Disease Detectives – Sample Problem
Disease Detectives Investigate an Outbreak of *Salmonella enteritidis*

In September 1994, the Minnesota Department of Health detected an increase of reports of *Salmonella enteritidis* infections. After an initial investigation, a nationally distributed brand of ice cream was implicated in the outbreak. Disease detectives established national surveillance and surveyed customers of the implicated manufacturer. Cultures for bacteria were obtained from ice cream samples, the ice cream plant, and tanker trailers that had transported the ice cream base (premix) to the plant.

Questions

1. Is this an outbreak? If so, what criteria of an outbreak does this incident meet?

2. A case control study was conducted to determine risk factors for factors for illness. Cases were defined as person with cultured-confirmed *S. enteritidis* infection who resided in southeastern Minnesota and who became ill during September 1994.

    a. What parts of a case definition do the above contain?

    b. Is the above case definition confirmed, probable, or suspected? What information in the above classifies the type of case of definition?

Hennessy TW, Hedberg CW, Slutsker L, et al. A National Outbreak of Salmonella enteritidis Infections from Ice Cream. NEJM 1996;334:1281-1286.

c. Brand X ice cream was eaten by 11 of 15 cases compared with 2 of 15 controls. An odds ratio of 10.0 (95% confidence interval, P =0007) was determined. Interpret the meaning of the odds ratio.

3. No other risk factors were identified. At this point in this investigation, can Brand X ice cream be said to be the source of the outbreak? Why or why not?

On October 7, 1994, the Minnesota Department of Health announced the findings of the case control study. Brand X initiated a nationwide recall of all ice cream made at its plant in Marshall, Minnesota. The first isolate of *S. enteritidis* from an unopened carton of ice cream was reported on October, 17, 1994.

4. What was the reason why disease detectives announced their findings on October 7th?

Of 11 S. enteritidis isolates from case patients, 9 were phage type 8, 1 was type 13a, and 1 was type 1.

Two hundred thirty-six unopened ice cream products made on 32 days during the period from July 12 through October 7, 1994 were sampled for culture: 8

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were positive for *S. enteritidis*. Five of the eight isolates were phage type 8. Cultures of 29 flavorings and ingredients did not yield salmonella.

5. Why was finding *S. enteritidis* phage type 8 in the cultures of the unopened ice cream important to this investigation?

Investigation of Ice Cream Production

No cause of salmonella contamination could be found in either the ice cream plant or the suppliers of the ice cream premix.

Following production, pasteurized premix was transported to the Marshall plant in tanker trailers and eventually made into ice cream. Neither the premix nor other ingredients were pasteurized after delivery to the plant.

Tanker trailers used to transport the premix were also used to carry unpastereurized liquid eggs, oils, molasses, corn syrup, and pasteurized dairy products. After July 1st , backhauling a load of unpastereurized eggs after loading a load of ice cream premix became a common practice.

Written procedures called for the washing and sanitation of tanker trailers and the outlet valve after the delivery of liquid eggs before premix was loaded. Documentation of cleaning was absent for seven tanker trailers on seven occasions during the outbreak period. To save time, drivers could elect to bypass the cleaning procedure after unloading eggs. In addition, egg residue was discovered in one tanker trailer after cleaning. Cracks in the lining of five tanker trucks were also noted.

On October 12 through 18, the FDA obtained samples of liquid eggs from three egg-production facilities served by the trucking company. Three yielded *S. enteritidis*: one was phage type 8 and two were type 13a.

6. Based on the above information, what conclusion can be made on the cause of the contaminated premix?

7. List one change that should be made in the transportation of premix that would decrease the likelihood of a similar outbreak.

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