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HLTH 3800

Epidemiology Outbreak Investigation

Personal Expectations:

I expect this to be more of an educational course where the ways that the original investigation occurred will be presented to me simply for me to learn.

Step 1: Detect the Problem

The actual first step in learning what had happened was to learn more about *Salmonella* and how the body is infected by it. It was easy to see how this issue was not considered an actual concern for some time since the resources were not available to investigate. Sadly, it seems like this issue was fixed mostly because of the attention it gained from other countries. The next part of detecting the problem was deciding what kind of study to use. It was extremely useful that I did this investigation after learning how to distinguish between case-studies, cohort studies, and experimental studies because it made choosing the method of investigation effortless. If a researcher is looking into past events to try to create trends, they should use a case-study.

Step 2: Develop a System to Monitor the Problem

The general idea of this step is to develop a system to monitor issues. Yet again, it is apparent how this issue was missed due to lack of public health resources. The person who had watched the communicable disease surveillance system had retired and never been replaced. I wonder just how many potential outbreaks were missed due to the lack of knowledge. Another concern was the recall bias from previous cases. This impacted data as well, which was clear when incidence rates were calculated and showed no problem in comparison to other countries. This led to the analysis of the overall system to figure out how to improve accuracy. I think it is interesting how sensitivity is considered important to the objectives. The other ideas make sense but the connotation of sensitivity to me is passivity which is unnecessary for this system. Researchers need more information not less. I did read that some unordinary cases went to the World Health Organization, but the reports were filtered depending on if the researcher thought the condition was worth reporting. There was also a significant delay for receiving reports. I hope that these issues coming to light will help people realize that it is important to document everything within a short period of a problem occurring so trends can show. The new methods for reporting were desperately needed. I think the most important was the accurate flow of information. This seemed like the big umbrella all problems fall under the amount and timeliness of information given through the proper channels. The new rules also stated that diseases spread through food, water, or personal contact have to be reported within 24 hours which I think is a great addition to the preexisting ones.

Step 3: Characterize the Problem

The incidence rate was 8.6 cases per 100,000 people which was only a portion of the lab-reported cases after the system had been updated. Clearly this lack of reporting was still a problem, so researchers created a multi-line graph with different Salmonella strains. This helped some, but the researchers created an age bar-graph which really showed reason to the lack of reporting. It makes sense that the 0-4 age range had the most reports because parents are much more likely to take their child to the doctor for an issue than go themselves. The next biggest question was why are outbreaks occurring more in December and January? I’m really not sure what could be impacting the increase during only a few months because it would make more sense if it was a particular year that increased or even an age group.

Step 4: Identify the Source of the Problem

The researchers first decided to conduct a case-control study instead of a cohort study. This makes a lot of sense because the source of exposure is not known, so instead researchers will look at cases that have already happened to help understand what the patient did and where they were when they were infected. They studied people who had been reported and asked for each person to fill out a questionnaire including a food diary. I don’t know how effective this method will be because recall bias might play a very big part in falsely identifying exposures. Investigators used the data to create odds ratios based on their questionnaire and found that the exposures most likely to be risk factors were eating shell eggs, eating dishes with raw or undercooked eggs, and underlying illness. All of these risk factors are not surprising to me because one of the most common foods to expose others to Salmonella is eggs and how they are prepared. Underlying illness would affect a person’s immunity with most sicknesses, so it is probably much easier for them to catch another illness. The spike in cases during December and January also makes a lot of sense now. It is very common for people to make eggnog and other dishes that either contain eggs in general or have raw eggs. Although this is a possibility for the reason why there is an increase, I would venture to say it is true but needs to be confirmed with yet another study, possibly a cohort since the exposure would be known.

Step 5: Clarify the Source of the Problem

Since eggs were confirmed as possible exposure points and at least risk factors for Salmonella Enteritidis, egg-containing foods as well as eggs themselves were cultured to look further into the reasons why people were getting sick. All but one egg had the same phagocytic type of Salmonella Enteritidis which, of course, supported the earlier findings from the odds ratio. The next step was to identify how the eggs were being kept that made them prominent carriers of Salmonella. Researchers studied ten farms which nine made up three-quarters of the country’s egg supply. These batches showed that Salmonella Enteritidis was the most common type in eggs and about one in twenty eggs was contaminated. With this said though, it was much more common to find Salmonella on the eggshell instead of in the egg. This correlates with the finding of transovarian transmission of Salmonella from hens to eggs through external contamination of the egg. The true issues were found when an inspector went to each farm and found that six had poor sanitary conditions. This would definitely affect egg production and could even lead to other illnesses other than Salmonella.

Step 6: Implement Control Measures

Although the unsanitary conditions were a problem that farms needed to fix, they weren’t the only reason why the illness happened. Grocery stores and consumers were also to blame because they did not practice good prevention of contamination. For grocery stores this mainly meant that they needed to make sure eggs were properly refrigerated, while consumers need to cook eggs thoroughly before eating. Since the problem has been found and prevention needs to happen, more education on the subject is always the answer. I think it was very smart to offer a real incentive for people to attend workshops on the subject because it would most likely create a big turnout. Food safety did not stick to workshops and direct education. Advertisements and pamphlets were also used which, with all resources together, would reach most of the population. New regulations were also brainstormed to determine how to best combat these issues in the future.

Step 7: Monitor Control Measures

Farms now must undergo health assessments and testing to keep egg production up to standards. With all the efforts presented above, Salmonella incidence decreased. There were still doubts in the accuracy of the surveillance system and whether all cases were being reported. A researcher compared hospitalization records for Salmonella with cases reported to the surveillance system to find slightly over half of the cases were being reported. This could skew data dramatically because under reporting is not giving the full scope of illness. Staff decided to change reporting procedures by simplifying it and providing training that focused on the who, what, when, and how to report.

Conclusion:

The program gave such an in-depth view of the investigation that it was clear to understand how eggs were found to be the cause of many Salmonella cases. The ideas of testing eggs and further educating not only farm workers but also grocery stores and consumers on the control and prevention were necessity to decrease incidence. In the end, the increase in reporting and education has helped decrease prevalence of Salmonella effectively. I think this investigation was a very engaging way for me to learn more about the outbreak investigation process. Although I expected to do more grunt work to solve the outbreak, I think it was extremely beneficial to understand the thought process used for each step and see how researchers moved from one step to the next. The modules were set up in a very helpful way that enhanced the thought process being used, and the questions in each module made me think about what I would do before the answer was given, which I appreciated because it made me think. I do think this outbreak investigation could be more engaging by having students investigate. If students were split into groups and had to solve an outbreak, it would help enforce techniques and ideas we have learned in class.