CASE STUDY

AN OUTBREAK OF ACUTE HEPATITIS IN PROVO, UTAH
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PART 1

INTRODUCTION

A case study is a procedure of doing research whereby thorough contemplation is given to the progress of a person, collection or arrangement over a period of time. It is also a particular case in a research work that is used to demonstrate a notion or belief. It can be viewed as a strategy for conducting research and it comprises intense analysis of a single unit. It stresses on the evolving features which are related to the environment.

1.A. Key steps in the investigation of an outbreak.

The investigation of a disease is a task that involves various disciplines due to the need for skills obtained from epidemiology, laboratory medicine, microbiology and chemistry. The following steps herald an investigation (knowledge, 2011).

I. Initial valuation of the situation

In this step, the consideration as to whether or not the cases reported to the doctor are of the same sickness or not is first made. When the first consideration turns out to be positive, the background motion of the disease is inspected to check whether the outbreak is factual. The first initial reports of the case should be interviewed to gain in-depth knowledge to try and establish the source. Specimen from all cases reported should be collected, and the common illness characteristics that run through all the cases should be considered. A site investigation of the area where the outbreak is expected to have happened should be done and then an initial hypothesis should be formulated after the field research. A decision is then made as to whether there will be need for further investigation.
II. Communication

This is done to ensure that the diagnosis of a though outbreak has been confirmed. The best mode of communication to workmates, the patients and the public should be established. Accuracy should be ensured and information should be passed to all of the people who need to know, in a timely manner. Use of mass media should be done beneficially.

III. Descriptive epidemiology

At this stage one should establish the defining cases that have been confirmed and the ones that seemed probable. The highest number of cases attainable should be identified and data collected on a uniform questionnaire. Cases should be categorized by time, place and person, and the people who are most exposed to getting sick should be identified. The rate of the attack should then be determined.

IV. Analysis and interpretation

All data existing should be revised and an instructive hypothesis established. Further specimens should be collected for in-depth laboratory analysis. This done to find cases that need to be focused on.

V. Control.

Further studies meant for control purposes should be done. Conclusions should be made and the findings made should be compared with the known facts of the disease. Recommendations should then be made to prevent the recurrence of the outbreak in the future. Remaining areas that were not studied should be studied. Information should then be shared with other health workers to promote awareness and prevent future recurrences.

1.B.
The team is yet to determine whether they are dealing with an outbreak. They had identified the same type of illness among people of the same city, and they had also identified a pattern of the illness (tendency to cluster by households). The team however needed to know the background motion of the disease to identify whether the disease was and obtain the epidemiological description of the disease.

PART 2

2.A.

The agents causing this problem were most likely to be toxic substances (an overdose of the drug acetaminophen), The other agent that was most likely to be viruses (herpes simplex virus).

For the acetaminophen overdose, the elements that are compatible with the disease include: dark urine, jaundice, rise in the levels of serum bilirubin and alkaline phosphatase (Fontana, 2008). The level of serum aminotransferases is also an element of acetaminophen overdose. In review, however, there lacked symptoms such of hepatic encephalopathy, peripheral oedema, and the lack of hepatitis A and B.

For the Herpes simplex virus, the elements that are compatible with the general description are: fever and malaise (Salvaggio, 2016). In retrospect, the description of symptoms to match with Herpes lacked headaches, sore throat, no ulcer lesions were reported and there was no oral or labial lesion reported.

2.B

The confirmation of the diagnosis was made possible by the lead of fever followed by jaundice which signified the presence of hepatitis. Of the hepatitis viruses, the Hepatitis A virus
is the most likely possibility as it can lead to fulminant liver failure. There, however, is herd immunity that would make community-wide outbreaks uncommon in Utah. Hepatitis D virus could also have caused such clinical diagnosis but large community outbreaks are not common.

Hepatitis E virus infection can result to such clinical symptoms and can also occur as an outbreak on large communities. The serological tests done initially for HAV and HBV infection needed to be checked but could also be suggestive that HEV was the causal agent.

To confirm the diagnosis, blood specimens of case patients were collected by the investigators and the sera obtained was sent to the regional medical research centre in Salt Lake City. Of the 47 sera samples, all were negative for IgM anti-HAV, HBsAg and antibodies to HCV. However, all serum samples were positive for anti-HEV antibodies in ELISA. This confirmed to the investigators that they were dealing with Hepatitis E outbreak, the first one documented in Utah.

PART 3.

3.A.

The key elements in a case definition are;

a) Person.

This describes the key characteristics that the patients share.

b) Place

This is the specific geographical location of the area associated with an outbreak.

c) Time

This is the period associated with the onset of an illness for the cases under scrutiny.

d) Clinical features
These are the initial features that are usually simple and objective which get to be put in place by laboratory results.

3.B

The case definition was: a combination of loss of appetite with yellow coloration of the conjunctiva or coloured urine that occurred suddenly since January 17 2004 in a resident of Provo.

PART 4

4.A.

The potential options available to search for cases during an outbreak investigation are

I. Taking cases passively as they get reported through the surveillance system.

II. Stimulated passive surveillance through reminding investigators to

III. Active surveillance

IV. Door to door case search.

There are various strategies that can be used during an outbreak as long as the application to the whole population shall be uniform for the whole area of investigation. This makes sure that the strategy will lead to the identification of cases that are a representative of all the cases. The easiest way to identify a case is to take cases passively reported through the surveillance system. The next option is the stimulated passive surveillance. It consists the investigators reminding the reporting units to notify cases through the routine surveillance systems. In case a more extensive research is needed, active surveillance can be made use of. Information is actively collected by investigators from reporting sites or laboratories. Door to door case search is the last resort that
can be used to do maximum exhaustion of investigation. It is done when there are available resources by the investigators. In this investigation, 44 workers collected information in 7 days.

4.B.

The strategy that was used to conduct the research was the door to door case research. In seven days with the help of 44 field workers and collected information regarding age, sex, date of onset, signs and symptoms and potential exposures.

4.C.

The minimum information needed from a case is the age, their gender, the date of onset, symptoms and the signs and the potential exposure.

PART 5

5.A.

Description of the epidemiological information.

Case reports started from the 19th of January to the 1st of March 2014. The highest incidence of the outbreak was on the month of February, the 14th. The distribution of the disease incidence was not regular. Most incidences that occurred were near a spot where water was pumped from the river. in the whole area, there were underground water sources that were distributed all over. The most prevalent age for the disease was between the 15-44 years bracket. It was also noted that the rate of attack for males was higher than that of the female gender.

5.B.

The epidemic curve has its shape suggesting that the source of the outbreak is common. It is likely that exposure to the disease happened sometime earlier in January since the incubation
period for the Hepatitis E virus takes at least one month. How the disease was distributed geographically was a suggestion that people were clustered around the water supply from the pump which drew water from the river. The distribution of the disease attack rate along all the ages signified that the disease was able to affect everyone in the whole bracket but younger adults were more exposed to the risk of exposure. It is probable that the time of strike by the employees of the municipal water system was the time that the exposure took place.

5.C.

The hypothesis that could be generated from the collecting of this data is: the failure to treat water during the strike of the municipal water system employees led to the release and supply of water that was not treated, to the public between 2-10\textsuperscript{th} January 2004 and hence led to the outbreak.

5.D.

The hypotheses could be tested by an analytical epidemiological study. The investigators made use of the case definition that they had made at the case search stage for the case control study. For the controls, they used healthy people from the population, selecting them randomly in the various areas affected. They selected as many controls as the cases in each area. They then made use of standardized questionnaires to collect information from case patients and control subjects about demographic characteristics and about the water source they were using in the house.

PART 6

6.A.

The options available for the investigators were: doing a case control study or a cohort study. The reason a good choice was needed is because the hypotheses needed to be tested.
The most preferable choice for this study was the case control study. This is because there was a low incidence rate in the population even where attacks seemed to register the highest mark.

6.B.

For this particular case study, it is recommended that healthy people be chosen from the general population randomly and in the various areas that are affected. The criteria used for recruiting was the case definition that had been formulated at the case search stage.

6.C.

The data to be collected would most likely be the information of the participants (age, and gender), the demographic characteristics of the place they come from and the source of the water which they use at home.

PART 7

7.A.

The data would be analysed using the odds ratio. Application of the odds ratio to the 2x2 table generates an odds ratio of \( \frac{493 \times 404}{45 \times 134} \) which comes to 33. The 95% confidence interval of this odds ratio is spread from 23 to 47.

There was no association measure used since the kind of association that was observed was not caused by chance.

PART 8

8.A.

The results obtained from this investigation were totally compatible with what is known about HEV including its usual mode of transmission and period of incubation.

8.B.
New things about HEV were learnt. First, HEV infections with this virus had never been reported in Utah and the laboratory tests done during the hepatitis outbreak was to be carefully done for the identification of unusual pathogens,

It was also noted that the occurrence of the disease one incubation period after the window during which there was a strike is compatible to the fact that the water treatment is effective in disease prevention. In water treatment, the treatment processes were not known of how effective they were but it was known that chlorination alone was not an effective cleaning method. The study revealed that water treated in the various processes involved was clean and therefore the system of cleaning water using multiple systems was an effective method.

8.C.

Some features of hepatitis E were discovered during this given case study. It was noted that there had never been any known infections of the HEV that had ever been reported in Utah. This was the first time that there was an outbreak for the virus. It was also not known that the pathogen would be found in water but the findings prompted the request that there be more scrutiny for the pathogen while treating water in the future.

PART 9

9.A.

Different audiences are in need of the report of these findings for various reasons. The first recipients of the findings of this report should first be submitted to the public health managers through an oral briefing so that they can be aware and take the necessary prevention, or treatment precautions.
The second recipients should be the epidemiology colleagues and laboratory specialists. The findings should be submitted in the form of a report that holds the epidemiological indications that documents the conclusion of the investigation.

Thirdly, there may be the need to report to the local administration or the political council of the area and this can be done directly or through the local manager of public health. The main form of submitting these findings to them would be through talking points to them. It also helps as it notifies the authority that there is a response to a crisis that needs mitigation.

They should also report to the community of the affected area in order to raise awareness over what steps can be taken to cause prevention. Talking to the community would best be done through press releases and interviews for health education messages.

The scientific community should also be supplied with the information of this investigation with manuscripts that contains new findings of this disease in order that the information catalogue of the disease may be advanced as well as paving way for secondary investigations.

9.B.

The findings were most likely to be understood by the audience since the investigators processed the information carefully and ensured that there was no spreading of unnecessary measures that would not be supported by the evidence. This way, attention of the public would not be directed to other unwanted sides of attention. However, the investigations were done at a time too late to offer useful knowledge to the public over dealing with the epidemic.

9.C.
The media that would be most appropriate to reach all of these audiences would be electronic media on the overall.

For the public health managers, circulars and journal articles would be the best form of media to avail the information to them. This is because the most resourceful informer of the medical fraternity are the research journals.

The epidemiology colleagues and laboratory specialists can be well reached and informed through live conferences and meetings to inform them of the findings. The reports can also be published.

The political administration should be made aware of the findings through print media. Brief on-point statements can be printed and submitted to the leaders, or the chief public health manager would place the report to the leaders through a briefing by word of mouth.

The mass public can be enlightened through radio and television broadcasting. TV and radio broadcasting is the major way in which information reaches the public. The investigators can make a press release or take an interview in order to engage the public on the findings of the report.

9.D.

There were no short-term recommendations save for the reassurance to the public that the exposure to the outbreak had been arrested and superseded.

For the medium term and long term, the researchers worked with the district health authorities to initiate a dialogue with the municipal water supply about (1) quality assurance measures that could ensure the continuous quality of the water supply and (2) the type of minimum service that could be put in place in the case of strikes.
9.E.

There lacked a surveillance system that could identify the cluster in time to do anything about the event that led to the exposure. The reports were made only after the outbreak and there was no lead to the possibility of an outbreak due to the disease’s long incubation period.
References


www.healthknowledge.org.uk/public-health-textbook/disease-causation-diagnostic/2g-communicable-disease/outbreak-investigation