MINISTRY OF HEALTH

SULTANATE OF OMAN

Guideline for Outbreaks Management in Health Care Facilities

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The Department of Infection Prevention and Control
Directorate-General for Disease Surveillance and Control

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Acronyms

CDIPC	Central Department of Infection Prevention and Control
DGDSC	Directorate-General for Diseases Surveillance and Control
GCC	Gulf Cooperative Council
HAI	Health care associated infection
HCW	Health care worker
ICT	Infection control team
IHR	International Health Regulations
ILI	Influenza like illness
IPC	Infection prevention and control
MDRO	Multidrug resistant organism
MoH	Ministry of Health
OCT	Outbreak control team
PPE	Protective personal equipment

1. Introduction

Effective management of outbreaks in health care facilities is challenging. The early recognition of an outbreak, rapid initiation of control measures and effective communication is critical for minimizing the outbreak's impact.

Outbreaks should be suspected when an increase in the incidence of a particular infection or colonization is over the expected rate or when specific pathogens or adverse events have been recognized. Outbreaks in health care facilities are often multifactorial but almost all due to lapses in infection prevention and control (IPC) practices, inappropriate cleaning of environmental surfaces, and improper disinfection/sterilization of medical devices. It can start from unrecognized colonization or infection of a patient, attendant to a patient, healthcare personnel or from visitors.

The analysis of patterns of disease occurrence leads to an understanding of their spread and control. Appropriate investigations are required to identify the sources of the outbreak and to justify control measures. This guideline will focus on management of infectious diseases outbreaks at the health care facility level.

2. Purpose

This document will serve to provide guidance for managing infectious diseases outbreaks in healthcare facilities, including identification, reporting, and procedure of investigation and control measures.

3. Definitions in the context of disease outbreak management

- **Case definition** – a standard set of criteria for deciding whether the individual should be classified as having a health condition of interest. It includes clinical criteria and, particularly in the setting of an outbreak investigation, restrictions by time, place and person.
- **Cluster** – an aggregation of cases in a given area over a particular period where the number of cases has increased more than expected.
- **Cohorting –** the grouping together of individuals in a specific area to limit the contact between infected cases and non-infected cases.

- **Epidemic curve** – a graph in which the cases of the diseases that occurred during the outbreak are plotted according to the time of onset of illness of each case.
- **Hypothesis** – the best guess on the likely reservoir, sources and mode of transmission of disease and infections.
- **Line list –** a table that contains key information about each case in an outbreak, with each row representing a case and each column representing a variable such as demographic, clinical and epidemiologic information (e.g., risk factors and exposures). It describes an outbreak in terms of person, place and time.
- **Outbreak** – (cluster, epidemic) is an increase in the incidence of a particular infection or colonization over the expected rate; usually two or more cases of the same infection, related in time and place with evidence of transmission or an epidemic-prone pathogen is detected or when an unusual microbe or an adverse event is recognized.
- **Endemic –** usual presence of a disease or condition in a specific population or geographical area.
- **Incubation period** – time interval between initial contact with an infectious agent and appearance of the first sign or symptom of disease.
- **Latent period** – the period between exposure and the onset of the period of communicability, which may be shorter or longer than incubation period.
- **Health care worker (HCW)** – any person, working in a healthcare entity who has the potential for exposure to patients, residents, or consumers of the healthcare entity and/or to infectious materials, including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or contaminated air.
- **Index case –** an individual whose infectious disease or genetically transmitted condition or mutation is the first identified in a population, region or family.
- **Confirmed case** – a person with a confirmed infection, usually has laboratory verification.
- **Probable case –** a person who is most likely infected, usually has clinical features without lab verification.
- **Suspected case –** a person who might be infected, usually has fewer typical clinical features than a probable case.

4. Outbreak detection

Sporadic cases of infection may only be recognized if a pathogenic microorganism is cultured in the microbiological laboratory. The infection control team (ICT) will enable early detection of a potential outbreak and routinely monitors all laboratory isolates. However, the monitoring of laboratory isolates can only relate to positive specimens sent to the laboratory and will not include pathogens not routinely sought, e.g., viral infections. Therefore, HCWs must be aware that two or more patients and /or HCWs with symptoms of a potential infectious condition will constitute an outbreak situation.

The number of current cases may be compared with the usual baseline incidence (from previous months or years). If local data are not available, compare to information from national surveillance systems or the literature. Outbreaks arising insidiously may reach considerable proportion before becoming apparent. Medical staff should report any suspicion of a potential outbreak to the ICT.

Outbreak management in healthcare facilities begins with the timely identification of an outbreak. Different sources could be utilized to identify an existence of an outbreak:

- notifications and routine surveillance;
- laboratory services notification;
- informal reports from hospital clinicians;
- the regional department of diseases surveillance and control;
- the Central Department of Infection Prevention and Control (CDIPC);
- the department of diseases surveillance within the Directorate-General for Diseases Surveillance and Control (DGDSC);
- open sources such as social media and rumors from communities.

5. The 12 steps of an outbreak investigation

Outbreak investigation is usually divided into several systematic steps. However, it is important to remember that outbreaks generally do not unfold in an orderly or linear manner. Therefore, the steps described in the following figure and discussion are not necessarily applicable in all settings and many steps may occur simultaneously or be repeated multiple times during the investigation.

Figure 1. Steps of outbreak investigation

5.1. Confirm the presence of an outbreak

To confirm a diagnosis, review surveillance reports, patient's charts and microbiology records as an initial step in the investigation. Check in records for patient details – when and where admitted, risk factors, if patient met with infected patient at same time, what symptoms patient developed, also check laboratory history to see if the patient was a known or newly diagnosed case. Then verify the diagnosis and describe the initial concern.

5.2. Take early infection control measures

When the outbreak is confirmed, the IPC team and nurse in charge must intervene immediately to ensure implementation of IPC practices required, for example:

- isolation: isolate the infected cases in an isolation room;
- cohorting: cohort patients in one room – if a single room is not available, cohort staff taking care of those cases during an outbreak and ensure there is dedicated toilet facility for the cohort not shared by other unaffected individuals;
- hand hygiene: monitor hand hygiene and monitor staff adherence;
- cleaning and disinfection: ensure environment, instruments and shared equipment are properly cleaned and disinfected.

> Note: early infection control measures should not be delayed awaiting the identification of the source or mode of transmission.

5.3. Alert key partners about investigation

Facility administration should be notified so that resources can be made available and so that risk management and public affairs staff can prepare to assist. Call for an urgent meeting of the infection control committee or outbreak team. These teams should include the following:

- infectious disease doctor/microbiologist;
- infection prevention and control team/representative;
- consultant/medical representative;
- ward/unit in-charge;
- general services manager;
- director of nursing or representative;
- medical director or representative;
- Director of Disease Surveillance and Control in the governorate and central department of infection prevention and control at the DGDSC to coordinate the process at governorate and national levels, especially preventing spread to other health care facilities;
- IPC from the Department of Disease Surveillance and Control at the Directorate General of Health Services and may also include representative from CDIPC; and
- other stakeholders to be invited dependent on outbreak circumstances.

The core function of an outbreak management team:

- investigation and control of the outbreak;
- reviewing all of the evidence including microbiology reports and epidemiological information collected to date and confirming that an outbreak is taking place;
- agreeing on a case definition;
- confirming the outbreak and notifying Department of Disease Surveillance and Control in governorate and CDIPC;
- co-coordinating arrangements for investigating the cause of the outbreak;
- completing regular risk assessments throughout the duration and for an agreed period following the outbreak;
- meeting regularly to review the progress of the outbreak and minutes of meeting should be kept and be shared if needed;
- declaring when the outbreak is over and informing stakeholders (including CDIPC).
- evaluating the outbreak and making recommendations for the prevention of future outbreaks;
- maintaining surveillance by writing regular interim report;
- releasing institutional notifications;
- Preparing a written report at the end of the outbreak.

5.4. Perform a literature review

The literature review will help to identify possible sources of infection from previous experience of the same incident. In addition, that might merit further investigation and might provide important insight into optimal investigative methodology. All this will help the team to focus their efforts on suspected sources and provide guidance on required investigation and control measures.

5.5. Establish a preliminary case definition

Establishment of case definition – a standard set of criteria for deciding whether a person should be classified as having the disease or condition under study – usually includes:

- clinical data about the disease (e.g. onset of signs and symptoms, frequency and duration of clinical features associated with the outbreak, treatment, devices);
- characteristics about affected people or population risk factors (e.g. age, race, sex);
- information about the location or place;
- a specification of time during which the outbreak occurred.

Investigators often classify cases as one of the following:

- **Confirmed:** usually has laboratory verification
- **Probable:** usually have clinical features without lab verification (+/- supporting lab tests)
- **Suspected:** usually have fewer of typical clinical features

Note: case definitions may need to be updated during an investigation (e.g., broad to specific case definition).

5.6. Develop a methodology for case finding

A variety of sources can be used to find additional cases that fits the case definition and may be related to the outbreak. Data collection should include the following type of information (personal identification, demographics, medical history, laboratory result, risk factors and reporter information). Data should be collected on one standard case report form.

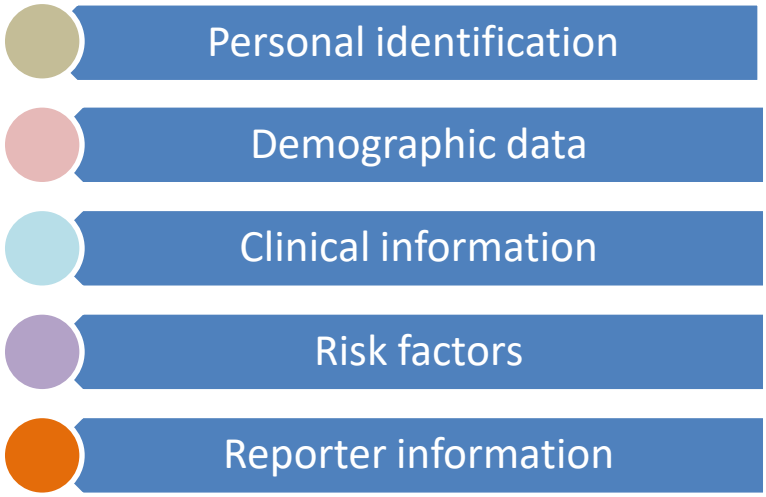

Figure 2. Elements of a good case report

5.7. Prepare an initial line list and epidemic curve

In general, information that can be helpful on a line list can include details about patient's signs or symptoms. The date from the line list can be used to generate an epidemic curve. The shape of the epidemic curve will provide information that can help to identify the mode of transmission and exposure in healthcare settings are often ongoing and organisms may be transmitted from patient to patient, in addition to coming from a common, contaminated source.

- **The line list**

  A line list is an important and effective tool in outbreak management. It is a means of collecting data related to individual cases and the outbreak as a whole. Line listing is a helpful tool to keep track of different categories of cases. It also allows information about person, time and place to be organized and reviewed quickly. It is essentially a database of rows and columns. Each row represents a case and each column represents descriptive factors or clinical details, for example:

  - name of patient or staff
  - demographic data
  - date of birth
  - date of onset
  - sign and symptoms,
  - sample collection date
  - result date
  - recovery dates, etc. (See Annex 4).

- **Epidemic curve**

  An epidemic or epi curve is essentially a graph in which the cases of a disease that occurred during an outbreak are plotted according to the time of onset of illness of the cases. An epidemic curve gives a graphical display of the numbers of incident cases in an outbreak, plotted over time.

  You can learn a lot about an outbreak from an epi curve, such as:

  - the outbreak's time trend, which is the distribution of cases over time;
  - general sense of the illness magnitude;
  - inferences about the outbreak's mode of spread; and
  - the most likely period of exposure.

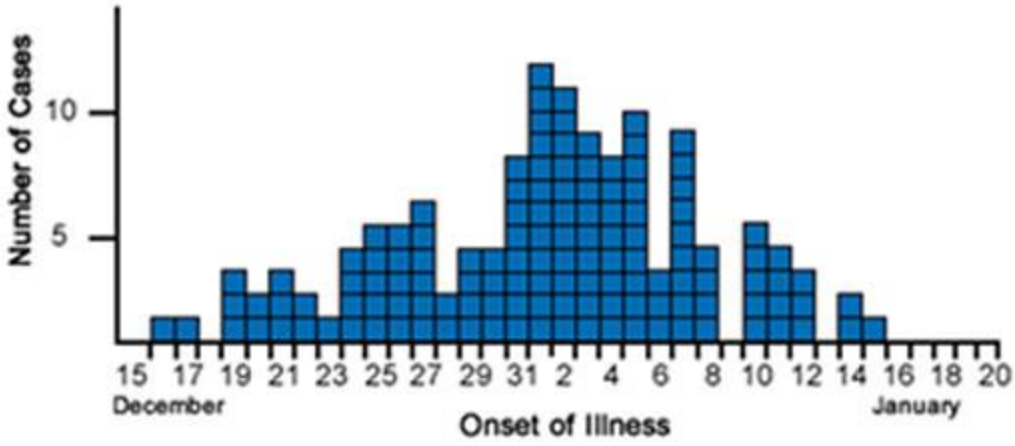

Figure 3. Example of an epi curve

The other way of presenting an epi curve when there is outbreak of multiple organisms in different units, as shown in Figure 4 below. This type of chart with different colors to represent each unit will help in tracing patient movement, where they got the infection and to what extent the outbreak has reached. Moreover, it will help in identifying the source of infection and type of organism in each unit. In this chart, you can also see the outcome of the cases.

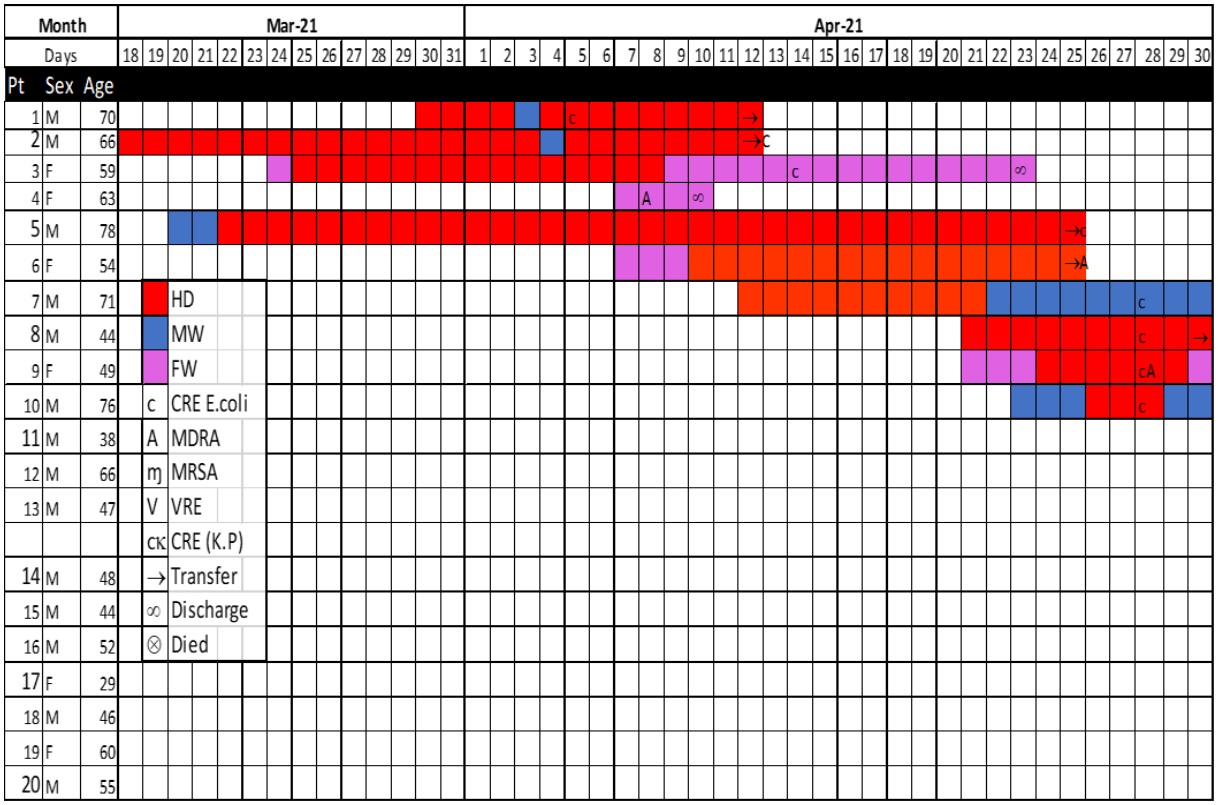

Figure 4. Epi curve showing outbreak of multiple organisms in different units

5.8. Form a tentative hypothesis

Although it is listed as the eighth step in outbreak investigation, often, outbreak investigators develop hypotheses at the time of receiving the initial report. The initial hypothesis may address the source of the organism, mode of transmission, risk factors and type of exposure that caused the disease. The investigator should be familiar with the different aspects of the disease as well as the agent itself. Since evaluating the hypothesis is the next step, the initial hypothesis should be testable.

5.9. Evaluate the hypothesis

Initial hypotheses are evaluated in one of two ways; comparing hypothesis to known facts or by utilizing analytic epidemiology. A combination of tools could be used to evaluate the initial hypotheses that may include environmental evidence, laboratory science and epidemiology.

Environmental studies often help explain why an outbreak occurred. The specific objectives of an environmental investigation are:

- to identify the source, mode and extent of the contamination; and
- to assess the likelihood that pathogens or toxins survived processes designed to remove them or reduce their concentration.

Environmental investigations will differ according to the nature and size of the outbreak. Because the amount of physical evidence will quickly diminish with time, environmental investigations should be carried out as soon as possible. The environmental investigation should start with focused problem oriented visual inspection looking for visible source and/or transmission vehicle.

Additional environmental studies can be done through conducting microbiological environmental sampling which is done by the following:

a) Sample collection and culturing according to the nature of the disease.

b) Analysis and interpretation of results, which may include:

- relatedness studies of isolated pathogen in patients or environment or instrument by
    - phenotypic methods e.g. antibiogram, serotyping, toxin detection;
    - pulse field gel electrophoresis;
    - other molecular typing studies (e.g., sequencing) – when available, these molecular typing methods are helpful to identify infection source, infer transmission dynamics and appropriately allocate prevention resources.

Antibiogram	Pulse field	Molecular studies
•The cumulative proportions of pathogenic organisms that are susceptible to particular antimicrobials. This provides a profile of the susceptibilities of specific pathogenic bacteria to antimicrobial agents as tested in routine clinical microbiology practice.	• Pulsed-fieldgel •Pulsed-field gel electrophoresis is a laboratory technique used to produce a DNA fingerprint for a bacterial isolate. This method investigates relatedness of bacteria isolated from sick people, contaminated food, environmental surfaces and instruments.	•Field of science concerned with studying the chemical structures and processes of biological phenomena that involve the basic units of life, molecules. The field of molecular biology is focused especially on nucleic acids (e.g., DNA and RNA) and proteins — macromolecules that are essential to life processes — and how these molecules interact and behave within cells.

c) Identifying the expected actions based on the results obtained.

Note: samples from staff are not routine and should be reserved to scenarios where the outbreak continues despite the control measures and no particular source has been found.

5.10. Initiate IPC measures according to the investigation and source possibility

The primary goal is control of the outbreak and prevent additional cases. In general, control measures are usually directed against one or more segments in the chain of transmission (agent, source, mode of transmission, portal of entry or host) that are susceptible to intervention. For some diseases, the most appropriate intervention may be directed at controlling or eliminating the agent at its source. **(See Figure 5).**

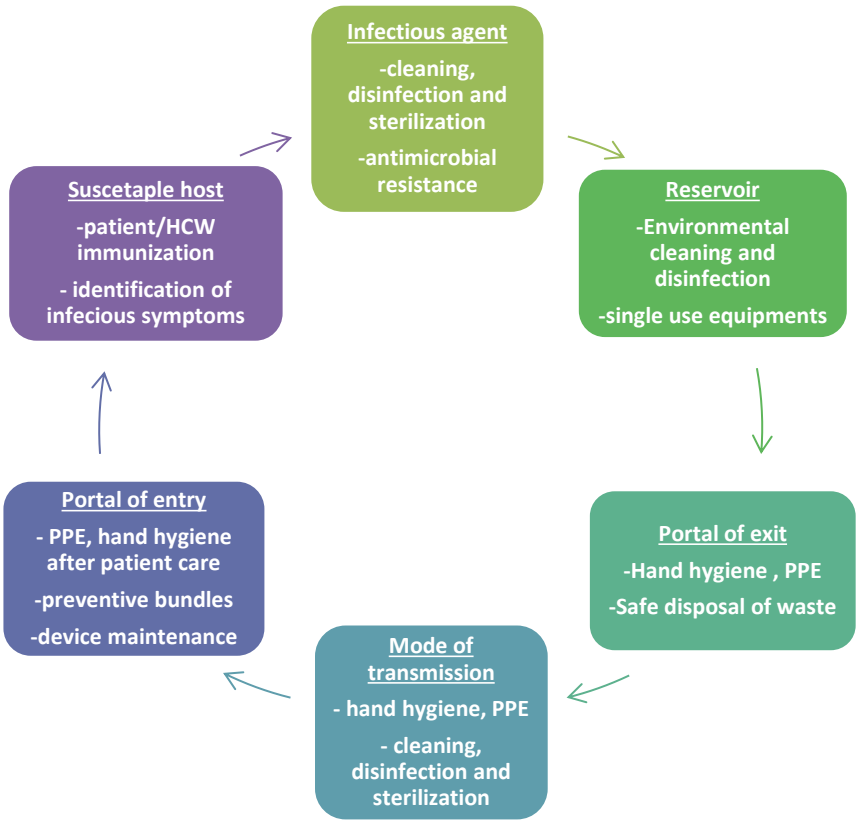

Figure 5. Breaking transmission cycle.

Control measures can be implemented to:

- **Control the source:**

- Address the source of the outbreak – the source of infection, mode of transmission and pathogenicity should be identified.
- Control the source of the pathogen by:
- Removing the source of contamination as a primary measure, e.g. discard contaminated food.
- Inactivating or neutralizing the pathogen, e.g., disinfect and filter contaminated water.

- **Control transmission and protect risk groups:**

- **<u>Diagnose, treat and facilitate investigations</u>**

- Investigate, diagnose and treat individual cases
- Work with the primary investigator to facilitate specimen collection

- **Implement transmission-based precautions**

- Transmission-based precautions must be implemented while diagnostic test results are pending based on the clinical presentation and likely pathogens.
- Restrict infectious cases to their rooms or isolate them with the appropriate transmission-based precautions until symptoms have completely resolved. For some pathogens, the periods of communicability may be even longer.

- **Cohorting patients**

- Cohort together infected individuals in order to decrease opportunities for transmission of infectious agents.
- If cases are confined to one unit, all patients from that unit should avoid contact with patients in the remainder of the facility.

- **Use protective personal equipment (PPE)**

- The use of PPE, such as masks, gowns, and gloves, is recommended for direct patient care of ill patients during an outbreak depending on the mode of transmission of causative organisms.
- Visitors should be discouraged or limited for one person (see below).
- Eye protection/safety glasses, goggles and face shields should be worn when there is a potential for splattering or spraying of blood, body fluids, secretions/excretions, including cough producing aerosol generating procedures while providing direct patient care.

- **Hand hygiene**

- To facilitate HCWs, patients and visitor, hand hygiene facilities should be set up at designated areas in the facility.[1]

- **Enhanced environmental cleaning/sanitizing**

- Ensure cleaning and disinfection of environmental surfaces frequently contaminated by patients/HCWs (i.e., handrails, doorknobs, bathroom units, furniture).
- Ensure a process for proper disposal of contaminated materials.
- Disinfection methods should be reviewed regularly.[2]

[1] For more information please refer to Ministry of Health (MoH) Oman's 2019 document, Policy and procedure for hand hygiene (https://www.moh.gov.om/documents/236878/4737288/Hand+hygiene+policy+MOH+2019.pdf/8329a2c3-07be-c52a-b730-1ddf8c4dc8c0, accessed 13 September 2022).
[2] For more information please refer to MoH Oman's 2021 document, Guidelines for environmental cleaning program in healthcare facilities (https://www.moh.gov.om/documents/236878/4743006/Guidelines+for+Environmental+Cleaning+program+In+Healthcare+-+1.pdf, accessed 13 September 2022).

- **Cohorting HCWs**

- If possible, exposed HCWs should remain caring for symptomatic cases daily and avoid transferring to another unit/floor during the outbreak.
- Exclusion of symptomatic HCWs from work/facility.
- HCWs who meet case definition are excluded from the facility until asymptomatic; if the causative agent is known, other measures may apply.

- **Discourage/limit visiting**

- Any symptomatic (potentially infectious) visitors should be excluded at any time.
- During an outbreak, visitors should be discouraging from attending outbreak cohort especially when cause and mode of transmission is unknown. If no other mode of communication with affected patients is available restrict visitors to one per patient during the day and instruct them to:
  - clean their hands before entering;
  - wear provided PPE;
  - visit only their own friend/relative, in their own room or patient space, and not to mix with other patients, visitors or attendants;
  - not use toilet facility dedicated for patients;
  - clean their hands after exiting isolation area;
  - clean their hands after exiting from the facility.
- The recommendation for closing the facility to visitors/volunteers is rarely needed in cases of uncontrolled outbreak with concern about extension to community and/or if its due to virulent disease and this should be discussed with director of DGDSC as part of incidence command chain for public health events (Annex 1).

- **Restrict new admissions, re-admissions and transfers**

- Restricting admissions unnecessarily will create a backlog in acute care or other health care facilities; on the other hand, admitting persons who are susceptible into an outbreak situation poses a risk to their health. In general, admission of new patients to an outbreak affected unit/area/s is not permitted.
- Patients can be transferred from the outbreak health care facility to another facility if necessary, for patient care and in discussion with ICT ensuring that:
  - appropriate control measures are implanted during transfer and in the new admission location;

- prior notification to hospital infection control office is made. In addition, designated HCWs at the outbreak facility should contact the new transferred location directly by phone to inform that the patient is coming from an outbreak situation.

- **Ward closure**

  The decision to close a ward will be taken by the hospital director according to the recommendations of the outbreak control team (OCT). OCT should ensure that the following are informed of any decisions taken:

  - Regional director
  - Director of Infection Control.

- **Modify host response to exposure**

  Immunize susceptible host, or use prophylactic chemotherapy.

- **Education**

  Provide patient education to all cases and contacts. Provide education of HCWs, visitors, volunteers, and patients' families about infection and outbreak prevention and related policies. Topics to be included in education programs for all HCWs and patients are:

- Importance of hand hygiene;
- Appropriate disinfection of equipment (any equipment that is shared between patients must be disinfected after each use);
- Barrier precautions, e.g., appropriate use of gloves and gowns, eye protection, and masks (respirators/surgical) according to the type of isolation;
- Standard environmental cleaning;
- Information about disease morbidity, mortality, transmission, as well as prevention;
- Advising HCWs, visitors and volunteers that persons experiencing symptoms of infection should not be working/visiting the facility.

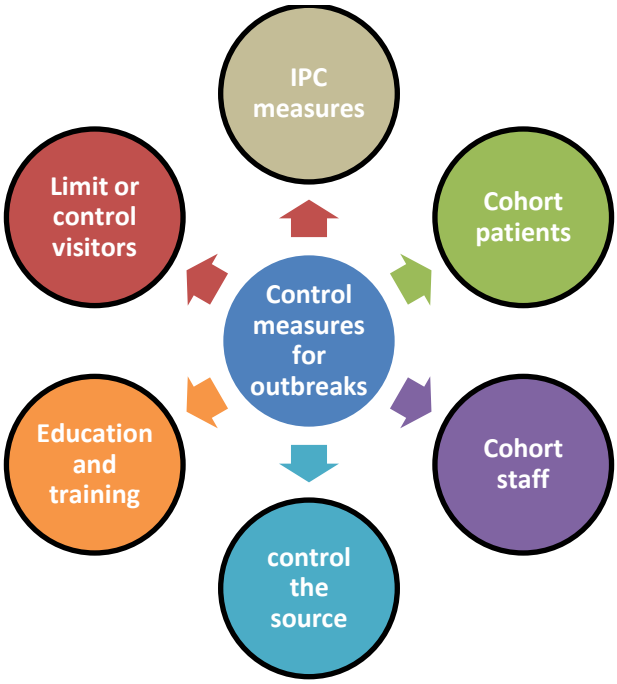

Figure 6. Control measures for outbreaks

5.11. Monitor, evaluate and refine the control measures

Once control and prevention measures have been implemented, they must continue to be monitored and reviewed regularly to ensure that recommended control measures are being carried out. During this stage, daily visits by the outbreak team/infection control nurses to the affected area must be done to:

- Advise on measures of outbreak control;
- Ensure the appropriate precautions are taken;
- Monitor the flow of patients in and out of their rooms;
- Confirm availability of enough supply;
- Monitor the cleaning and disinfecting process.

In case of suboptimal compliance with recommended measures, consider how to best heighten the compliance through awareness, training and accountability.

5.12. Prepare and disseminate a final report

At the conclusion of the outbreak. The outbreak team declare an incident/outbreak of infection over when it is considered safe and appropriate. For a particular infectious syndrome, the waiting time should be 2 incubation periods without new cases or if not applicable at least 4 weeks with no new case linked to the previous outbreak location or affected individuals.

A final report should be prepared and disseminated to MoH-CDIPC, regional directorate of communicable disease, all OCT members and the hospital director. The final report should be detailed and highlight the following:

- Implemented preventive and control measures;
- Description of effectiveness of control measures;
- Other impacts relevant to prevention and control;
- Recommendations regarding future surveillance and control;
- Experience of all participants in the management of the outbreak;
- How the plan was revised in accordance with the results;
- Identification of shortfalls and particular difficulties encountered;
- Recommendations of any structure or procedure improvement which decreased the recurrence of the outbreak; and
- Debrief.

See Annex 5: Template of outbreak report

6. Document history and version control

Document history and version control			
Version	**Description of amendment**	**Author**	**Review date**
01	Initial release		
02			
Written by	**Reviewed by**	**Approved by**	

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8. Annex

Table A.1. Examples of microorganisms and on how to consider an outbreak

Types of organisms	Outbreak definition
Multidrug resistant organisms (MDRO)	An increase of hospital acquired MDRO cases above the endemic (baseline) level in the healthcare facility during a specific time period, and may include an increase of cases e.g., Methicillin-resistant *Staphylococcus aureus*, *Acinetobacter* and *Pseudomonas*, etc. *2 cases are considered outbreak
Clostridium Difficile	1 case is considered an alert 2 cases are considered an outbreak
Legionella	If the patient has been admitted for 10 days
Foodborne disease outbreak	2 or more people who shows similar illness upon consumption of common food 1 case of botulism and chemical poisoning is considered outbreak
Waterborne disease	2 or more person who shows similar illness upon consumption of common water resource
Influenza like illness (ILI)	3 or more cases of ILI in a defined setting with in a 3-day period 1 or more laboratory confirmed cases of influenza within a 3-day period An increase of absenteeism in association with ILI and or laboratory confirmed
Chicken pox and measles	1 case is alert 2 cases are considered an outbreak
Acute hepatitis B or C	1 case of a patient who have an invasive procedure during the incubation period and no other risk factors for hepatitis is an alert 2 cases are an outbreak
Acute hepatitis A	2 cases are an outbreak
Candida* spp. & *Burkholderia cepacia	2 cases are an outbreak
Aspergillus* spp. & *Candida auris	1 is an outbreak

A.	
STEPS	ACTIVITY
Recognizing a potential outbreak	Review surveillance reports, patients' chart and microbiology records **A.** Verify the diagnosis *Describe the initial concern **Promptly identify the source, way of transmission, causative organisms **B.** Confirm that an outbreak exists; *Use the case definition to find other cases **Based on the report gathered if needed it represents & increase in the baseline, proceed with the next step.
Alerting key partners about the investigation	Notify the following: Director of IPC Facility Administration Micro lab Other stakeholder as appropriate Regional IPC
Performing literature review	Literature review will help identify possible sources that might merit further investigation
Establishing an initial case	Develop specific criteria for case definition. It should be narrow to focus investigation efforts and should be broad enough to capture the majority cases.
Developing a methodology for case finding	Use variety of sources to find additional cases: *if case definition includes a laboratory results, the records can be used to facilitate the identification of possible cases. ** if the outbreak involves a health care associated infection or adverse event or MDRO for facility is performing surveillance, infection control or surveillance records can be useful.
Preparing an initial line list	Developed a line list reviewing the various sources of information i.e., medical records, patient location information (admission, discharge, and transfer data) and staff interview. Create an epidemic curve. In some instances, the shape of epidemic curve will help identify the mode of transmission.
Observing & reviewing potentially implicated patient care activities	The observations of practices can ultimately identify the cause. The pathogen and infection can also be important factor. **Example if the outbreak involves Aspergillus, careful observation of construction activities near patient care is needed. Focus on practice patterns and workflow that deviates from good infection prevention practices, facility or unit policies.
Consider whether environmental sampling should be performed	Recommendations *Perform these cultures after making the line list and doing observations so that they can focus on items that seem the most likely implicated.
Implementing the initial control measure	*Implement a variety of IC measure including transmission based precautions as needed throughout the course of the investigation. *Reinforce education on compliance with general IP & C recommendations. *Develop plan of actions to ensure compliance.
Steps to follow up investigation	*Refine the case definition *Continue case finding and surveillance *Regularly review control measures *Consider whether an analytical study should be performed
Communication during and after the outbreak	Prepare and disseminate a final report *Include all the findings and recommendations **Share with persons participating in the investigation and others as needed

Fig. A.1 Incident report command chain at governorate level

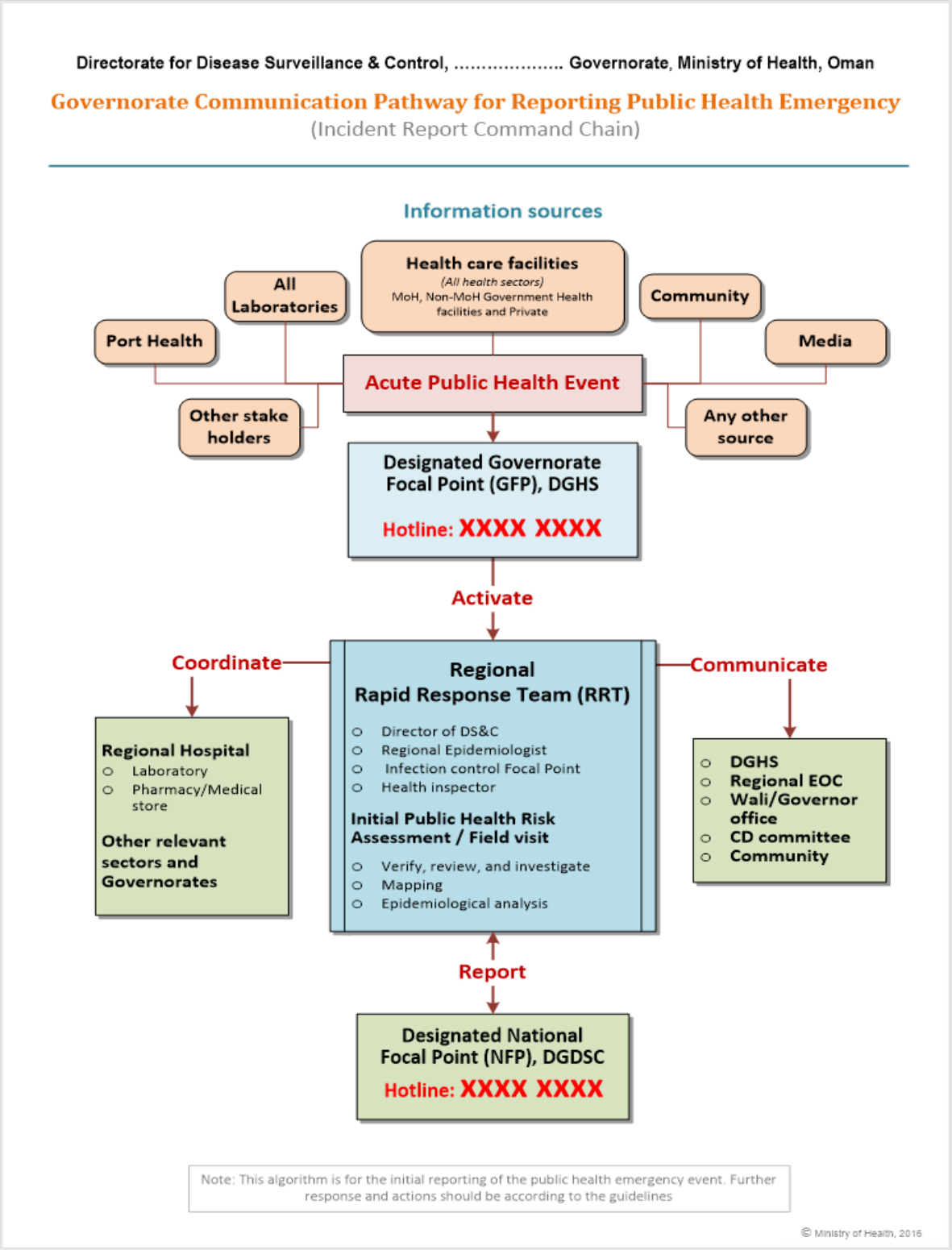

Fig. A.2 Incident report command chain at national level

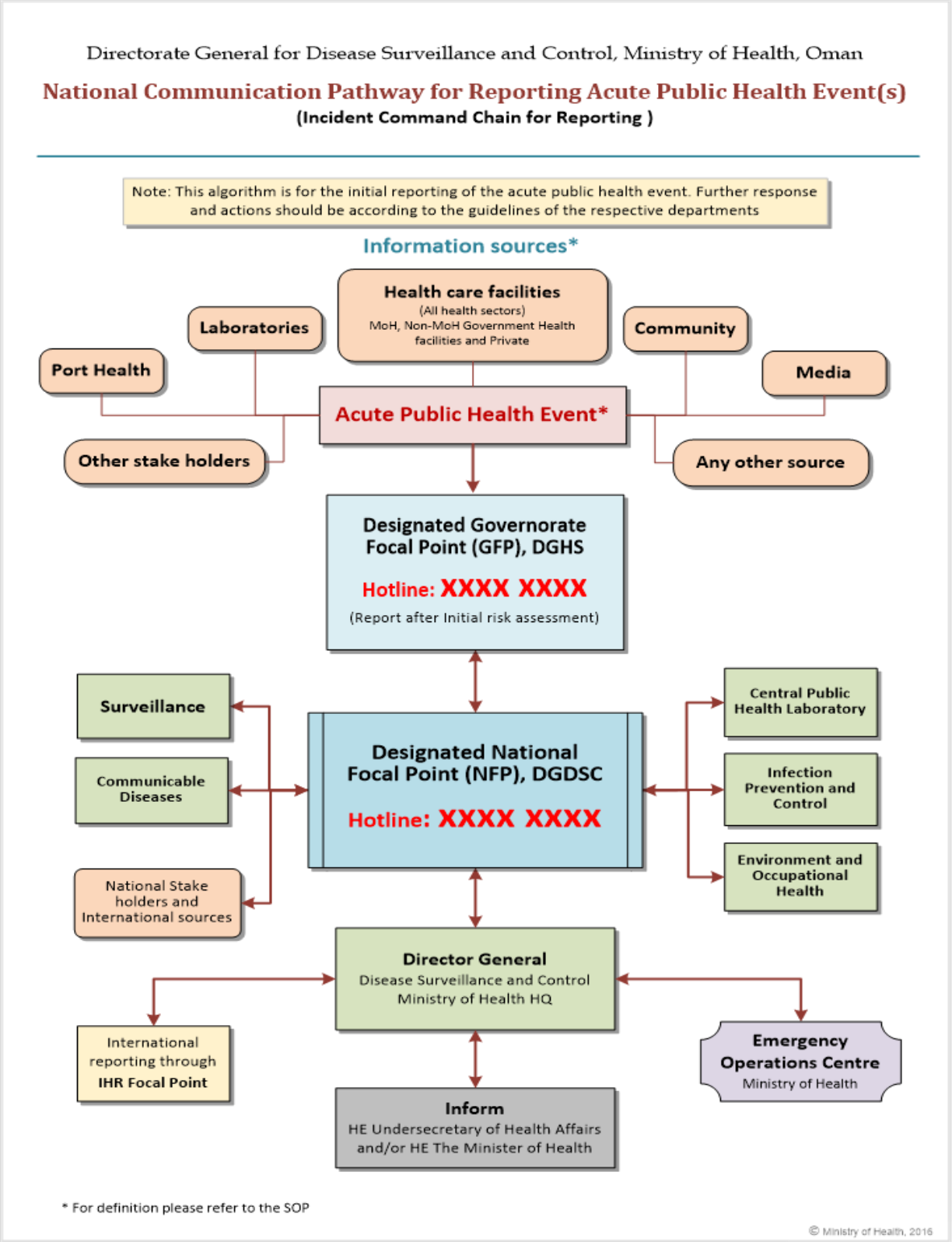

Fig. A.3. From Annex 2 of the International Health Regulations (IHR) (2005)

8.2. Annex 2 of the IHR (2005)

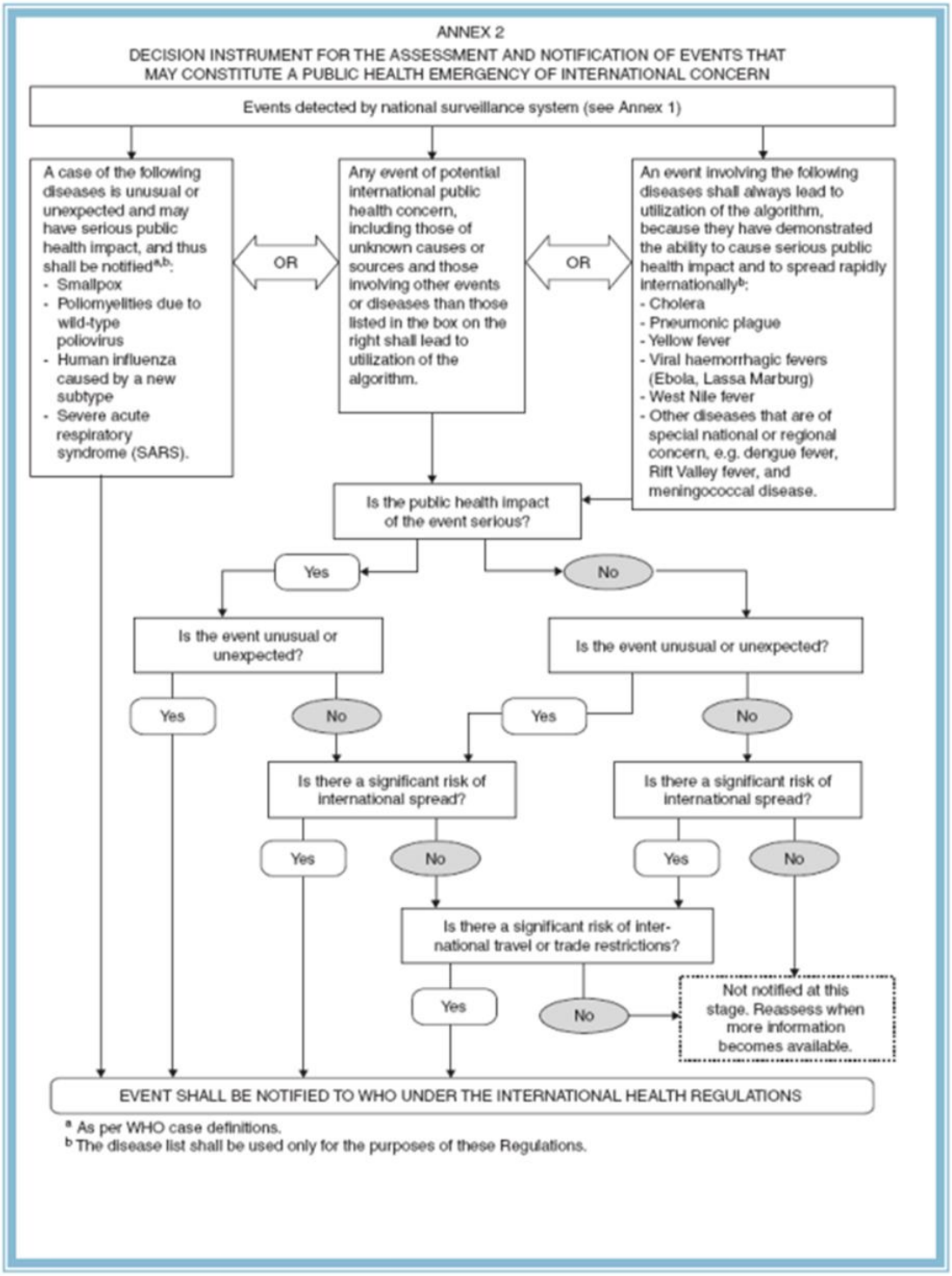

Table A.3. Template of outbreak investigation report

1. Outbreak investigation
Outbreak start and end (dd/mmm/yy): Start: / / End: / /
Outbreak location of (Name of facility/address):
Type of outbreak:
Date of 'Final report submission':
2. Executive summary
Include the key features of the outbreak investigation, addressing the "who, what, where, and when" of the outbreak. A scientific description of the outbreak or the causal hypothesis based on the evidence. Identify lessons learned, recommendations, interventions (could be ongoing), or areas that need further attention. Include important points in the report.
3. Introduction and background
Describe the specific events that led to the investigation, including how the outbreak or case was first reported. For outbreak – steps taken to confirm the outbreak (including surveillance trends), and who assisted in the investigation. Background information identifies the population demographics, previous, similar outbreaks, describing the area, site or facility involved.
4. Methods
Outline the steps taken to investigate the outbreak or case investigation 1. Epidemiological methods: Explain how cases are defined and ascertained. Outline the analytical study. methodology and include interview tools and techniques used for investigation 2.Microbiological/toxicological investigation 3. Environmental Investigation **IPC measures**: Outline number and types of IPC measures that were implemented including case management (inspection report, initial precaution, etc.), contact tracing, environmental measures (immunization, facility closure and/or sanitizing), etc. **Laboratory analysis**: Describe the number and types of specimens submitted for analysis.
5. Results
Scientific description of what was discovered **Epidemiological results**: Highlight the number of cases, personal details, and clinical features, including geographical distribution, epidemic curve, risk factor analysis, and attack rates environmental culture results: Describe the results of inspections, risk assessments, and trace back.

Laboratory results: Summarize the results of patients and environment or source testing.
6. Discussion
This section brings together all aspects of the outbreak and case investigation. Discussion will include the main hypotheses and justification of conclusions and actions being based on evidence or balance of probabilities. Actions taken to protect patient and staff health are described. As well as, highlight the problems encountered during the investigation including the lessons learned during the investigation.
7. Conclusions
Highlight briefly the outcome of the investigation.
8. Evaluation and recommendations
Describe what should have been done to control the outbreak or the illness in the case, prevent future occurrences, and improve management in the future. The purpose of this section is to educate, so specificity is important. Recommendations for any changes to the "Outbreak response plan" should be included.
9. Acknowledgements
This is an opportunity to thank those who assisted with the outbreak/case investigation.
10. Appendices (optional)
These may include a chronology of events, OCT members, terms-of-reference for the team, maps and references, questionnaires, letters to health-care professionals, media releases, and fact sheets etc.
Signature: This report requires sign-off by the Outbreak Management Designate.

Fig. A.4. Line list of cases

Case No.	Patient name	IP.No	Age	Sex	DOA	Wilayat	Diagnosis	Risk factor	Transferred institution	Ward admitted	Room & bed no	Bed movement with date	Site of specimen	Specimen date	Type of sample	Specimen result	Date of onset	Was it HAI *?	Outcome of patient	Remark
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				

* HAI=health care associated infection

Fig. A.5. Infection prevention outbreak management algorithm