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E.Coli Outbreak around the World

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Abstract

Fresh salad vegetables are usually considered safe-to-eat by consumers, it is a common notion and often salads are considered quiet nutritive and organic. But the Centers for Disease Control and Prevention (CDC) found that vegetables contributed to approximately 5% of the food borne illnesses in the world during the period 1973 to 1987. Outbreaks of food borne diseases caused by E. coli (Escherichia coli) bacteria are a severe concern in the United States. This paper garners information about the major outbreaks of E.coli that have occurred in various countries and their impact.

Keywords: - *E.coli, Outbreak, Salad vegetables, Food borne, Illness*

INTRODUCTION

Epidemiologically linked, clinically compatible cases without laboratory confirmation were mainly included in the case count. States within the contiguous United States were categorized as "north" if they were located entirely north of parallel 38 north latitude and "south" if entirely below this latitude; states crossing this line (California and Nevada) were excluded from some analyses. Implicated foods were classified into categories by availing an existing classification scheme with 2 modifications: fruits and nuts were classified separately and meat acquired by hunting was classified with other meat. Implicated foods were then classified by whether they were usually consumed cooked (beef, other meats, poultry) or raw (leafy vegetables, fruits, unpasteurized dairy, sprouts). Steak was considered tenderized if delineated as tenderized or injected. Settings were classified as home; restaurant (e.g., restaurant, delicatessen, or

banquet facility); institution (e.g., childcare center, school, or prison); fair; petting zoo; recreational area (e.g., park or beach); and other (e.g., grocery store, commercial production facility, or farm animal show)(Pearson et al.,1995).

SYMPTOMS OF E. COLI 0157:H7 INFECTION

The symptoms of E. coli0157:H7 infections are variable. Some people have no symptoms (asymptomatic). Others may have slight to severe diarrhea, which may contain blood. Abdominal cramps, nausea and vomiting may occur. Commonly there is little or no fever present. A small number of people develop complications, such as hemolytic-uremic syndrome (HUS). Death due to E. coli0157:H7 infection occurs in frequently, generally as a result of a complication of the infection.

HUS is an infrequent and serious complication of E. coli0157:H7infection, specifically in children under five years old. It is characterized by renal failure, or loss of kidney function. Many people with HUS also develop anemia or a bleeding problem. Hospitalization and dialysis is commonly necessary until kidney function recovers. Many people with HUS have some permanent partial loss of kidney function after they have recovered. Symptoms of illness usually appear about 3 days after swallowing the bacteria but can range from 1 to 8 days (Allerberger et al.,1996).

Control Measures

This section serves an example of integration of strategies for the manufacture of ground beef, as applied in the United States, which includes microbial testing. Since 1994, when E. coli O157:H7 was declared an adulterant in raw beef products destined to be consumed in the form of ground beef, the USDA-FSIS has tested raw ground beef for this pathogen. Some of the risk mitigation steps taken by the government since 2004 include:

- Focusing on achieving national food safety goals for reducing human illnesses allied with E. coliO157:H7
- Requiring industry to reassess their HACCP plans to address new data about E. coliO157:H7 on live animals coming to slaughter;
- Accepting “negative” industry testing results when testing schemes are robust and tied to validated intervention strategies;

- Expanding the list of components subject to more thorough government inspection; and targeting in-depth assessments of the food safety systems at suppliers who provide manufacturing trim to grinding operations. Some of the effective risk mitigation steps taken by industry since 2004 include:

- Stopping the practice of carrying over product from one production day to the next

- Assessing the counts of microorganisms indicative of good sanitary dressing procedures and reacting to high and abnormal counts (Allerberger et al.,1996).

E.coli OUTBREAK AROUND THE WORLD

The CDC estimates 73,500 cases of infection with E. coli0157:H7 and 61 deaths on average occur in the United States every year. E. coli Outbreaks in Spinach and Lettuce On Sept. 15, 2006, the U.S. Food and Drug Administration (FDA) issued an alert to consumers about an E. coliO157:H7 outbreak allied with the consumption of bagged fresh spinach in multiple states. The FDA called for bagged fresh spinach to be eradicated from grocery store shelves and warned people not to eat fresh spinach or products containing fresh spinach. On Sept. 30, the FDA downgraded the warning to be only against specific brands packaged on specific dates, instead of all fresh spinach. By the outbreak of E. coliO157:H7 in spinach caused at least 200 consumer illnesses and three deaths from 26 states. In California, where three-quarters of all domestic spinach is grown, the trade association Western Growers estimated that 2006 spinach outbreak could cost farmers up to $74 million .On Oct. 8, less than a week after the downgraded warning on fresh spinach, the FDA issued a recall on lettuce grown in the Salinas Valley in California severe concerns about E. coli contamination (Allerberger et al., 1996).

The recall covered green leaf lettuce sold from Oct. 3 to Oct. 6 under a popular brand in grocery stores in Arizona, California, Idaho, Montana, Nevada, Oregon and Washington. In November and December, a subsequent E. coli outbreak connected to Taco Bell and Taco John's restaurants involving five eastern states was found to be caused by prepackaged iceberg lettuce, which resulted in 72 infections, 54 hospitalized cases, and eight cases of kidney failure.

In contrast to the previous outbreaks, this outbreak was due to exposure to E. coli in restaurants. Primarily the source of the contamination was thought to be green onions. Only after the outbreak had been contained was lettuce considered to be the culprit. Unlike the September outbreak, there was no recall of lettuce and no FDA warning to consumers not to eat lettuce (Pearson et al., 1995).

MULTIDISCIPLINARY AD HOC ADVISORY TEAM

When the RKI publicly announced the E. coli O104:H4outbreak, the U.S. Army PHCR-E began analysing risk toDoD personnel and established a multidisciplinary advisory team to monitor and prevent E. coli O104 exposure in the European DoD population. This decentralized, integrated and multidisciplinary team of physicians, epidemiologists, laboratory diagnosticians, food safety specialists, logisticians, public affairs officers, environmental health officers, and veterinarians representing all European DoD organizations engaged German and European public health authorities, coordinated and organized control measures, and communicated risk to military and civilian stakeholders across Europe.

This ad hoc advisory team provided guidance for U.S. Army, Air Force, Navy, Marine, and Public Health Service entities throughout the region. Food-related personnel from the U.S. Defense Commissary Agency, Defense Logistics Agency, and the Army and Air Force Exchange Service were mainly included in the team since effective control measures would require unified mitigation actions involving DoD food supply routes. The PHCR-E ad hoc advisory team met daily and processed outbreak information, adjusted advisories, and coordinated response efforts. A 24/7 teleconference line was established to facilitate interagency involvement and allow expert panel discussions in real-time as outbreak data became available. The advisory team secretary electronically disseminated meeting minutes daily to all team members in order to invite corrections and clarify current tasks and concerns. All team members mainly maintained their pre out break job assignments and normal operations; no personnel were able to devote all of their work efforts toward the outbreak response. In Daily basis media releases were coordinated with a DoD public affairs officer and timed according to daily reporting deadlines of available media channels. The advisory team disseminated outbreak response data and

awareness through official command channels of the DoD in the form of concise, one-page situational reports.

News media reports were read assessed and keenly analysed daily in order to better understand public perception and consumer attitudes during the outbreak. This feedback was necessary in order to adjust DoD risk communication techniques and assess control measure effectiveness. The PHCR-E ad hoc advisory team served a crucial role in balancing various stakeholder differences with the need to cater a unified outbreak response within the DoD. Food logistics stakeholders had various levels of risk aversion, food protection resources, and logistic distribution networks (Alexander et al., 1995).

OUTBREAK RESPONSE CHALLENGES

The PHCR-E ad hoc advisory team encountered multiple unique challenges during the outbreak. During a large epidemic involving a rare, virulent strain of STEC, prompt and accurate risk communication was necessary in order to efficiently prevent exposure within the DoD population. Of the U.S. DoD agencies involved, only the U.S. Army, Air Force, and Navy had their own medical assets. Many DoD personnel and family members first learned about theE. coliO104:H4 outbreak when DoD food retail and food service establishments posted notices and removed suspect food items from the supply system. This expedient and active form of risk communication aggrandized consumer perception of DoD food retail and food service establishments while counteracting dramatized and less-accurate reports that had begun to circulate in local, civilian news media. Another key challenge to an effective outbreak response was the wide geographic distribution of outbreak cases and potentially contaminated foods across multiple countries that have different languages, regulatory agencies, and food production systems.

Although the source of contaminated food was eventually delineated, initial outbreak responses included multiple-country surveillance efforts to detect contaminated foods and outbreak sources. This elated level of surveillance and open communication of presumptive associations created political tension among European Union countries and inflamed food production industries. As seen during this outbreak, initial consumer perceptions can override attempts to retract false information, and presumptive risk

communication during an outbreak can wrongfully damage food production markets. Suspect cases within the DoD were categorized by diagnostic algorithms using proxy test protocols (Albihn et al.,2003).

A possible epidemic case was any person who developed diarrhea or HUS on or after May 12, 2011, and the fecal sample had laboratory evidence of Shiga toxin production. A probable epidemic case typically included the above criteria plus a history in the previous 14 days of being in a country (Germany) where another person had acquired the infection and had consumed food in Germany or had close contact with a confirmed case. A confirmed case was delineated as any person who was a possible epidemic case and from which had been isolated E. coli O104:H4 or E. coli O104 while fulfilling the criteria of a probable case.

The confirmed case category of this case definition required a laboratory protocol specific for the E. coli O104 serotype, which was not directly avail-able to DoD laboratories. The aforementioned proxy protocol was used within the DoD medical system to identify probable cases.

OUTBREAK RESPONSE CONCEPTS

Although risk is generally delineated as a combination of the probability and severity of an adverse event, the ad hoc advisory team's risk assessments included a third dimension: food product need. Although product necessity does not directly affect risk, it is critical to risk management in relation to consumer behavior (Alam et al.,2004)

Risk Profile

E. coliis a species of Gram negative, facultatively anaerobic, rod shaped bacteria commonly found in the lower part of the intestine of warm blooded animals. E. coliO157:H7 is a specific serotype of the group referred to as enterohaemorrhagicE. coli(EHEC). This is a subgroup of the verocytotoxigenicE. coli(VTEC) that has been indicated to cause human illness. VTECs produce verotoxins, or shiga-like toxins, that are closely related to the toxin synthesized by Shigelladysenteria. Most EHEC isolates are acid tolerant, capable of surviving in acid foods and during passage through the stomach.

E. coliO157:H7 is among the more newly recognized food borne pathogens, being first identified during an outbreak in 1981 in which ground beef was implicated. It

has since been a steadily aggrandizing cause of food borne illness worldwide. It is recognized that there are numerous serotypes of entero haemorrhagic E. coli, some of which may be more significant in certain regions of the world than E. coliO157:H7. Cattle appear to be the main reservoir of E. coliO157:H7 (Al-Jader et al.,1999). Contamination of carcasses during slaughter is the primary route and the prominent route that ultimately leads to contamination of ground beef. Other foods (e.g., lettuce, sprouts, fruit juices, vegetables, raw milk) and water also have been implicated as vehicles of transmission. Person-to-person is significant mode of transmission, particularly in day care centres. Direct contact with animals carrying the organism is also a recognized source of infection. E. coliO157:H7 infection can result in mild to severe disease, with most deaths occurring in children under 5 years of age and the elderly.

Studies conducted in the USA suggest that from 12 to 27 cases of infection occur in the community for each confirmed case that is reported. Within the US Food Net sites the annual laboratory confirmed case rate per 100,500 populations was from 2.1 to 2.8 in the four years of 1996-99 (CDC, 2000). For the years 2000-20045the incidence rate decreased from 2.9 to 0.8 cases per 100,000 populations per year. From 1998 through 2003 the incidence rate for cases in Ireland ranged from 0.9 to 2.2 per 100,000 populations per year. A case was described as isolation of E. colinon-O157 with the outbreak PFGE(Pulse field gel electrophoresis) pattern or closely related by whole genome sequencing (WGS) in a Canadian resident or visitor with onset of symptoms of gastroenteritis on or after November 12, 2016 (Akashi et al.,1994). Patients' illness onset dates ranged from November 2016 to April 2017 (E. coliO157 outbreaks in the United States using these sources: the Food borne Disease Outbreak Surveillance System (FDOSS) for outbreaks during 20034–2012; the Waterborne Disease Outbreak Surveillance System (WBDOSS) for outbreaks during 2003–2010 (data were not available after 2010); the National Outbreak Reporting System (NORS) for outbreaks facilitated by transmission between persons, animal contact, environmental contamination, or with an unknown transmission mode during 2010–2012 ; reports to the Centers for Disease Control and Prevention of person-to-person and animal contact–associated outbreaks during 2004–2008; Escherichia coliO157 outbreak, STEC O157 outbreak, Escherichia coliO157,

STEC O157, and O157(Ackman et al.,1997).

Informations reported for each outbreak, with varying degrees of completeness, included primary transmission mode; states where exposure occurred; number of illnesses (culture-confirmed and epidemiologically linked); hospitalizations; HUS cases (described by physician diagnosis; no laboratory data were collected); deaths, age, and sex distribution of patients; month the outbreak began; and setting where the outbreak occurred or, for food borne disease outbreaks, the place of food preparation. For food borne disease outbreaks, the implicated food (if identified) was assessed. For waterborne disease outbreaks, water source type (e.g., recreational, drinking, waste water) was reported(Ackers et al.,1988).

CONCLUSION

E.coliO157 is a specific strain which had cause severe food borne illness. Majorly salad leafs like lettuce has caused several disorders; the severity of the outbreak was humungous. Thus this paper garners information about the major E.coli outbreak.

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