Public Health England

Protecting and improving the nation's health

COVID-19 Hospital Outbreak Pack

Documents to support hospitals to undertake epidemiological investigation of an outbreak of COVID-19 in a hospital setting

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Introduction

This toolkit provides resources designed to help undertake epidemiological analysis of outbreaks of COVID-19 that have occurred in hospital settings.

The toolkit includes

1. Case definitions that may be used for suspected and confirmed cases of COVID-19
2. A template agenda for an outbreak meeting
3. Instructions for how to create a line list, timeline, case maps and epidemiological curves using either Excel or ‘RStudio’

1. Case definitions for investigation of hospital cluster of COVID-19 cases

In responding to a disease cluster or outbreak it is important to agree a case definition including a description of time, place, person and clinical features early on in the investigation and reviewed throughout. This enables the incident or outbreak control committee members to gather, analyse and present relevant information to inform decisions on effective outbreak control measures.

It is often helpful to devise a hierarchical set of case definitions depending upon certainty of diagnosis in the individual, moving from a highly specific case-definition (high certainty that the patient has the disease, but with recognition that not all cases will meet this definition) to a high sensitivity definition (high certainty that all cases have been detected, but with the recognition that some identified cases may have a different cause of illness). This hierarchy will usually have 2-3 levels.

Case-definitions are usually based on clinical and/or laboratory criteria, but may also have an epidemiological (e.g. contact with a confirmed case), geographical or setting component (e.g. a specific hospital site, block or ward), and/or may also have a time component (e.g. from a specific date).

For a potential Covid-19 cluster/outbreak in a healthcare facility, an example of a set of case definitions might be:

Category	**Criteria**
Confirmed	Laboratory confirmed diagnosis of Covid-19 in a patient who is or has been in hospital X. (*You might also want to include any affected members of staff).*
Probable	A hospital inpatient (*or staff member*) who has one of the following without an alternative diagnosis*: • clinical or radiological evidence of pneumonia; ***or*** • acute respiratory distress syndrome; ***or*** • Fever (≥37.8°C) ***and*** at least one of the following respiratory symptoms, which must be of acute onset: persistent cough (with or without sputum), hoarseness, nasal discharge or congestion, shortness of breath, sore throat, wheezing, sneezing;

	or • a loss of, or change in, normal sense of taste or smell (anosmia) in isolation or in combination with any other symptoms
Possible	Any acute respiratory symptoms or fever, without other identified cause*, or worsening of a pre-existing respiratory condition

** It will be helpful to take samples to exclude other respiratory pathogens, particularly those for which antibiotic/antiviral treatments are available and/or for which a vaccine could be used to protect contacts (e.g. influenza, pneumococcus). The likelihood of some of these will vary by season.*

Please note that a negative Covid-19 PCR result in a person who has had a clinically compatible illness is not conclusive proof that they did not have the infection (e.g. timing of test, adequacy of sample and inherent false-negative rate of test).

You should set appropriate case-definitions for your particular situation and you may wish to take account of the surveillance case-definitions in the regularly updated PHE guidance '*COVID-19: investigation and initial clinical management of possible cases*' – current version at: https://www.gov.uk/government/publications/wuhan-novel-coronavirus-initial-investigation-of-possible-cases

You should then try to classify Confirmed, Probable and Possible cases by how likely each case is to be a nosocomial (hospital acquired) case, based on the duration of time between admission and symptom onset:

- 0-2 days: Unlikely
- 3-7 days: Indeterminate
- 8-14 days: Probable
- >14 days: Definite

You may also wish to set 2 exposure levels of staff contact with a case, depending upon whether (e.g.) the staff member wore appropriate personal protective equipment (PPE) and/or whether the staff member was exposed to an aerosol-generating procedure.

2. Template Agenda for COVID-19 incident/outbreak meeting

<Date, time and venue>

1. Introductions & apologies
2. Minutes – review of actions from previous meeting(s)
3. Purpose of the meeting
    a. At first meeting agree Chair and Terms of Reference
4. Summary of situation- situation updates (for subsequent meetings)
    a. Epidemiological
        a. Number of cases according to case-definitions and description by person, place and time
        b. Clinical management & outcome
    b. Patient movements on admission
    c. Suspected cases- patients and linked staff
    d. Patient pathway- from admission to discharge
5. Microbiology
6. Infection Prevention and Control
    a. Case isolation/cohorting facilities
    b. Environmental cleaning
7. Current Risk assessment -any evidence of hospital transmission
    a. Implication for finding further case(s) as per case definition
    b. Implications for current control measures
    c. Potential for review of control measures
8. Contacts identification/management
    a. Staff
    b. Patients
9. Discharge Plans for cases- returning to own or residential facilities and ability to self-isolate safely.
10. Communications
    a. Internal – staff, inpatients, students, volunteers, visitors
    b. Discharged patients – contacts of confirmed case
    c. External: NHSE, PHE, Media statement
11. Agreed actions
12. Any other business & date of the next meeting

3. Creating a line list, epidemiological curve, timeline and maps

Line list, and instructions for how to create epidemiological curve and age/sex pyramid **using Excel**

Line list Epi curve
Age sex pyramid TEM

This tool will help you to:

- Create a list of cases and their details (called a line list) relating to a cluster or outbreak of infectious disease.
- Prepare data to make graphs.
- Create an epi curve (a bar chart) to show if/how the situation is developing over time. These can be produced by date of symptom onset or date of diagnosis, depending on what information you have and what you want to show.
- Create an age-sex pyramid to show the number of cases in the situation by age and sex.

Some of the columns of the spreadsheet are coloured in **grey**: these are for data that are required if using the 'R' script (below).

Epidemiological curve, maps and age/sex pyramid **using 'RStudio'**

This tool will help you to use the Excel line list above to undertake additional analyses, specifically to:

- Create epi curves (a bar chart) by date of symptom onset, date of testing and date of diagnosis
- Create epi curves with cases colour-coded by route of admission or by type of transmission
- Create an age sex pyramid to show the number of cases by age and sex.
- Create a point map showing the postcode of residence of cases, or a choropleth ("by region") map reflecting the number of cases in each local authority ward
- Create ouput descriptive summaries, incuding:
    - Age, sex and ethnicity distribution
    - Prevalence of comorbidities
    - Prevalence of hospital-acquired infection
    - Prevalence of ITU admission and death

To use the R script save the R script and map file below to a single folder. A postcode lookup file named “postcodes.csv” is also required within the same folder as the R script and map files*. Please contact Field Services (West Midlands) at FES.WestMidlands@phe.gov.uk to request a custom-prepared postcode lookup table or for instructions on how to prepare this from ONS files. In the R script section "DEFINE PATHS" name "filename" with the name of the completed Line list file from the hospital pack Excel file (including .xlsx). Run or source the full script. Results will be saved to a subfolder named "YYYY-MM-DD analysis output".


HospitalPack analysis v0.6.R


map_local.rdata

Case timeline **using Excel**


Time line Template.xlsx

This tool will help you:

- Create a time line of cases.
- Using the timeline, you can use the date of onset of symptoms to assess when infectiousness may have started (when the case could have infected others) AND to assess when exposure period of the case was (to review movements in the 14 days before onset to look for potential source).

Please note all these analytical tools are a guide only. Data quality and the analysis remain the responsibility of the organisation undertaking the analysis.