Outbreak investigation of an unknown gastrointestinal illness in District Victoria, Country Mala, 2016

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Disclaimer

Acknowledgements

We wish to acknowledge the Global Partnership Initiated Academia for Controlling Health Threats (GIBACHT) and their funding body, the German Federal Foreign Office, for their support in developing this case study.

Abstract

This case study is based on an outbreak investigation conducted by multisectoral team from animal and public health offices in Kaktong (a remote village in Zhemgang District Bhutan) during July–September 2010 [1]. This outbreak caused by ingestion of infected cow meat which had died after a brief illness (bleeding of unclotted blood from nostrils). The owner of the affected cow had opened the carcass and dressed the meat, which he shared or sold within the village for human consumption. It simulates an epidemiological investigation including active and passive case finding, descriptive and analytical epidemiology, laboratory confirmation, risk communication with implementation of control measures.

This case study is designed for the training of front-line public health professional, basic, intermediate and advanced level field epidemiology trainees. The case study will build the capacity of the trainees regarding investigating illnesses caused by animal–human interface.

How to use the case study

General instructions: This case study is an added resource for students of epidemiology and public health with specialised knowledge who need further information on the outbreak investigation with management and risk communication. The case study is ideally conducted in groups of about 10-20 participants under supervision of facilitator. Each student will participate in the case study by reading the paragraph on his/her turns. The facilitator will be responsible for engaging students in discussion, clarifying any confusing concepts or data analysis, and encouraging participants to think about the answers of the given questions. Notes for facilitator are coupled with each question in the facilitator version of case study with objective to aid facilitation.

Target audience: This case study was designed for public health professional (medical doctors, nurses, environmental health officers or laboratory scientists etc.) and trainees of field epidemiology (frontline, intermediate and advance level)

Prerequisites: Before using this case study, participants should have background knowledge on Anthrax (natural history of disease), public health surveillance and outbreak investigation.

Time required: Approximately 3.5 hours

Language: English

Participant's Guide

Goal of the Case Study:
Integration of Biosecurity and Biosafety measures during an outbreak investigation

Learning objectives:
After completing this case study, participants should be able to:

1) Apply the steps of an outbreak investigation, particularly for an unknown disease
2) Apply the descriptive and analytical techniques for data analysis during an outbreak investigation
3) Recognise the techniques of environmental investigations for identification of the source of infection
4) Identify the Biosafety and Biosecurity measures during outbreak investigations
5) Discuss risk communication strategies during outbreak investigations

PART I - OUTBREAK DETECTION

(Note: Please complete this section within 30 minutes)

University Medical Clinic Town Gota, District Victoria, Country Mala,

02 October 2016- Morning 11:00 A.M

The scene is busy. There are many patients waiting to receive attention. Staff is hustling around following the directions of the doctor and attending to incoming patients.

Medical Officer (MO): Nurse? It sounds busy out there. What's going on?

Nurse One: I'm sorry Doctor. Something must be going wrong. We have a lot of people waiting to see you. All appear to have different health related complaints, like fever, anorexia, nausea, vomiting, severe abdominal pain and few of them also reported with flu-like illness.

The MO starts examining cases, which are present in the clinic. Among all the patients, the MO identified a case of unusual illness with symptoms of abdominal pain, generalised weakness, hematemesis (vomit with blood) and high-grade fever. The case is a sociology student aged 24 living in the hostel with his friend. He immediately (at 11:30 am) calls the Epidemic Investigation Cell (EIC) and reports that a student is brought by his roommate and is suffering from an acute illness with fever, anorexia, nausea, vomiting and severe abdominal pain. According to the complaint of the student, on 28 September he developed fever and from September 29th to October 1st he vomited blood and had bloody diarrhoea. Findings of physical examination are as follows; temperature= 38°C, pulse rate= 120 beats/min, blood pressure= 110/60 mmHg, respiratory rate= 25 breaths / min. Moreover, the abdomen is distended with ascites and presented with tenderness in the right lower quadrant. His roommate recently came from his village Kapur, and he believed that their illness was due to poorly cooked cow meat they had eaten at home on 27th September. He also had history of food intake in the canteen of the University with his roommate.

Village Kapur is a remote area of district Victoria, having a population of 9,256 inhabitants. Socioeconomically, the people are poor and literacy rate is also low. Most of the villagers are farmers by occupation and also busy in the trading of the animals. Within a two-kilometre radius a rural health centre is present providing health care services 24/7 to the community of village Kapur and other adjacent villages.

Question 1: Do you think this complaint should be investigated further? Why or why not?

Answer:

Epidemic Investigation Cell at Provincial Directorate Health Office

02 October 2016- 11:55 A.M

The team members of the EIC decided to investigate further. They began by making a telephone call to the MO of the university clinic with the objective to establish the facts and determine if other persons were similarly affected. The MO informs them that no other case of similar illness was reported after the initial case. The team members requested to be informed of any identified patient with similar illness and ended the call.

One team member also called the MO of the Rural Health Centre located near village Kapur and asked about the cases with symptoms of fever, anorexia, nausea, vomiting, severe abdominal pain and tenderness with development of hematemesis, bloody diarrhoea. He was told that 9 residents of different ages and sex have reported with similar illness in the last 3-4 days, four of whom died the previous night. All patients had a history of eating poorly cooked meat, which was purchased from the Harry Meat Shop located in the village on 27th September, 2016.

Question 2: What should be the immediate line of action of the EIC Officer?

Answer:

Later that day at 3:00 pm on 02 October 2016, the Provincial Directorate of Health issued a notification for an outbreak investigation and also gave directives to the EIC team to formulate an investigative team, which will converge in the conference hall within half an hour.

Question 3: Who should be the members of the team and their role?

Answer:

The team leader of the EIC held a meeting with all member of the outbreak investigation team in the conference hall of the directorate and gave a brief presentation on the current outbreak situation.

Question 4: What activities should the team leader of the EIC need to perform before setting off for the outbreak investigation?

Answer:

The outbreak investigation team has realised it will need some equipment to aid them in the field during their investigation.

Question 5: What equipment will be taken to the field and why?

Answer:

Rural Health Centre (RHC) at Village Kapur

03 October 2016- 8:55 A.M

On the 3rd October, two members (epidemiologist, public health officer) of the outbreak investigation team visited the RHC to interview the MO, review medical records of 9 patients seen at the facility and interview the patients who were hospitalised for the past 3 to 4 days.

Question 6: What type of information does the outbreak investigation team need to be availed or collected from the patients?

Answer:

Table 1: Line listing of the cases with demographic data and clinical features (n=27)

					Clinical Features									
Patient No	Age (Y)	Sex	Date of onset	Outcome of illness	Temperature (^{0}F)	Pulse Rate	Blood Pressure	Respiratory Rate	Nausea vomit	Bloody diarrhoea	Severe and: pain	Abd: Tenderness	Ascites	Septicaemia
1	24	M	28-Sep	Alive	101	98	130/90	21	Y	Y	Y	Y	N	N
2	34	F	28-Sep	Death	101	104	120/80	22	Y	Y	Y	Y	Y	N
3	23	F	29-Sep	Alive	103	80	120/90	18	Y	Y	Y	Y	N	N
4	30	F	29-Sep	Alive	101	90	130/90	17	Y	Y	Y	Y	N	N
5	47	M	29-Sep	Death	100	100	120/80	21	Y	Y	Y	Y	Y	N
6	44	F	30-Sep	Alive	99	100	120/90	26	Y	Y	Y	Y	N	N
7	53	M	30-Sep	Death	102	106	130/90	29	Y	Y	Y	Y	Y	N
8	33	M	01-Oct	Death	101	98	120/80	30	Y	Y	Y	Y	Y	N
9	25	F	01-Oct	Alive	103	110	120/90	22	Y	Y	Y	Y	N	N
10	5	M	29-Sep	Alive	101	98	130/90	21	Y	Y	Y	Y	N	N
11	19	M	30-Sep	Alive	101	98	130/90	21	Y	Y	Y	Y	N	N
12	23	F	01-Oct	Alive	101	104	120/80	22	Y	Y	Y	Y	Y	N
13	34	F	30-Sep	Alive	103	80	120/90	18	Y	Y	Y	Y	N	N
14	67	M	01-Oct	Alive	101	90	130/90	17	Y	Y	Y	Y	N	N
15	45	F	29-Sep	Alive	100	100	120/80	21	Y	Y	Y	Y	Y	N
16	77	M	29-Sep	Alive	99	100	120/90	26	Y	Y	Y	Y	N	N
17	45	M	29-Sep	Alive	102	106	130/90	29	Y	Y	Y	Y	Y	N
18	15	F	02-Oct	Alive	101	98	120/80	30	Y	Y	Y	Y	Y	N
19	21	M	30-Sep	Alive	103	110	120/90	22	Y	Y	Y	Y	N	N
20	34	F	01-Oct	Alive	101	104	120/80	22	Y	Y	Y	Y	Y	N
21	23	F	29-Sep	Alive	103	80	120/90	18	Y	Y	Y	Y	N	N
22	34	F	29-Sep	Alive	101	90	130/90	17	Y	Y	Y	Y	N	N
23	67	M	30-Sep	Alive	100	100	120/80	21	Y	Y	Y	Y	Y	N
24	45	F	29-Sep	Alive	99	100	120/90	26	Y	Y	Y	Y	N	N
25	77	M	30-Sep	Alive	102	106	130/90	29	Y	Y	Y	Y	Y	N
26	45	M	29-Sep	Alive	101	98	120/80	30	Y	Y	Y	Y	Y	N
27	15	F	02-Oct	Alive	103	110	120/90	22	Y	Y	Y	Y	N	N

Question 7: Will you contact the Harry meat shop? Why and why not?

Answer:

On the same day (October 3), the outbreak investigation team visited the Harry meat shop and obtained information regarding the meat that was sold by the owner of the meat shop on 27th September, 2016. He told the team that he had two cows, which suddenly died after a brief illness. The animals exhibited bleeding of unclotted blood from the nostrils, mouth and their carcass was bloated [1]. The owner of the affected herd had opened the carcass and dressed the meat, which he sold within the village and other relatives residing in the other village for human consumption.

He further informed the team member that his wife who helped him in the cutting and distribution of the cow meat developed fever, anorexia, nausea, vomiting, severe abdominal pain and tenderness on 28th September. She was hospitalised where she developed hematemesis and bloody diarrhoea and, on the 29th September, she died in the hospital. Fortunately, he did not develop any illness.

PART 2 - DESCRIPTIVE EPIDEMIOLOGY AND HYPOTHESIS GENERATION

(Note: Please complete this section within 25 minutes)

After establishing that an outbreak is ongoing and attempting to verify the correct diagnosis, an essential step is to define what constitutes a case in this outbreak. This is called the **Case Definition**, which is used to identify and count cases.

A case definition is a set of criteria for deciding whether an individual ill person should be classified as a case or not [2]. The case definition places boundaries on who will be counted as a case, so the investigation does not include those with illnesses unrelated to the outbreak. This step helps to get an idea of the magnitude of the problem and records all cases for follow-up in the investigation.

Case definitions are often broken into sub-categories based on the strength of evidence, that this is a true case of the disease or is truly related to the particular outbreak being investigated. These designations are usually, “suspect,” “probable,” and “confirmed.”

Question 8: What are the components of a case definition?

Answer:

By keeping in view of the above information, all people were infected after eating meat so for the identification of the other cases we will develop an operational case definition of illness for active case finding.

Question 9: Develop a case definition of the Gastrointestinal Illness.

Answer:

The team will search for all suspected cases by using the case definition and also conduct a detailed interview with the help of team member (epidemiologist, public health officer). For collection of information, it is also decided that team members sit together and develop a questionnaire.

Question 10: What general types of information would you include in the questionnaire?

Answer:

With the case definition in place, the next step is to decide how to find additional cases. During the interview of the meat shop owner, the team asked of details of the persons who purchased the meat or freely distributed the meat to the relatives residing in his village. The team contacted all persons (n=47) who got the meat either purchased or free. The team located them and conducted a detailed interview using the case definition. Luckily, 17 individuals had not yet eaten the meat and 3 had not reported any illness after eating the meat.

In the evening, a meeting was held with persons who purchased the meat or got it for free, one team member summarised the food history among the residents of the village.

Summary of the cases with history of exposure:

Total persons who got the meat either free or purchased	47
Persons who got the meat and also ate the meat	30
Persons who ate the meat and developed the illness	27
Persons who ate the meet and did not develop the illness	03
Persons who got the meat and ate it uncooked	17

He also presented the line list of all cases (n=27) who reported to the hospital from 27th September and came from village Kapur.

Table 2: Line listing of the cases with demographic data, clinical features and food exposure history (n=27)

					Clinical Features										Food History						
Patient No	Age (Y)	Sex	Date of onset	Outcome of illness	Temperature (^{0}F)	Pulse Rate	Blood Pressure	Respiratory Rate	Nausea vomit	Bloody diarrhoea	Severe and. pain	Abd: Tenderness	Ascites	Septicaemia	Rice	Bread	Meat	Rice + Meat	Bread + Meat	Bread + Rice	Rice, Meat +Bread
1	24	M	28-Sep	Alive	101	98	130/90	21	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y	N	N
2	34	F	28-Sep	Death	101	104	120/80	22	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N
3	23	F	29-Sep	Alive	103	80	120/90	18	Y	Y	Y	Y	N	N	Y	Y	Y	N	N	N	N
4	30	F	29-Sep	Alive	101	90	130/90	17	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y	N	N
5	47	M	29-Sep	Death	100	100	120/80	21	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N
6	44	F	30-Sep	Alive	99	100	120/90	26	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	N
7	53	M	30-Sep	Death	102	106	130/90	29	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	N	N
8	33	M	01-Oct	Death	101	98	120/80	30	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	N	N
9	25	F	01-Oct	Alive	103	110	120/90	22	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	N	N
10	5	M	29-Sep	Alive	101	98	130/90	21	Y	Y	Y	Y	N	N	N	N	Y	N	N	N	N
11	19	M	30-Sep	Alive	101	98	130/90	21	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	N
12	23	F	01-Oct	Alive	101	104	120/80	22	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	N	N
13	34	F	30-Sep	Alive	103	80	120/90	18	Y	Y	Y	Y	N	N	N	N	Y	Y	N	N	N
14	67	M	01-Oct	Alive	101	90	130/90	17	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	N
15	45	F	29-Sep	Alive	100	100	120/80	21	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	N	N
16	77	M	29-Sep	Alive	99	100	120/90	26	Y	Y	Y	Y	N	N	N	N	Y	N	N	N	N
17	45	M	29-Sep	Alive	102	106	130/90	29	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N
18	15	F	02-Oct	Alive	101	98	120/80	30	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	N	N
19	21	M	30-Sep	Alive	103	110	120/90	22	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	N
20	34	F	01-Oct	Alive	101	104	120/80	22	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	N	N
21	23	F	29-Sep	Alive	103	80	120/90	18	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	N
22	34	F	29-Sep	Alive	101	90	130/90	17	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	N
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26	45	M	29-Sep	Alive	101	98	120/80	30	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	N	N
27	15	F	02-Oct	Alive	103	110	120/90	22	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	Y

The epidemic investigation team gathered information with the help of a questionnaire with the objective to define the disease according to place and person (age, gender and food items eaten) and distribution of the disease by time (onset time and epidemic curve).

Question 11: Calculate the totals and percentage for each column and row. Determine any important differences by age or by gender. Why should this be done?

Table 3: Outbreak findings by person, case distribution by age and gender

	Male		Female		Total	
Age Group	Number	%age	Number	%age	Number	%age
0-9						
10-19.						
20-29						
30-39						
40-49						
50-59						
60-69						
70 and >						
Total by gender						

Interpretation:

Question 12: In this village the total population was 9,256. By using the number of cases and proportion of the population of the village, calculate the age and sex specific attack rate.

Table 4: Attack rate of the outbreak by age and sex

Age Group	Male				Female				Total			
	% of Population	Pop:	Number of Cases	Attack rate (%)	% of Population	Pop:	Number of Cases	Attack rate (%)	% of Population	Pop:	Number of Cases	Attack rate (%)
0-9		1259				1240				2499		
10-19.		1277				1037				2314		
20-29		768				676				1444		
30-39		537				564				1101		
40-49		462				417				879		
50-59		278				231				509		
60-69		218				154				372		
70 and >		55				83				138		
Total		4854				4402				9256		

Traditionally, a special type of histogram is used to depict the time course of an epidemic. This graph, called an epidemic curve**,** or epi curve for short, provides a simple visual display of the magnitude of the outbreak and its time trend [3]. The epi curve shows the magnitude of the epidemic over time as a simple, easily understood visual. It permits the investigator to distinguish epidemic from endemic disease.

To draw an epidemic curve, you first must know the time of onset of illness for each case. For some diseases, date of onset is sufficient. For other diseases, particularly those with a relatively short incubation period, hour of onset may be more suitable

To interpret an epidemic curve, you should consider its overall shape. The shape of the epidemic curve is determined by the epidemic pattern (for example, common source versus propagated), the period of time over which susceptible persons are exposed, and the minimum, average, and maximum incubation periods for the disease.

An epidemic curve that has a steep upslope and a more gradual down slope (a so-called log-normal curve) is characteristic of a point-source epidemic in which persons are exposed to the same source over a relative brief period. In fact, any sudden rise in the number of cases suggests sudden exposure to a common source one incubation period earlier.

In a point-source epidemic, all the cases occur within one incubation period. If the duration of exposure is prolonged, the epidemic is called a continuous common-source epidemic, and the

epidemic curve has a plateau instead of a peak. An intermittent common-source epidemic (in which exposure to the causative agent is sporadic over time) usually produces an irregularly jagged epidemic curve reflecting the intermittence and duration of exposure and the number of persons exposed. In theory, a propagated epidemic one spread from person-to-person with increasing numbers of cases in each generation should have a series of progressively taller peaks one incubation period apart, but in reality, few produce this classic pattern.

Question 13: Draw an epidemic curve by using date of onset of disease and write down the interpretation.

Answer:

Based on clinical findings, the descriptive epidemiology of early cases, and hypothesis generating interviews, investigators hypothesised about the source of the outbreak in the people of village Kapur.

Question 14: What will be your hypothesis?

Answer:

PART 3 - LABORATORY INVESTIGATION

(Note: Please complete this section within 25 minutes)

Seminar room of Rural Health Centre at Village Kapur

04 October 2016- 9:00 A.M

A meeting was conducted in the seminar room with the objective to make discussion on the causative agent with required sample and test for humans and animals.

Question 15: How might you narrow down the range of agents suspected of causing the gastrointestinal illness?

Answer:

Using the above concept, the outbreak investigation team made two decisions:

Decision 1: Two members visited the diseased person, took samples and sent to the reference laboratory for identification of microorganisms.

Decision 2: Collect an environmental sample to confirm the presence of causative agents.

Question 16: In this investigation, what kind of samples should be collected from infected person?

Answer:

Question 17: What kind of environmental sample/s do you need to collect? List some of the materials you need?

Answer:

Question 18: Discuss the WHO guideline safety measures and procedures during the collection of samples that individual should follow?

Answer:

Question 19: Before sending the sample/s to the reference laboratory, what are the points needed to consider?

Answer:

Question 20: Discuss how you would transport these biological samples to the reference lab?

Answer:

Question 21: What prevention measures from contaminated objects you take?

Answer:

PART 4 - DESIGNING AN EPIDEMIOLOGIC STUDY TO TEST THE HYPOTHESIS
(Note: Please complete this section within 30 minutes)

Question 22: What type(s) of study would you use to investigate this hypothesis? Why?

Answer:

Twenty-seven persons meeting the case definition were included as cases. It was decided that one control would be selected for every case and would be matched to the case by age group and gender.

Question 23: How would you define controls for this study?

Answer:

Question 24: Name the sources of controls and from where they are selected?

Answer:

For a case-control study, the odds ratio is the appropriate measure of association. The odds ratio compares the odds of exposure among cases to the odds of exposure among controls [4].

	Case	Control	TOTAL
Exposed	a	b	(a+b)
Unexposed	c	d	(c+d)
TOTAL	(a+c)	(b+d)	(a+b+c+d)

$$\text{odds of exposure (cases)} = \frac{\text{number of cases with the exposure}}{\text{number of cases without the exposure}} = a/c$$

$$\text{odds of exposure (control)} = \frac{\text{number of controls with the exposure}}{\text{number of controls without the exposure}} = b/d$$

$$\text{Odds ratio} = \frac{\text{Odd of exposure (Cases)}}{\text{Odd of exposure (Controls)}}$$

$$\text{Odds ratio} = \frac{a/c}{b/d}$$

= ad/bc (known as the cross-product)

- An odds ratio of 1.0 means that the exposure is not associated with the disease (i.e., the odds of exposure among cases is the same as the odds of exposure among controls) [5].

- An odds ratio greater than 1.0 means that the odd of exposure among cases is greater than the odds of exposure among controls; the exposure may be associated with the disease if the odds ratio is statistically significantly greater than 1.0.
- A p-value of less than 0.05 and 95% confidence interval which does not include 1.0 suggests that the odds ratio is significantly greater than 1.0.
- An odds ratio of less than 1.0 means that the odds of exposure among cases is lower than the odds of exposure among controls; the exposure may be protective if the odds ratio is statistically significantly less than 1.0.

Total 27 age and sex matched controls were selected from the village. A detail interview was conducted with each of the selected control and collect information on about food exposure Among them 23 ate rice, 5 bread, 3 meat, 4 rice and meat, 7 bread and meat, 3 rice and bread and 2 ate rice, bread and meat

Question 25: Calculate the appropriate measures of association for these exposures.

Table 5: Odd ratio calculation

S.No	Risk Factor	Cases	Control	Odds Ratio	95% CI	p value
1	Rice	20	23			
2	Bread	4	5			
3	Meat	26	3			
4	Rice + Meat	2	4			
5	Bread + Meat	6	7			
6	Rice + Bread	2	3			
7	Rice + Bread + Meat	1	2			

Question 26: Write down the interpretation of the odd ratio observed by 2 X 2 table

Answer:

On 5th October, the reference lab sends the report of blood sample and declared that it was positive for Anthrax

Question 27: Please provide general information about anthrax, what types do exist?

Answer:

After inspection of the meat shop with local food safety officials, the shop was closed. The implicated meat was not distributed to other villages of the district. The meat, which was still present in the refrigerator of some household of the village was immediately removed by following the WHO recommended guideline.

Furthermore, if a veterinarian confirms an animal has died from anthrax, it is probable that it will have contaminated its immediate environment with its secretions and any slurry will need to be decontaminated.

Question 28: What control measures in the handling of infected animals do you suggest?

Answer:

Redevelopment of sites previously occupied by industrial premises where there might have been a risk of anthrax contamination e.g., old farms, anthrax burial sites, tanneries and wool mills, or where old buildings due for demolition have hair plaster walls, or crypt clearance work, may present an incidental risk to construction workers.

Appropriate soil sampling/building material sampling, and laboratory testing for anthrax **may** give an indication of spore population and their distribution at a site. It is, however, better to adopt a precautionary approach if redeveloping industrial sites, and assume that anthrax spores **are** likely to be present **although probably at low numbers which would not put the worker at significant risk** [6]. Appropriate assessment needs to be taken of the intended use of any site being redeveloped and any remedial action thought necessary. If decontamination is required the best practical option may be heat treatment, which normally means incineration. If the area is too large, chemical disinfection may be more appropriate. Generally, control measures will need to be applied for prevention of Anthrax infection [7].

Question 29: What Control measures in the development of contaminated land do you suggest?

Answer:

Question 30: Do you think this report of anthrax disease could be deliberately caused by someone or a group of persons? Biosecurity measures during outbreak

Answer:

PART 5: COMMUNICATION DURING OUTBREAK INVESTIGATION

(Note: Please complete this section within 10 minutes)

Effective risk communication is an essential element of outbreak management. When the public is at risk of a real or potential health threat, treatment options may be limited, direct interventions may take time to organise, and resources may be few [8]. Communicating advice and guidance, therefore, often stands as the most important public health tool in managing risks.

Pro-active communication encourages the public to adopt protective behaviours, facilitates heightened disease surveillance, reduces confusion and allows for a better use of resources - all of which are necessary for an effective response.

By alerting a population and partners to an infectious disease risk, surveillance of potential cases increases, protective behaviours are adopted and confusion is limited.

Question 31: What measures are needed to be taken by the government for development of effective communication with the public and media?

Answer:

Question 32: What will be the benefit of communication with the public and media?

Answer:

Question 33: In this scenario, what information needs to be communicated to the public media? At what time should this information be communicated?

Answer:

Question 34: What is risk communication?

Answer:

Conclusion:

The announcement was made by public health officials of Department of Health of Mala that meat of infected cow sold by Harry Meat Shop was the source of the outbreaks in September of 2016. Health department collected all remaining meat that was present in the houses and refrigerator of meat shop. Consumers stopped buying meat from all other sources. Insufficient cooking and inadequate refrigeration may have provided conditions for bacterial survival.

The meat that is believed to be the cause of the outbreak was cooked at relatively low temperatures (78-80°C or 158-176°F) over a time period of approximately 40 minutes, too short to kill Bacillus anthracis.

To safely prepare foods, government of Mala recommends that all meat to be sterilised at temperatures of 116 to 121°C (240-250°F) in pressure canners operated at 0.66 to 0.97 atm (10-15 lb/in^2). At these temperatures, the time needed to destroy bacteria in meat ranges from 20-100 minutes.

References

1. Thapa NK, Tenzin KW, Tshering Dorji M, Dorjee J, Marston CK, Hoffmaster AR. Investigation and control of anthrax outbreak at the human–animal interface, Bhutan, 2010. Emerging infectious diseases. 2014;20(9):1524.

2. Neslund VS, Goodman RA, Hadler JL. Frontline public health: surveillance and field epidemiology. Law in public health practice. 2007:222-37.

3. Dicker RC, Coronado F, Koo D, Parrish RG. Principles of epidemiology in public health practice; an introduction to applied epidemiology and biostatistics. 2006.

4. Hillis SL, Woolson RF. Analysis of categorized data: use of the odds ratio as a measure of association. Textbook in psychiatric epidemiology. 2002:35-63.

5. Nelson A, Brunette K, Rybka TP, Alexander L, Wilfert RA, MacDonald PD. Case-Control Studies for Outbreak Investigations. FOCUS on Field Epidemiology.3(2).

6. Fasanella A, Galante D, Garofolo G, Jones MH. Anthrax undervalued zoonosis. Veterinary microbiology. 2010;140(3-4):318-31.

7. Kumar A, Kanungo R, Bhattacharya S, Badrinath S, Dutta T, Swaminathan R. Human anthrax in India: urgent need for effective prevention. The Journal of communicable diseases. 2000;32(4):240-6.

8. Abraham T. Risk and outbreak communication: lessons from alternative paradigms. Bulletin of the World Health Organization. 2009;87:604-7.