JAN 2025

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE AND ENGINEERING

DEPARTMENT: HEALTH SCIENCES

PROGRAMME: Post Graduate Diploma in Infection Prevention and Control (PGDIPC)

STUDENT REGISTRATION NUMBER

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COURSE CODE: IPC 103(3): SURVEILLANCE, EPIDEMIOLOGY AND RESEARCH METHODOLOGY

DURATION: 2 HOURS TOTAL MARKS: 100 MARKS

INSTRUCTION TO CANDIDATES
Answer **ALL** questions

Section A: 10 minutes **Total marks 10 Marks**

Spot Examination:

Instructions: Each slide will be displayed for two (2) minutes. You will respond to the questions and write your answer within the two minutes for each slide. Write your answers in the spaces corresponding to each slide and question. If you have any query raise your hand as early as possible before the slide is removed. Queries after all the slides have been displayed will not be accepted.

1. "A" represents_____ [1 mark]

   "B" represents_____ [1 mark]

2. a. What name is given to the type of graphs?

   _____ [1 mark]

   b. State any **ONE** difference between the two graphs

   _____

   _____ [1 mark]

3. This is an investigation done for reduction of central venous catheter associated blood stream infections following implementation of a resident oversight and credentialing policy.

   a. What name is given to the image?

   _____ [1 mark]

   b. What is the use of this investigation?

   _____

   _____ [1 mark]

4. Look at the graph showing timeline of onset of ventilator-associated pneumonia (VAP) following orotracheal intubation (OTI) among Intensive Care Unit(ICU) COVID-19 patients as displayed.

a. What name is given to this type of graph?
_____ [1 mark]

b. Interpret the information from the graph.
_____
_____
_____ [1 mark]

5. The graph is an epidemic curve for an outbreak of Salmonella that occurred in Mutare. Salmonella generally has an incubation period of about 1-3 days.

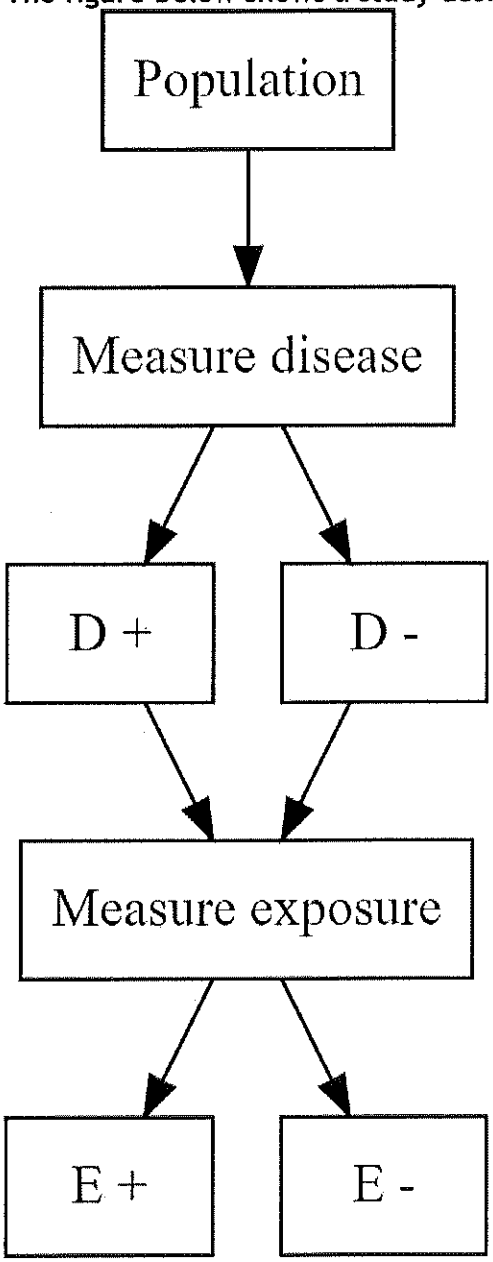
a. What type of outbreak is this?
_____ [1 mark]

b. Give **one** reason for your answer in 5 (a) above.
_____
_____
_____ [1 mark]

Section B: COMPULSORY **Total marks = 6**
ANSWER ALL QUESTIONS

Encircle the correct answer on the question paper using a blue/black pen.

1. **The figure below shows a study design.**



Which of the following study designs is shown in the figure above?

a) Cohort study

b) Cross sectional study

c) Ecological Study

d) Case control study

e) Randomised Controlled Trial

2. **Which of the following is the most important characteristic of the median?**

   a) It is greater than the arithmetic mean when the data are skewed to the right

   b) It can be distorted by outliers

   c) Is a measure of the spread of data

   d) Is a useful summary measure when the data are skewed

   e) Is used to calculate the 95% confidence interval

3. **Which of the following is a reason to conduct HAI surveillance?**

   a) To reduce the risk of infecting yourself only

   b) To reduce the risk of infecting fellow health care professionals

   c) To reduce the risk of infecting visitors and other clients only

   d) To reduce the risk of not infecting the surrounding environment

   e) None of the above

4. **Which of the following is the most suitable way of answering a question relating to use of masks to prevent COVID-19 infection among clinicians?**

   a) A report of an expert committee

   b) A well conducted cohort study

   c) Uncontrolled experiment

   d) Randomised Controlled Trial

e) Cross sectional study

5. **The primary use of the standard error of the sample mean is in calculating the:**

   a) Variation

   b) Standard deviation

   c) Error rate

   d) Confidence interval

   e) Interquartile range

6. **Which of the following are examples of outcome indicators?**

   a) Catheter-associated urinary tract infections (CAUTIs)

   b) Number of patients in isolation

   c) Adherence to central line insertion practices

   d) Number of windows opened during caring for TB patients

   e) All of the above

SECTION C: Short answer questions **Total marks = 40**

Instructions: Write your answers in the spaces provided on this sheet.

1. a) Outline the steps in conducting a HAI surveillance.

   _____
   _____
   _____
   _____
   _____
   _____ **[6 marks]**

   b) List any four (4) mandatory variables for prioritization during HAI surveillance.

   _____
   _____
   _____ **[4 marks]**

2. Outline the 8 World Health Organisation (WHO) core components of an infection prevention and control program.

_____
_____
_____
_____
_____
_____
_____
_____ **[4 marks]**

3. Based on the standard definition of a HAI, respond to the questions in the following scenarios:
   a. A patient is admitted after a diabetic complication and gets a urinary catheter inserted. After 24 hours, the patient meets the criteria for urinary tract infection (UTI).
      i. Is this a healthcare associated infection? _____ **[1 mark]**

      ii. Explain your answer in 3(a)(i) above.
      _____
      _____ **[2 marks]**

   b) The patient in 3(a) above is admitted in intensive care unit (ICU) with a urinary catheter in situ for 5 days. The patient is transferred to high dependency unit at 10a.m. At 1700hrs the patient is transferred back to the ICU. After 24 hours, the patient meets the criteria for UTI.
      i. Is this an HAI? _____ **[1 mark]**

      ii. Explain your answer in 3(b)(i) above.
      _____
      _____
      _____ **[2 marks]**

   c) Mr Shiri, a 56 years old diabetic man develops ventilator associated pneumonia (VAP) caused by *Klebsiella pneumoniae* whilst in ICU. Seventy two hours later he meets all the criteria for catheter associated urinary track infection (CAUTI) and the organism is *Klebsiella pneumoniae* again.
      i. How many HAI would you report? _____ **[1 mark]**

      ii. Explain your answer in 3(c)(i).
      _____
      _____
      _____ **[2 marks]**

4. A dictionary for acronyms designated as variable codes, as well as those likely to be encountered in the course of collecting the surveillance data should be prepared before the data collection.

List any four (4) variables that need designated variable codes to be defined in the dictionary.

_____
_____
_____ **[4 marks]**

5. Match by drawing a line from the type of surveillance to what it measures.

Type of Surveillance	What is measured
1. Point Prevalence	a. Risk of HAI occurring
	b. Burden of the HAI
	c. Incidence of HAI
2. Continuous Prevalence	d. Prevalence of HAI

[4 marks]

6. State any four (4) goals of an outbreak investigation.

_____
_____
_____
_____
_____
_____
_____
_____ **[4 marks]**

7. Bradford Hill established a group of nine principles that can be useful in establishing epidemiologic evidence of a causal relationship between a presumed **cause** and an observed **effect**: Match each definition to its corresponding term in the table below. **[5 marks]**

Definition	**Insert selected term from above list**
a. The association agrees with currently accepted understanding of pathological process	Temporality
b. Increasing amount of exposure increases the risk	Consistency
c. Results are replicated in studies in different settings using different methods	Biological gradient
d. Exposure always precedes outcome	Specificity
e. A cause leads to a single, not multiple effects	Biological plausibility

Section D: Case based questions
Instructions: This section carries 44 marks. This section to be answered in a separate booklet.

Case 1
After an end of year party at a healthcare facility, there was an outbreak of Typhoid among 200 healthcare workers who attended the function. As part of the investigations, there was a high index of suspicion that salad was the probable source of *Salmonella typhi*, the causative agent for the disease. In a case-control study that was done among the 200 health care workers, the distribution of those who ate food that included salad at the function is as shown in the table below.

Ate salad	Typhoid	No typhoid	Total
Yes	40	25	60
No	60	75	140
Total	100	100	200

a. Calculate the odds ratio of having been exposed. **[4 marks]**
b. Interpret your result in (a) above. **[3 marks]**

Case 2

Mrs Moyo had a Caesarean section. The procedure lasted 45 minutes. She was not given any surgical prophylaxis. She delivered a healthy baby. Mrs Moyo was discharged on day 3 with no signs of infection. She was given Amoxicillin and Metronidazole to take for the next seven days. Mrs Moyo came back on day 10 for routine post-delivery review. The clinician in attendance noted that Mrs Moyo's wound did not look good. There was mild swelling, heat and the wound was not healing well. From the wound, oozed some fluid and Mrs Moyo complained of moderate pain and discomfort at the wound site. Coagulase negative *Staphylococcus* was isolated from a pus swab taken from the wound to the laboratory.

1. Does Mrs Moyo have a surgical site infection? Give reasons for your answer. **[4 mark]**

2. Is it possible that the pus swab was contaminated? **[1 mark]**

3. List five (5) possible risk factors for surgical site infection related to this case. **[5 marks]**
4. As the IPC focal person for the healthcare facility, what action would you take regarding this case? **[5 marks]**

Case 3

Read the following Methicillin-resistant *Staphylococcus aureus* Fact Sheet, then answer the questions below.

Methicillin-resistant *Staphylococcus aureus* (MRSA) infection is caused by a type of staph bacteria called *Staphylococcus aureus* that has become resistant to many of the antibiotics used to treat ordinary staphylococcal infections.
Most MRSA infections occur in people who have been in hospitals or other health care settings, such as nursing homes and dialysis centres. When it occurs in these settings, it is known as health care-associated MRSA (HA-MRSA). HA-MRSA infections are usually associated with invasive procedures or devices, such as surgeries, intravenous tubing or artificial joints. HA-MRSA can be spread by health care workers touching people with unclean hands or people touching unclean surfaces.

1. Describe MRSA infection causation in terms of agent, host, and environment.

   a. Agent
   b. Host
   c. Environment **[3 marks]**

2. You decide to carry out a cross-sectional study to determine the point prevalence of HA-MRSA at your facility. Using HA-MRSA as an example, what is a cross-sectional study? **[3 marks]**

3. You are going to collect data from three wards at your healthcare facility. How will this study be done? **[2 marks]**

4. What immediate control measures would you institute? **[4 marks]**

5. Eighty (80) patients were surveyed on the day and 12 patients were found to have HA-MRSA. What is the point prevalence? **[3 marks]**

6. Suggest any three (3) risk factors you that you can also determine during the cross-sectional study? **[3 marks]**

7. At the end of your study, what four (4) interventions would you recommend as a long term measure? **[4 marks]**

END OF PAPER