

Awareness of an Unfamiliar Food Safety Hazard: *Listeria* 1999

Listeria monocytogenes has been established to be a cause of food-borne disease only relatively recently. The disease listeriosis is uncommon, but potentially fatal. Outbreaks of listeriosis and resultant deaths have attracted media attention. In a 1999 nationwide survey, about half of the adults questioned had heard of *Listeria*. Respondents with at-risk household members were not more likely to be aware of *Listeria* than others. Since those most interested in food safety have probably already heard of *Listeria*, a challenging educational and informational effort remains.

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Unlike many microorganisms responsible for large outbreaks of human disease, *Listeria monocytogenes* was identified as a cause of disease only about 75 years ago. The role of food in the transmission of infection was established definitely only in the early 1980s. Governmental educational efforts began in the late 1980s. Since that time several large outbreaks of listeriosis, the infection caused by *Listeria*, have received extensive media attention, as have recalls of food products contaminated by *Listeria*. Because *Listeria* has only a relatively brief history as a known cause of food-borne disease, it provides an interesting case study of the spread of awareness of a food safety hazard through the American population.

In this paper, we will first review the history of major outbreaks of *Listeria* in the U.S. which have resulted in growing public awareness of the disease, its consequences, and the food vehicles which have been involved in its transmission. We then will examine survey data on awareness of *Listeria* in 1999. The demographic characteristics related to awareness will be investigated along with the relationship of awareness to concern about food safety and potential vulnerability.

Listeriosis as a Food-Borne Disease

Listeria was first authoritatively identified in 1924 and established as a cause of human disease a few years later (Roncourt, 1999, pp. 1-3). Since *Listeria* is ubiquitous in nature, the particular source for infections in humans initially was uncertain. During the 1930s, suspicion developed that there was a causal relation between listeriosis infections in dairy cows and the disease in humans. One of the problems confronting researchers was the long incubation period for the disease (1-21 days) and the fact that samples of the suspected food seldom were available for study, having been consumed or discarded (Ryser, 1999, p.301).

The first study which positively identified a food item as the cause of listeriosis in humans came only in 1981 (Schlech et al., 1983). Over the past two decades, *Listeria* has been identified as the definite or likely cause of a number of large-scale outbreaks of listeriosis in Europe and the U.S. (Ryser, 1999, p.300). In addition to raw vegetables and milk, soft Mexican-style cheeses and other soft cheeses made with unpasteurized milk, processed meats and undercooked chicken all have been identified as vehicles for the disease.

In contrast to other food-borne diseases which rarely result in death, the death rate from listeriosis has been estimated at 20 percent (Mead et al., 1999). Certain high risk groups are especially vulnerable: pregnant women, newborns, the elderly, and those with immunosuppressed conditions such as cancer, HIV, and AIDS patients; or organ transplant recipients. In healthy adults listeriosis can cause diarrhea and fever (Slutsker & Schuchat, 1999, p.76). Over the past decade, the high death rate for the disease, the growing population which is susceptible, and the knowledge that the disease is food-borne all have heightened concern about *Listeria* and listeriosis. The characteristics of the microorganism itself have added to these concerns: (1) it is relatively tough and is more resistant to microbiological control efforts than other microorganisms, and (2) it grows at low temperatures, thriving in conditions where other bacteria do not, reducing the usefulness of refrigeration which has been a traditional line of defense (Skinner, 1988, p.12).

Epidemiologists classify occurrences of infectious disease into one of two categories. Sporadic cases occur irregularly at low-level frequency. Outbreaks involve larger numbers within a particular localized population. Because of their size, their concentration in particular populations, and associated product recalls, outbreaks often attract media attention. Several outbreaks in which *Listeria* was identified as the cause occurred in the late 1970s

and early 1980s (Ryser, 1999, p.300). They do not seem to have attracted media attention as their sources were not either quickly or conclusively identified.

The source of the infection was more conclusively identified in an outbreak which occurred in the summer of 1983 in Massachusetts (Fleming et al., 1985). Fourteen died -- a death rate of 29 percent. Pasteurized milk from a particular processing plant was implicated. The researchers concluded that the pasteurization technique used might have permitted *Listeria* bacteria to survive. One of the deadliest and most costly outbreaks occurred in Los Angeles in 1985 (Linnan et al., 1988). The outbreak occurred chiefly among Hispanics and was linked to Mexican-style soft cheese from a particular large firm. In total, 142 cases were identified. There were 48 deaths. Because the investigators were able to identify the source of the outbreak, a recall was instituted for the cheese produced in the plant during the course of the outbreak. This was the first recall for a *Listeria*-contaminated product, and appears to be the first which attracted media attention. Another large and well-documented outbreak occurred in Illinois in July 1994 (Dalton et al., 1997). The outbreak was quickly linked to chocolate milk served at a picnic. In the years since 1994, there have been recurring outbreaks. These have involved both previously identified vehicles for listeriosis infection, and have added new items to the list of vehicles.

Awareness of Food Safety Hazards

Food safety issues such as *Listeria* outbreaks have characteristics which make them highly likely to receive media coverage and public interest. A set of eight characteristics which give events high news value has been identified by Sparkes and Winter (1980). Events such as *Listeria* outbreaks have all eight of these characteristics. The eight characteristics include brevity of duration (rather than an ongoing succession of events); simplicity; high relevance to the audience; involvement of important institutions or individuals, or large numbers of people; catastrophe or calamity; unusualness or novelty; familiarity to the audience (the idea of bacterial contamination certainly is familiar, even if *Listeria* is not); and personification (the event involves individuals rather than broad societal changes or natural events).

Contemporary communications research has concluded that individuals scan the mass of information to which they are exposed each day, and attend to that which seems most engaging or personally relevant (Graber, 1988), in an in-depth study of how individuals learn from the news, found that the primary reason individuals process news stories is to gratify personal life needs, not to get information on societal or job concerns. Only limited research bears directly on who attends to news stories on food safety. After a major 1979 study, Miller (1983) classified 25 percent of American adults as attentive to the food additive controversy. Those classified as attentive indicated that they were interested in the issue, had some basic level of knowledge about it, and had indicated some regular pattern of information acquisition. Another 21 percent of the respondents were classified as interested. This category also indicated interest and active information acquisition, but was less knowledgeable. Women were found to be more attentive than men. In a multivariate analysis, a college science course was found to be the most important predictor of attentiveness, followed by attentiveness to science policy, and completion of a baccalaureate degree.

Herrmann, Warland and Sterngold (1997) examined reactions to the 1989 Alar scare using data collected in 1991. Overall, 79 percent of the national sample of respondents recalled hearing the allegations about Alar. Men and women were about equally likely to have heard about the controversy, as were those with and without children in the household. Those who were older, had more formal education and were more frequent television news watchers were more likely to have been aware of the controversy.

Awareness of *Listeria*: 1999

Data from a nationwide consumer survey conducted in 1999 (Appendix) make it possible to study awareness of *Listeria*. The data also allow us to (1) determine whether awareness was concentrated in particular demographic categories, (2) determine the relation of the presence of at-risk individuals in the respondent's household to awareness of *Listeria*, to concern about it, and to knowledge about it.

In an early summer 1999 nationwide telephone survey, 51.6 percent of those surveyed indicated they had heard of *Listeria*. There were no significant differences in awareness by demographic characteristics such as sex, age, and education or by household food shopping or preparation responsibility (Table 1). The chief differences related to frequency of exposure to media stories about food safety. Those who reported having watched television

reports about food safety within the last month, or who had read a newspaper or magazine story about food safety within the last month, were more likely to report awareness of *Listeria*.

Respondents who had heard of *Listeria* were asked about their concern about it. There were significant differences in expressed concern by age, but these took no clear pattern (Table 1). There were significant differences by education, with those with less formal education typically expressing more concern. There also were significant differences by television viewing behavior. Those who reported watching a news report about food safety within the past month indicated concern more frequently.

Those who had heard of *Listeria* also were asked how much they believed they knew about it. There were significant differences in self-assessed knowledge for several variables: sex, age, shopping activity, food preparation activity, and exposure to newspaper and magazine coverage of food safety (Table 1). Females typically believed themselves to be more knowledgeable, as did older respondents. Those with more food shopping and food preparation responsibilities also typically considered themselves more knowledgeable. Those who reported having read a newspaper or magazine article about food safety within the past month believed themselves to be more knowledgeable than did those who had not.

Respondents were asked about the presence in their household of individuals who fell into categories considered especially vulnerable to serious effects from listeriosis infections: pregnant, age 10 or under, age 60 or over, and immune-suppressed. Respondents with vulnerable individuals (including themselves) in their household were not significantly more aware of *Listeria* than those from households which did not include at-risk individuals (Table 2). There were no significant differences in the percentages of respondents which indicated awareness of *Listeria* between households which included pregnant or immune-suppressed individuals, adults age 60 or over, or children 10 and under and those which did not include such individuals.

Respondents with an at-risk individual in their household also did not differ significantly from those who did not in the amount of concern they expressed about *Listeria* (Table 2). The relation of an at-risk household member to self-assessed knowledge of *Listeria* also was examined (Table 2). Respondents with an immune-suppressed household member differed significantly in the amount of knowledge of *Listeria* which they believed they had. They typically believed themselves to be more knowledgeable than did others. Self-assessed knowledge did not differ significantly for the other at-risk categories.

Discussion

These results suggest that awareness of *Listeria* has diffused fairly widely among the adult American population. They also suggest that awareness does not seem to be concentrated in particular demographic categories. This finding differs from that of the Herrmann, Warland, and Sterngold (1997) study which found that those with more formal education and who were older were more aware of the allegations against Alar. The findings are, however, similar in their conclusions that women did not tend to be more aware than men, and those with more media exposure were more likely to be aware.

If we accept the judgement of communications researchers that people expose themselves to information which they find interesting or useful, we can conclude that the portion of the population which finds the topic of food safety most involving is now probably aware of *Listeria*. The apparent lack of awareness by those with at-risk individuals in their household is a real cause for concern. Adults in the survey sample who were in households which included a pregnant person, a child ten or under, an adult 60 or over, or an immune-suppressed person were not more aware of *Listeria* than households which did not include such at-risk individuals. Nor did they express more concern about *Listeria* than other respondents. Respondents with an immune-suppressed household member did regard themselves as more knowledgeable than did others. This is somewhat reassuring as this group is perhaps the most clearly at risk from listeriosis infections. However, respondents without other types of at-risk household members do not appear to have the knowledge of *Listeria* which would be appropriate.

Conclusions

While half of the adults questioned in 1999 indicated awareness of *Listeria*, a necessary first step in any educational effort, the other half of those questioned were not aware of it. If this latter group is relatively uninterested in food safety, as is reasonable to conclude, reaching them will be particularly challenging. The numbers of at-risk individuals, the seriousness *Listeria* infections, and the evidence of only limited knowledge of the disease even among those who were aware of it, all argue for continuing efforts to educate the public.

Table 1
 Awareness by Respondent Characteristics, 1994 and 1999. Concern, and Self-Assessed Knowledge by Characteristics, 1999

	1999 (n = 1400)		1999 (n = 721)		1999 (n = 721)	
	Percent Aware	Chi-Square Statistic	Percent Some/Great Deal Concerned	Chi-Square Statistic	Percent Some/Great Deal of Knowledge	Chi-Square Statistic
<u>Sex</u>						
Females	51.6	.012, 1d.f. p = .91	63.5	2.589, 1d.f. p = .11	34.9	4.064, 1d.f. p = .04
Males	51.3		57.7		27.9	
<u>Age</u>						
18 - 32	52.4	.394, 1d.f. p = .94	53.1	10.301, 1d.f. p = .02	23.2	9.738, 1d.f. p = .02
33 - 44	51.6		65.7		34.3	
45 - 57	50.9		59.5		33.7	
58 +	50.2		68.1		37.3	
<u>Education</u>						
Grade 1 - 12	53.6	1.546, 1d.f. p = .21	66.8	7.181, 1d.f. p = .01	28.3	2.370, 1d.f. p = .12
Grade 13+	50.2		56.9		33.7	
<u>Food shopping</u>						
All/most	50.9	.312, 1d.f. p = .58	62.9	1.704, 1d.f. p = .19	34.6	3.859, 1d.f. p = .05
Some/no	52.4		58.0		27.7	
<u>Food preparation</u>						
All/most	51.4	.007, 1d.f. p = .93	62.7	1.408, 1d.f. p = .24	35.6	6.985, 1d.f. p = .01
Some/no	51.6		58.3		26.3	
<u>Read newspaper or magazine article about food safety</u>						
In past month	55.2	6.967, 1d.f. p = .01	63.8	3.003, 1d.f. p = .08	36.7	11.652, 1d.f. p = .001
Not in past month	47.5		56.6		23.2	
<u>Watched television news story about food safety</u>						
In past month	55.6	7.338, 1d.f. p = .01	65.2	6.608, 1d.f. p = .01	35.7	12.083, 1d.f. p = .001
Not in past month	47.7		54.9		22.3	

Table 2
 Presence of At-Risk Household Members and Awareness, Concern, and Self-Assessed Knowledge, 1999

	Percent Aware		Chi-Square Statistic	Percent Some/A Great Deal Concern (n = 721)		Chi-Square Statistic	Percent Some/A Great Deal Knowledge (n = 721)		Chi-Square Statistic
<u>Pregnant individual</u>									
Present	45.5	.501, 1d.f. p = .48	40.0	2.806, 1d.f. p = .09	46.7	1.570, 1d.f. p = .21			
None present	51.7		61.3		31.4				
<u>Child 10 or under</u>									
Present	53.5	.858, 1d.f. p = .35	64.6	1.623, 1d.f. p = .20	31.1	.044, 1d.f. p = .84			
None present	50.7		59.5		31.9				
<u>Individual - Age 60 or over</u>									
Present	50.6	.203, 1d.f. p = .65	66.1	3.424, 1d.f. p = .06	34.9	1.378, 1d.f. p = .24			
None present	51.9		58.7		30.4				
<u>Immune - compromised individual</u>									
Present	53.4	.293, 1d.f. p = .59	67.7	2.188, 1d.f. p = .14	42.2	5.829, 1d.f. p = .02			
None present	51.3		59.9		30.1				

Appendix

The data were collected from late May to early July 1999 in telephone interviews with a sample representing the conterminous United States. A random-digit dialing sample was again employed. English-speaking adults, age 18 and over were interviewed. Interviewers for this survey again attempted to produce a completed sample with roughly half males. The data for this study (n=1400) include 45.4 percent males, and 54.6 percent females. The cooperation rate was 59 percent. Included in the survey was the question "Are you concerned about *Listeria* bacteria, or is that something you never have heard of?" Respondents who replied yes or no (and thus had heard of *Listeria*) were classified as aware for this study. Those who said they never had heard of *Listeria*, or gave a don't know response were classified as unaware.

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Endnotes

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