation rate of 94.2% (162/172).

The 162 participants were compared to the 279 *Campylobacter* cases who did return the original mailed-out questionnaire during the same period. Demographic characteristics between study participants and respondents to the original letter did not differ. Two worked in a high-risk occupation, as food handlers.

An average of 2.6 call attempts were needed to reach participants, and Mondays between 11 am and noon were the times with most success. When asked about the original questionnaire, 130 (80.2%) recalled receiving it, and of these 39 claimed they had responded and 84 stated they were still planning to respond. There were 29 responses to an open-ended question pertaining to the reason questionnaires were not returned, the most frequent of which was

Table 2. Defined List of Suggestions Which Would Have Encouraged Return of Questionnaire in the Mail

Suggestions (When Prompted)	No. of Participants (%)
More information on importance of returning questionnaire	12 (19.0)
A simpler form	10 (15.9)
Telephone contact rather than by mail	6 (9.5)
Some form of incentive	1 (1.6)
Face-to-face contact rather than by mail	0
Availability of electronic or online submission of questionnaire	0
Offer language interpretation services	0
No factor would have encouraged me to return the form	34 (54.0)
Total	63 (100.1)

"too busy" ($n=8$, 27.6%). When prompted with a defined list of reasons for not returning the questionnaire, 79 responded and the most frequent response was that they "forgot" (54.4%), followed by "recovered from illness" (21.5%) (Table 1).

Of the 119 cases who answered the question on occupation at the time of illness, 53 (44.5%) reported being a student, 47 (39.5%) were employed, 16 (13.4%) were unemployed, and 3 (2.4%) reported being employed in a sensitive occupation category; these included a family physician, a food server, and a line cook. Forty-three cases answered the question concerning working while sick: of the 11 (25.6%) who reported that they did work while ill, none were employed in a high-risk occupation.

Questionnaire

When asked an open-ended question pertaining to what would have encouraged cases to return the questionnaire, 25 responded, with the most frequent response being "a reminder" ($n=14$, 56.0%). However, when prompted with a defined list of suggestions, 63 responded and the most frequent response was "more information on importance of returning questionnaire" (19.1%), followed by "a simpler form" (15.9%) (Table 2).

DISCUSSION

Participation, attributes, occupation

The completion rate (71.7%) and cooperation rate (94.2%) were high in this study, likely due to the topic's concerning the participant's own health. Other similar studies on personal health issues have not produced as high completion/response rates. For example, in a Swedish telephone survey of non-respondents to a mail survey on general health issues, conducted over two months in 2004, the response rate was 49.3%.² In a telephone survey follow-up to a mail survey sent to individuals treated for ulcerative colitis in March 2009 in Minnesota (United States), the response rate was 43%.³

Annual summaries from Toronto Public Health show an age distribution of *Campylobacter* cases with peaks in those aged under 5 years and those aged 20 to 29 years.⁴ While children under 5 years are not eligible for the LRE program, the current study showed that those ages 10-29 years comprised 49.4% of all participants, compared to only 37.3% in the same age group who had responded to the mail survey ($p=0.012$). It may be necessary to consider other ways to survey clients, such as an option for online response; this could be particularly effective with younger-aged clients. In a US randomized survey where over 32,000 persons rated their own health, there was a higher response rate from web surveys, but this resulted in upwardly biased measurements of self-related health compared to mail surveys. The authors suggested that a combina-

tion of survey methods (mixed modes) can enhance coverage to a broader mixture of respondents.⁵ Although not a health study, a study conducted by the U.S. Department of Defense with over 77,000 military personnel responding, compared demographic and health characteristics of Web responders with paper responders. Web responders were more likely to be younger and overweight or obese. Additionally, web responders provide more complete contact information, including their e-mail addresses. Survey research conducted over the Internet may need to be conducted along with traditional mail survey strategies to reflect behavioural or demographic differences.⁶ However, there are challenges with online studies, such as the legal implications where adult/parental consent is required.

In a previous unpublished study by TPH (2011) for cases reported from 2006-2009, 1.7% of all (includes *Campylobacter* enteritis, amebiasis, giardiasis, yersiniosis) LRE cases reported working in sensitive occupations (i.e., health care, food preparation, or in a day-care centre). Of the three participants in this study who identified their occupation as one considered to be sensitive, one was a family physician. No published evidence of *Campylobacter* cases being transmitted from a health care worker to their charges was found, although it is theoretically possible. The most frequent sources of *Campylobacter* in our environment are not people but foods of animal origin, water, and animals.⁷ Two of the three participants in this study who identified their occupation as sensitive worked in the food industry, one as a server and the other as a line cook. *Campylobacter* illness frequently arises in situations in which persons ingest undercooked chicken or unpasteurized milk.⁸ As well, a food worker in preparing chicken can transfer *Campylobacter* from their fingers or utensils to ready-to-eat foods, such as produce, which will not undergo a further step to inactivate *Campylobacter*.^{9,10} Additionally, a food worker preparing chicken could contaminate surfaces with chicken juices; another person could then touch this same surface and put their fingers into their mouth, unknowingly ingesting the bacteria. The restaurant server identified in this study would not likely be handling foods that would present a great risk to the public. However, it is possible that the line cook identified in this study could transmit *Campylobacter* from feces (i.e., via inadequate handwashing after toileting) to food or common surfaces.

In an outbreak in a Kansas (US) school in 1998, 129 *Campylobacter* cases met the case definition.¹¹ Epidemiologic investigation identified the gravy made from an instant mix and canned pineapple, both served at common meal, as the likely sources. A food handler reported severe diarrheal cramps and profuse diarrhea necessitating numerous trips to the bathroom during a lunch-serving shift that day. During another *Campylobacter* outbreak at a boys' summer camp in Connecticut (US) in 1980, 40 campers and staff became ill.¹² Eating salad prepared by an ill staff member was determined to be the cause. Kitchen staff members were observed to be unhygienic in their handwashing practices, i.e., not using soap and wiping their hands on their aprons.

None of the three participants working in sensitive occupations in this study worked while ill; the family physician particularly mentioned having had "no contact with patients for two weeks" during the (physician's) period of illness. Therefore, the likelihood of direct or indirect transmission of *Campylobacter* from these three individuals was low. Additionally, in the control group of

279 *Campylobacter* cases, only two (food handlers) stated that they were in high-risk occupations. Based on information from cases who were successfully contacted and who self-reported on their occupation and whether they had worked while ill, it would appear that at least in this study sample there was little risk to the public with regard to ongoing transmission. Since 43 cases did not state their occupation, it is acknowledged that there could be additional cases working in sensitive occupations beyond what was reported. However, the very few reported instances when *Campylobacter* has been transmitted from infected persons through a workplace exposure support the classification as low-risk.

Questionnaire

When presented with an open-ended question regarding the reason for not returning the questionnaire, 27.6% (8/29) participants volunteered that they were "too busy". However, when prompted with a list of reasons for not returning the questionnaire, the majority responded that they "forgot" (54.4%), followed by "recovered from illness no longer considered it relevant" (21.5%), "form too complex" (10.1%), and "not important to return" (8.9%). These findings suggest that a more detailed explanation in a cover letter explaining as to why the response is being solicited by Public Health, even after the subject has recovered from the illness, and a simplification of the form for mail return may increase response rates.

Respondents were asked for ways that would encourage them to return the questionnaire and only one participant said an "incentive" would have worked. However, in a study in 2005-6 in Los Angeles County among Hispanic women diagnosed with breast cancer, patients were mailed a questionnaire and \$10 incentive, and non-respondents were contacted by phone.¹³ Subjects were called a minimum of five times within two to three weeks of the mailing if no response was received. A 72% response rate was achieved; 98% completed the survey and 2% were interviewed by telephone. The high response rate was attributed to the incentive, extensive telephone follow-up, a native Spanish-speaking interviewer, and a focused questionnaire. In the current study, lack of an incentive was not an impediment to a high cooperation rate. We would suggest rather that participants are more likely to answer questions on health issues that affect them personally. Additionally, the cover letter to the questionnaire could stress the value of their timely response, i.e., in contributing to detecting outbreaks and epidemics and preventing further transmission in the community.

This study showed that Mondays proved to be the best days for speaking with participants. This was somewhat biased and self-fulfilling because halfway through the study, success on that day of the week became obvious and therefore more calls were placed on Mondays. Similarly, the time most people were home was around the lunch hour and calls were made then. This may be due to the large number of students and unemployed participants, who may be available to take calls when at home having lunch.

Limitations

Our study has several limitations. The generalizability of this information is limited to other large urban centres with similar population diversity and strong presence of public health authorities. Cities with high levels of distrust or a less ubiquitous public health presence may not find the LRE method of much value. Due to time

constraints, the study was only conducted over six months and not a full year. The six months, however, did include the typical enteric months (i.e., late spring, summer, early fall) and there is no reason to believe that those who are sick in winter or the colder months would differ in any way significant to this study's findings. It is worth noting that we relied on an honour system to determine if a client was working in a sensitive occupation and while ill. While the same honour system is assumed when clients are telephoned directly (i.e., not eligible for LRE program), we do not know if this reflects the same information a client would have shared if they responded to the mailed-in questionnaire only (i.e., routine LRE). Additionally, participants may have been led in their answers with the prompts used to facilitate use of categorical data.

Overall, the data collected during this study support that the LRE program should continue for *Campylobacter* cases. While some cases working in high-risk occupations can be missed, the number was small and confirmed that despite the occupational risk and without contact by PH, clients all chose to cease working during their illness. Taken together with suggestions for how to improve the questionnaire and letter, using a LRE system to monitor a widespread mostly low-morbidity gastroenteric illness can be an effective public health strategy.

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RÉSUMÉ

OBJECTIFS : La plupart des cas de *Campylobacter* sont traités comme étant atteints d'un entéropathogène à risque modéré (ERM) et reçoivent par la poste une lettre du Service de santé publique de Toronto (SSPT) accompagnée d'un questionnaire pour recueillir des informations de base sur leurs risques. Nous avons cherché à connaître les raisons pour lesquelles certains cas auxquels le questionnaire a été envoyé n'ont pas répondu à la lettre et à déterminer si un ou plusieurs d'entre eux exerçaient une profession à risque élevé.

MÉTHODE : Nous avons téléphoné aux cas déclarés au SSPT entre le 11 juin et le 6 décembre 2012 qui n'avaient pas retourné le questionnaire dans un délai de 30 jours. Nous avons demandé aux répondants s'ils se souvenaient de la lettre initiale, pourquoi ils n'y avaient pas répondu, et s'ils exerçaient une profession à risque élevé.

RÉSULTATS : Sur les 226 cas n'ayant pas répondu à la lettre, 172 (76,1 %) ont été joints par téléphone, et 162 (71,7 %) ont répondu aux questions du sondage. La raison la plus fréquemment citée pour n'avoir pas répondu à la lettre initiale était d'avoir « oublié » (54,4 %). Parmi les réponses suggérées pour encourager les gens à répondre à la lettre initiale à l'avenir, la plus communément choisie était de fournir « plus d'information sur l'importance de retourner le questionnaire » (19,1 %). Trois des 119 cas dont la profession était connue (2,4 %) exerçaient une profession sensible : un médecin de famille, une serveuse et un cuisinier à la chaîne. Aucun d'entre eux n'avait travaillé pendant sa maladie. Lorsque nous leur avons proposé une liste de raisons possibles de n'avoir pas retourné le questionnaire, la majorité des répondants ont indiqué avoir « oublié » (54,4 %); l'autre réponse la plus souvent citée était d'avoir « guéri de la maladie et ne plus juger la question pertinente » (21,5 %).

CONCLUSION : Pour augmenter le taux de réponse à l'avenir, une lettre d'accompagnement devrait clairement expliquer pourquoi le Service de santé publique cherche à obtenir ces réponses même après la guérison, et le formulaire devrait être plus simple à retourner par la poste. Un très petit nombre de cas non joints initialement par le programme d'ERM habituel exerçaient une profession sensible. Comme aucun n'a déclaré avoir travaillé pendant sa maladie, la probabilité de transmission directe ou indirecte de *Campylobacter* par ces trois sujets était faible. L'utilisation d'un système d'ERM pourrait être une stratégie de santé publique efficace pour surveiller une maladie gastroentérique étendue, généralement à faible morbidité.

MOTS CLÉS : campylobacter; entéropathogènes à risque modéré; enquête téléphonique