1.1 Abbreviations

ACORN	A Clinically Oriented Antimicrobial Resistance Network
AMR	Antimicrobial Resistance
BSI	Bloodstream Infection
CAI	Community-Acquired Infection
CRF	Case Record Form
EQA	External Quality Assurance
GCP	Good Clinical Practice
GLASS	Global Antimicrobial Surveillance System
HAI	Hospital-Acquired Infection
KAP	Knowledge, Attitudes, and Practices
LIMS	Laboratory Information Management System
MORU	Mahidol-Oxford Tropical Medicine Research Unit
ODK	Open Data Kit
PPS	Point Prevalence Survey
QM	Quality Management
REDCap	Research Electronic Data Capture
SOP	Standard Operating Procedure
WHO	World Health Organization

1.2 Purpose

This document provides a summary of procedures for ACORN surveillance, from site set up to collection of clinical data. The ACORN diagnostic stewardship manual and IT manual provide additional information.

1.3 Background

ACORN is a human antimicrobial resistance (AMR) surveillance project intended for use in low- and middle-income (LMIC) country hospital settings. The surveillance will add value to pathogen-focussed AMR surveillance, such as the World Health Organization (WHO) Global AMR Surveillance System (GLASS), by capturing essential data on patient clinical features, management, and outcomes. The aim of ACORN is to provide more actionable data to local institutions and national surveillance systems and policy makers via an interactive data visualisation and reporting dashboard tool, while being fully compatible with GLASS.

Surveillance participants are hospitalised patients in whom a parenteral antibiotic has been commenced for treatment because of clinician suspected acute infection. Diagnostic stewardship activities will be implemented to optimise blood culture, and syndrome specific additional culture, specimen collection in potential surveillance participants. Surveillance target pathogens are the BSI-associated organisms included in WHO GLASS: *Streptococcus pneumoniae, Staphylococcus aureus, Salmonella* spp*., Pseudomonas aeruginosa, Neisseria meningitidis, Klebsiella pneumoniae, Haemophilus influenzae, Escherichia coli,* and *Acinetobacter* spp.

Community-acquired infections are identified by daily review of new admissions to designated surveillance wards. Hospital-acquired infections (HAI) are identified during weekly point prevalence surveys (PPS) on these wards. Basic demographic characteristics, comorbidities, clinician diagnosis, empiric treatment, and markers of clinical severity are recorded on enrolment. Final clinician diagnosis, hospital discharge and day 28 outcome data are collected subsequently. To contribute to the WHO GLASS attributable mortality study, additional clinical and treatment data are collected on patients with confirmed *E. coli* or *S. aureus* bloodstream infection (BSI).

Clinical data entry can be done either directly using the Open Data Kit (ODK) Collect app on an Android tablet or via paper CRFs with subsequent entry into the surveillance REDCap database using a laptop and web browser.

Laboratory data, either extracted from an existing laboratory information management system (LIMS) / WHONET file or entered into WHONET software specifically for surveillance, is linked to clinical data using an offline data management app. This app, and an identical online version, can be used for data visualisation and reporting. The app is designed for real-time monitoring of surveillance and frequent use is encouraged. The ACORN surveillance workflow is summarised in Figure 1.

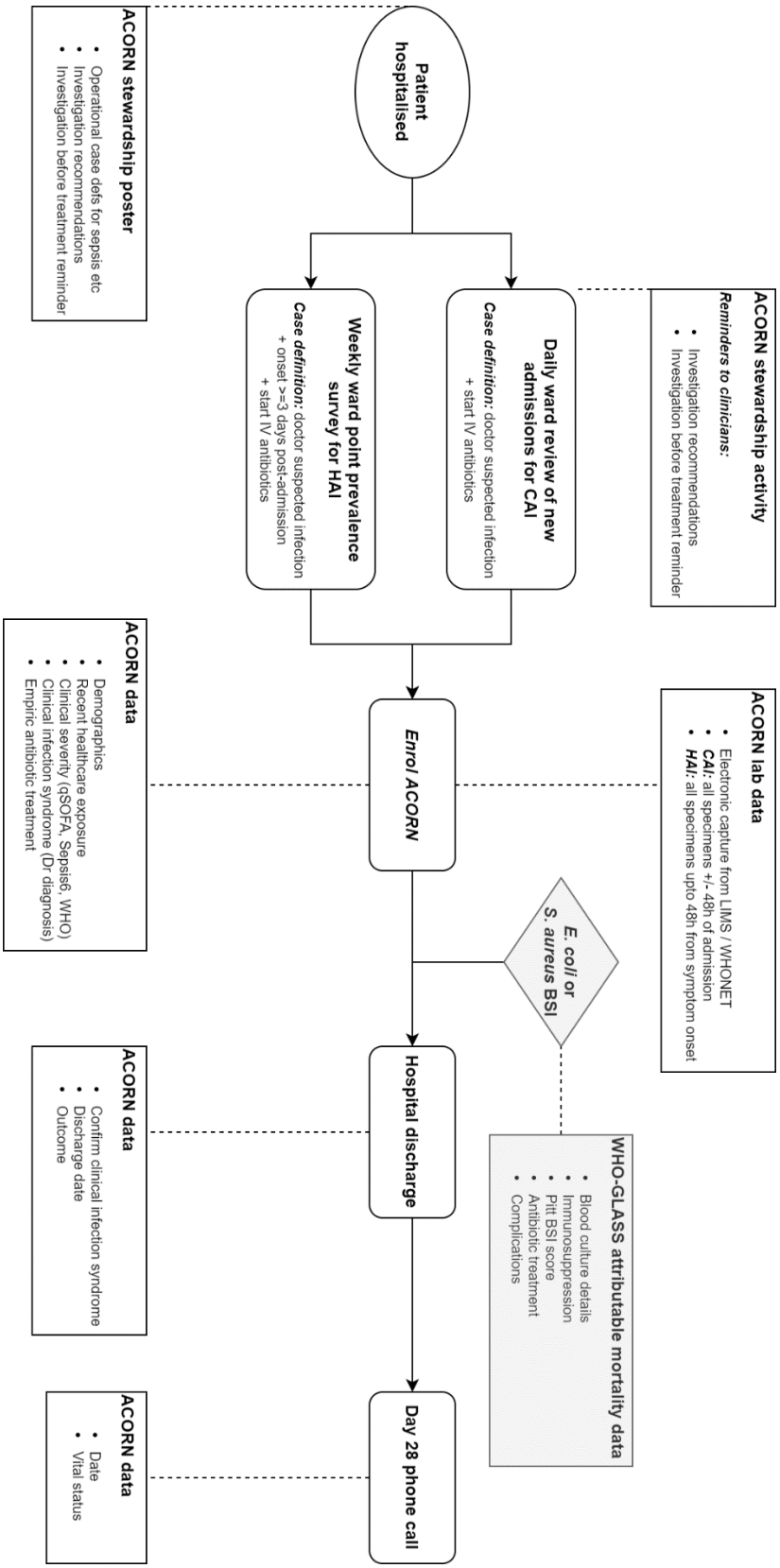

Figure 1. ACORN surveillance workflow

2 Site preparation

2.1 Purpose and Scope

To describe the activities required to prepare sites and wards for ACORN surveillance.

2.2 Requirements

- ACORN site preparation checklist.
- REDCap and ACORN app / dashboard user login details (provided by the ACORN IT team).
- A computer, smartphone, or tablet with internet access to complete the online site summary form.
- Weblink to online site survey form: https://tinyurl.com/ACORNREDCap
    - If the TinyURL weblink above does not work, use the full weblink:
    - https://redcap.tropmedres.ac/REDCap_Prod01/
- Training materials.
- Specimen collection posters.
- Patient information poster(s).
- Participant information sheets.
- Participant consent forms (if required by local ethics committee).
- Surveillance logbook (and refusal logbook).
- Paper data collection forms (CRFs) if required.
- Translations of any / all above into local language if required.

2.3 Procedure

Successful participation in ACORN requires engagement with and buy in from hospital management, clinical, and laboratory staff. Early engagement with these groups is critical. The ACORN site timeline / activity summary is outlined in Figure 2.

Figure 2. ACORN surveillance site timeline and activity summary

2.3.1 Determine the key personnel for the ACORN site team

Given the variation in staffing, there is no mandated team structure. A suggestion would be to include at least one clinician (preferably an infectious disease doctor or clinical microbiologist), two surveillance nurse / research assistants, and one microbiology laboratory technician. Within this team, a site lead should be identified: this need not be the most senior member of the team. This person will be the point person for contact with the central ACORN project team.

2.3.2 Consider International Conference on Harmonisation Good Clinical Practice (GCP) training for all members of the ACORN team

Whilst this would not be considered mandatory for surveillance, it provides training on key aspects of research methodology and data collection. There are free online courses available, e.g. via The Global Health Training Centre (https://globalhealthtrainingcentre.tghn.org/ich-good-clinical-practice/).

2.3.3 Identify appropriate wards for ACORN surveillance

Three or more acute admission wards should be selected for surveillance: the selection should ideally include a general adult medical ward, a general paediatric ward, and an intensive care unit. It may be desirable to start with three wards and to include additional wards only if patient numbers and human resources permit. Consideration should be given to harmonisation with other surveillance activities, where possible. Once surveillance staff and wards have been identified, complete the:

- Online site summary form (this can be completed using the paper version first, ACORN Form 1).
- Laboratory assessment (see section 5).
- Diagnostic stewardship checklist (see section 3).

Prior to commencement of surveillance the ACORN site team should approach the senior clinician(s) and nurse(s) on each target ward, along with senior microbiology laboratory staff, to explain the purpose and scope of ACORN. Describe the CAI, HAI PPS, and diagnostic stewardship components.

- Devise and implement a plan to meet ACORN diagnostic stewardship requirements (see section 3).
- Organise and deliver ACORN orientation presentations to clinical staff working on surveillance wards.
- Perform the clinician KAP survey (see section 4).

On each surveillance ward, determine how surveillance participants will be identified and followed up:

- Participant details will be recorded in a surveillance logbook: depending on the size of the hospital / ACORN surveillance team it may be necessary to have individual logbooks in each surveillance ward.
    - Logbooks will contain patient identifying information so should be kept securely at all times.
    - ACORN ID (a unique patient identifier, assigned at first enrolment) will include a ward identifier, which will help if multiple logbooks are to be used (i.e. one per surveillance ward):
        - *A[For ACORN]N[WARD ID]NNNN[4 digit patient ID]*
            - e.g. A10001 (ward 1, patient 1), A20305 (ward 2, patient 305)
        - Ward identifiers will be confirmed prior to commencement of surveillance
        - These ACORN IDs will be rendered completely unique by concatenating the site ID code prior to analysis, e.g. KH001A20305 (Cambodia site 1, ward 2, patient 305)
        - It does not matter if the patient is readmitted subsequently to a different ACORN surveillance ward: continue to use their original ACORN ID
- For CAI cases, newly admitted patients will need to be identified, e.g. from a ward admission logbook (see section 6).
- For HAI PPS, all admitted patients will be reviewed on a single day per week (see section 0). It will be helpful to be able to quickly identify those admitted for >48 hours on the survey day.

- Plan how surveillance staff will be alerted to *E. coli* and *S. aureus* BSI cases (i.e. patients with positive blood cultures for these organisms) – this may require daily liaison with the microbiology laboratory.
- Plan how discharge time point clinical data will be acquired: this may be from an electronic hospital information system or from the patient clinical notes, depending on the site (see section 9). If the latter, a system of flagging relevant notes could be implemented, e.g. by adding a coloured / ACORN logo sticker to the front cover at the time of enrolment and storage of these notes in a dedicated location on the ward for a short time following discharge.

Ensure that participant information material is made available to potential participants:

- At least one ACORN information poster should be displayed on each surveillance ward. Place these where they can be seen by patients. Depending on the site, it may also be desirable to place information posters in the emergency room, out-patient clinic or admissions department.
- Devise a system to ensure that each new admission receives an ACORN patient information sheet. This may be delegated to nursing staff or a ward administrative office but could also be done by an ACORN site team member during daily review of new admissions.
- Random spot checks should be done to ensure that information posters remain in situ during surveillance and that, if delegated, all admissions to the surveillance wards are given a patient information sheet.

2.3.4 Select method for clinical data collection and entry

There are two options for clinical data collection:

- Direct data entry into ODK Collect, using an Android tablet.
- Collection of data on paper case report forms (CRF), with subsequent data entry into the ACORN REDCap database.

A surveillance site should select one option for data collection and entry. Whichever option is selected, all clinical data will be stored ultimately in the central ACORN REDCap database, where error checking and correction is possible. Further details are provided in the ACORN IT manual.

2.3.5 Confirm laboratory data access or data collection plan

The ACORN project RShiny app links clinical and laboratory data automatically based on patient identifier and key dates. The simplest way for this to occur is to provide the ACORN app with existing LIMS or WHONET data. The app will filter the LIMS or WHONET data file to keep only cultures from ACORN participants. Local laboratory codes are mapped to ACORN codes. To be compatible with the ACORN app, laboratory data files need to meet the following specifications:

- Data in wide format: one culture / isolate per row with antimicrobial susceptibility test (AST) results on the same row:
    - A WHONET file is completely compatible: either old (dBase) or new (SQLite) format.
    - A text file (csv or txt) or Excel (xls or xlsx) will also be compatible.
- Include a specimen number and a patient identification number:
    - The patient identification number MUST be the same as captured in the ACORN clinical CRF (either the local hospital ID or the ACORN ID).
- Include all culture data, even no growth and non-target organisms (including contaminants if possible).
- The data file should include cultures for all patients during the surveillance period and including any ward / clinical area that cultures could have been done on a patient admitted to a surveillance ward.

If it is not possible to access existing laboratory LIMS or WHONET data extracts, then microbiology specimen and culture data for all ACORN participants will need to be entered into WHONET specifically for the project. A WHONET laboratory template and installation document is available for this purpose.

3 Assessment / implementation of diagnostic stewardship at surveillance sites

3.1 Purpose and Scope

To set out a framework for diagnostic stewardship to improve appropriate microbiologic testing of patients with suspected bacterial infection at ACORN surveillance sites. The endpoint of diagnostic stewardship is to ensure that the right patients have the right tests at the right time and that results are used to ensure that they receive the right treatment. Systematic testing of patients with suspected infection will result in data that can be used to formulate local treatment guidelines as well as be used for AMR surveillance activities.

It is important that ACORN stewardship is aligned to existing specimen collection, processing, and feedback procedures. Note that diagnostic stewardship activities may involve nursing, medical / surgical, and laboratory staff.

3.2 Requirements

- ACORN diagnostic stewardship checklist (ACORN Form 2).
- Access to / knowledge of existing local diagnostic stewardship materials.

3.3 Procedure

A member of the ACORN surveillance team should complete the diagnostic stewardship checklist to determine the extent of existing diagnostic stewardship activities / materials at the site. Relevant laboratory details will be captured during the laboratory assessment (see section 5).

Negative answers to any of the questions should prompt development of that item / activity. Prior to commencement of surveillance, the site should have in place the following:

- Recommendations for standardised investigations for suspected infection, at least covering when to collect a blood culture and / or sterile site fluid culture.
- Written procedures for collection, storage, and transport of microbiology specimens.
- Standardised microbiology specimen request form.
- Summaries of specimen collection guidelines in poster format for display on wards.

Clinical and nursing staff should be trained in the appropriate collection and transport of diagnostic microbiology specimens before surveillance commences, with regular refresher training (e.g. every 6 – 12 months).

Ideally, the ACORN surveillance team will include a clinical microbiologist or infectious disease physician who would provide reinforcement to such documents and also provide diagnostic advice to clinicians on individual patients, particularly to identify the focus of infection in those with sepsis.

Examples of appropriate guidelines are included in the ACORN diagnostic stewardship guideline. These can be adapted to the local situation where existing materials are not fit for purpose. They are not intended to replace existing documents, where these exist and are of an appropriate standard.

4 Clinician Knowledge, Attitudes and Practices survey

4.1 Purpose and Scope

The purpose of the clinician KAP is to make a baseline assessment of the clinical staff working on ACORN surveillance wards. The survey gathers information on current knowledge, attitudes and practices around diagnostic microbiology and AMR surveillance. The data will be used primarily to inform and iterate site-specific surveillance training and implementation.

The KAP survey is expected to take around 5 – 10 minutes to complete.

4.2 Requirements

- Computer, smartphone, or tablet with internet access.
- Weblink to the online survey form: https://tinyurl.com/ACORNclinicianKAP
    - If the TinyURL weblink above does not work, use the full weblink:
    - https://redcap.tropmedres.ac/REDCap_Prod01/surveys/?s=EMHJNNFT83

4.3 Procedure

The ACORN site team should approach the senior ward clinician(s) to explain the purpose and scope of the KAP.

A list of clinicians to include in the survey should be made and a schedule made for survey activities (e.g. at clinician handover meetings or other regular meetings). Where possible, doctors working night duties should be encouraged to complete the survey at the beginning or end of their shift.

Ideally, organise set times for groups of clinicians to complete the survey:

- Explain the purpose of the survey.
- Emphasise that participation is voluntary and that no personal identifiers will be collected (i.e. participants will remain anonymous).
- Encourage completion of the survey without discussion with colleagues.
- Encourage positivity and cooperation: reinforce that the survey is not an examination.
- Demonstrate how to complete survey.

5 Laboratory assessments and monitoring

5.1 Purpose and Scope

The purpose of the Laboratory Pre-Assessment online survey and the Site Laboratory Assessment tool is to make a baseline assessment of the laboratories that will be used for processing samples and submitting data for AMR surveillance. The assessment tools allow the assessors to gather information on the current capacity of site laboratories including what routine specimen processing the laboratory already carries out, the current level of quality management and quality control in the laboratory, safety procedures and specimen reporting. There is an initial online Laboratory Pre-Assessment survey followed by a virtual Laboratory Assessment.

The online Laboratory Pre- Assessment online survey is expected to take around 5 minutes to complete. The Site Assessment and report writing will take 1-2 days.

Once surveillance has begun, data on on-going quality management will be collected and reviewed on a quarterly basis.

An overview of the Laboratory Assessment Process is shown in Figure 3.

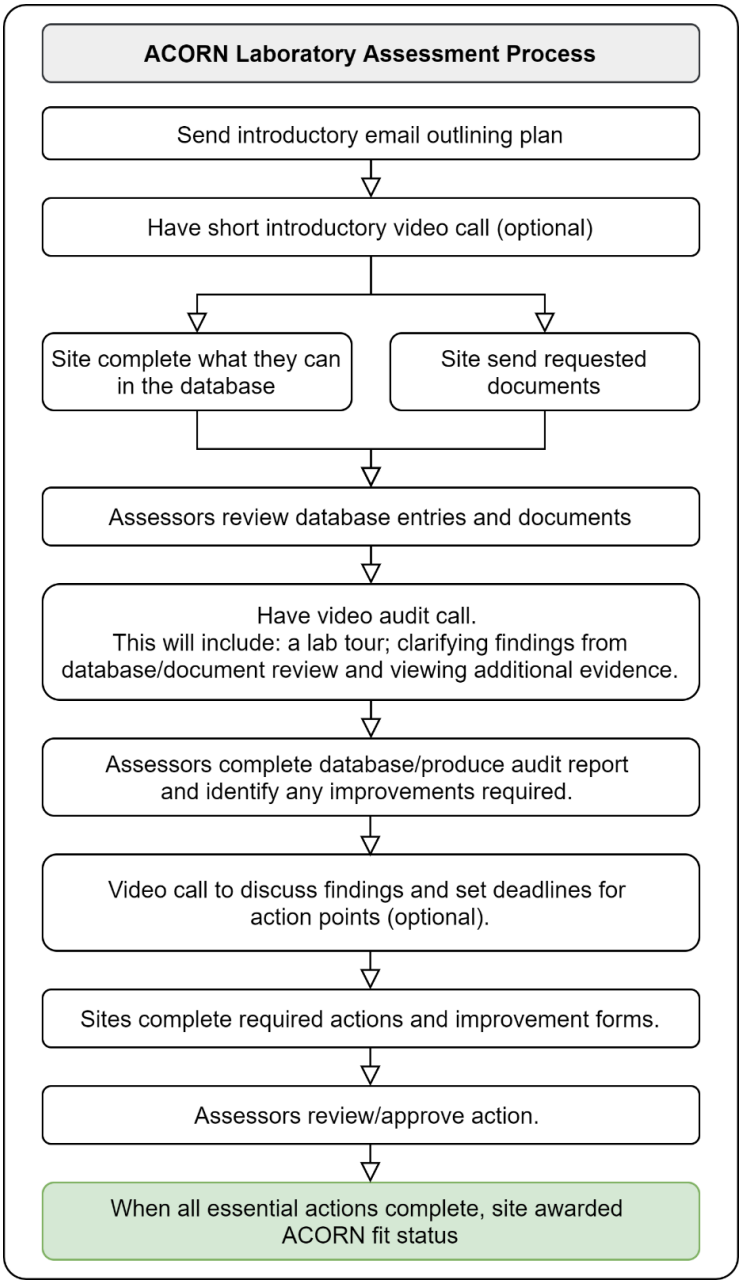

Figure 3. Laboratory assessment process

5.2 Requirements

5.2.1 Laboratory Pre-Assessment online survey

- Computer, smartphone, or tablet with internet access
- Weblink to online survey form: https://tinyurl.com/ACORNlabsurvey
    - If the TinyURL weblink above does not work, use the full weblink:
    - https://forms.office.com/Pages/ResponsePage.aspx?id=V2MauMjTw0GOH7MpRqSG-erOKVDZpOtLtV61_k600EJUM1YzWUxBS0JKU0dET1c5ODc0UTU0TzA3Qy4u
- Site laboratory manager or senior laboratory staff

5.2.2 Site Laboratory Assessment

- ACORN laboratory assessors (1 or 2 members)
- Site laboratory manager or senior laboratory staff
- Computer, smartphone, or tablet with internet access
- Weblink to online Laboratory Assessment and Quality Management (QM) Database
- Access to laboratory documents (Standard Operating Procedures (SOP), External Quality Assurance (EQA) reports etc)
- Smartphone or tablet with internet access and video for virtual lab tour

5.3 Procedure

5.3.1 Laboratory Pre- Assessment online survey

- The ACORN laboratory assessors will contact the site laboratory manager to explain the purpose and scope of the Laboratory Pre-Assessment online survey.
- The ACORN laboratory assessment team will email the link to the survey to the site laboratory manager. The survey should be completed within a week.
- The survey key findings will be shared with the laboratory and laboratory notified if it is potentially suitable for ACORN.

5.3.2 Site Laboratory Assessment

- ACORN laboratory assessors will send an introductory email to the site laboratory manager outlining the laboratory assessment plan.
- An option to have a short introductory video call will be available if needed.
- The site laboratory staff will complete what they can in the Laboratory Assessment and QM Database:
- Weblink to online database: https://tinyurl.com/ACORNREDCap
    - If the TinyURL weblink above does not work, use the full weblink:
    - https://redcap.tropmedres.ac/REDCap_Prod01/
- The site laboratory staff will send the requested documents to the laboratory assessors.
- ACORN laboratory assessors will review the database entries and documents received.
- ACORN laboratory assessors will schedule a video audit call which will include a virtual laboratory tour, clarifying findings from the database / document review and possibly asking to see additional evidence.
    - Electronic laboratory data capture mechanism (LIMS, WHONET, etc) will be confirmed during this meeting, and the laboratory data dictionary will be completed to map local variables to the ACORN system (see ACORN IT manual).
- ACORN laboratory assessors will complete the Laboratory Assessment and QM Database, produce an audit report and send this to the site laboratory manager. The report will contain details of findings and recommendations for training and / or improvements and will give the overall conclusion of the assessment:
    a) Laboratory suitable for ACORN: no training or improvements required.

b) Laboratory suitable for ACORN: training and / or improvements recommended, but not required.
c) Laboratory suitable for ACORN following training and / or implementation of recommendations.
d) Laboratory not currently suitable for ACORN.

- An option to have a video call to discuss the report / findings and agree on an action plan if training and / or improvements are required will be available if needed.
- Site laboratory completes the required actions and record in the ACORN improvement action forms (AIAF) and send to the ACORN laboratory assessors.
- ACORN assessors will review / approve each action.
- When all essential actions are complete, the laboratory site will be awarded ACORN fit status and can contribute laboratory data to the project.

5.4 Ongoing Laboratory Quality Monitoring

- Approximately every 3 months the site laboratory staff will enter quality monitoring data into the online Laboratory Assessment and QM Database and send quality related documents to the ACORN laboratory assessors.
- The ACORN laboratory assessors will review the database entries and documents and notify the site laboratory manager if any quality issues are noticed.

6 Patient enrolment and follow-up

6.1 Purpose and Scope

To provide a summary of patient identification, enrolment and follow-up. These steps are designed to be efficient: each data collection form takes <5 minutes to complete.

6.2 Surveillance Population

All hospitalised patients of any age (i.e. children and adults) on pre-selected surveillance wards.

6.3 Identification of Patients

Patients are identified on surveillance wards in two ways:

- Community-acquired infections (CAI) are captured by daily review of new admissions (see section 7).
- Hospital-acquired infections (HAI) are captured during weekly point prevalence surveys (see section 0).

6.4 Surveillance Procedure Summary

At the first encounter with an eligible patient during their admission:

- Confirm verbally that the patient or parent / guardian / caretaker / legal acceptable representative has read the surveillance information material and agrees to participate.
- Assign an ACORN ID: the ACORN ID is unique to the participant: i.e. use the same ACORN ID if the patient is re-admitted to hospital several times during the surveillance period (even if to a different surveillance ward).
- Complete the recruitment logbook.
- Complete F01 – Enrolment form.
- Complete F02 – Infection episode form.

If this patient has additional infection episodes during the admission, complete a new F02 for each episode.

If the patient has a positive blood culture for *E. coli* or *S. aureus,* complete F05 – BSI episode form.

At hospital discharge, complete F03 – Infection and hospital outcomes form.

At 28 days after the final infection episode of the admission, contact by telephone and complete F04 - 28 days outcome form. On rare occasions the day 28 follow-up could occur before hospital discharge or following readmission.

It is very important the “ACORN ID” and “Admission date” fields are filled in correctly on each form, as these are used to link the forms together. To help with accuracy, these fields must be double entered on each form. The ACORN central management team will work with site surveillance staff to correct errors and unlinked forms.

Examples of patient admissions are documented in Figure 4 below:

- Patient #1 is admitted with a CAI and has no HAI episodes during admission. In this case there will be 1x F01, 1x F02, 1x F03, and 1x F04.
- Patient #2 is admitted for a non-infection indication (e.g. stroke) and develops an HAI before discharge. A blood culture collected during the HAI is positive for *S. aureus.* In this case there will be 1x F01, 1x F02, 1x F03, 1x F04, and 1x F05.
- Patient #3 is admitted with a CAI and also develops an HAI during admission. In this case there will be 1x F01, 2x F02, 1x F03, and 1x F04 (which would be completed 28 days following the onset of the HAI episode).

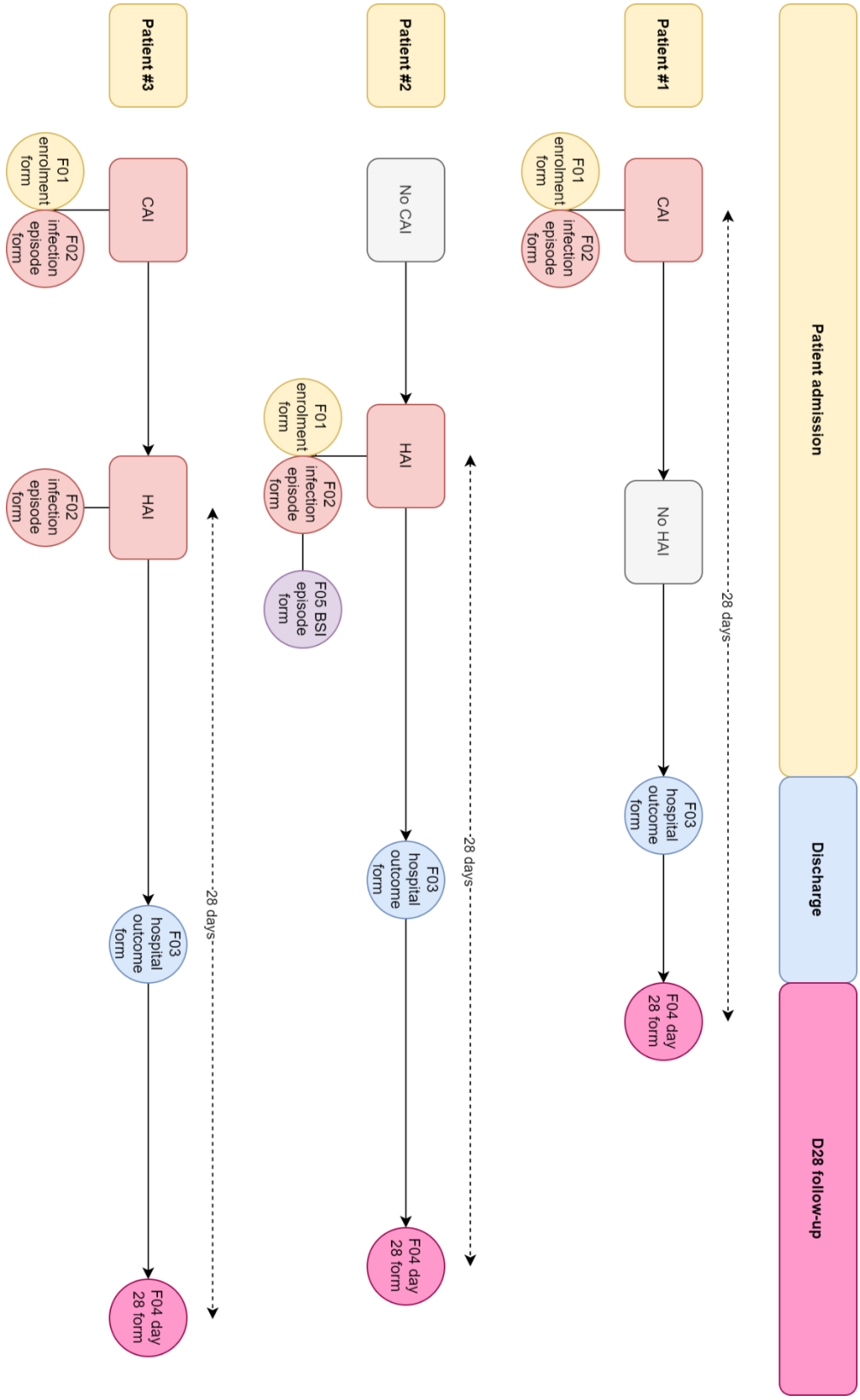

Figure 4. Examples of surveillance patients and data capture

7 Enrolment of patients with clinically suspected community acquired infections

7.1 Purpose and Scope

To describe the procedure for enrolment and initial data capture from patients with suspected community-acquired infection.

7.2 Requirements

- ACORN enrolment logbook.
- Data capture tools: either Android tablet / ODK Collect for direct data entry or paper CRF for subsequent data entry into REDCap.

7.3 Procedure

A member of the ACORN site team should visit each surveillance ward each day between Monday to Friday, at least once but ideally in both the morning and the afternoon.

Patients admitted to the ward since the previous day should be identified from the ward admission log. Patients admitted over the weekend (Saturday or Sunday), or on a public holiday, should be identified on the following Monday / routine workday.

Review the clinical records of each newly admitted patient briefly and identify those meeting the CAI inclusion criteria:

- Patient with clinically suspected infection on admission to a surveillance ward (including those transferred directly from another facility), in whom the decision to start IV antibiotic treatment has been made, and are willing to participate in the surveillance.
    - Practically this means decision to start IV antibiotics by the time of review (or up to 24 hours following admission if admitted over the weekend): if reviewed very soon after admission and an antibiotic decision is pending, it would be preferable to return to review at the next scheduled ward visit to confirm eligibility.
- This includes:
    - Patients transferred directly from another facility with an acute infection.
    - Patients admitted to a non-surveillance ward initially but transferred to a surveillance ward within 48 hours of admission.
    - Patients investigated and treated for suspected CAI in the Emergency Department (Emergency Room / Accident and Emergency Department) with delayed transfer to the ACORN surveillance ward.
        - This may occur because of bead shortages, COVID-19 screening procedures, or other local operational challenges.
        - If this scenario occurs, it is important to optimise collection of microbiology specimens in the Emergency Department and to follow the enrolment criterion of commencement of IV antibiotic treatment within 24 hours of admission (i.e. to the Emergency Department).

Do the following for each patient meeting the inclusion criteria, unless the patient opts-out of surveillance (i.e. declines to participate when the ACORN team approach to gather information).

- Enter details into the enrolment logbook:
    - Patient name.
    - Patient hospital ID.
    - Enrolment date.

    - Admission date.
- Assign an ACORN ID (use ACORN ID from a previous admission if known).
- Complete the “F01 – Enrolment form” (general patient / admission information).
- Complete the “F02 – Infection episode form” (information about the current CAI).
- Confirm the details for the day-28 telephone follow-up and record these in the enrolment logbook:
    - Correct telephone number to contact the patient.
    - Likely date for follow-up (28 days after the enrolment date, assuming the patient does not have a subsequent HAI).

8 Hospital-acquired infection point prevalence surveys

8.1 Purpose and Scope

To describe the ACORN hospital-acquired infection point prevalence survey procedure and initial data capture from patients with suspected HAI.

8.2 Requirements

- ACORN enrolment logbook.
- Data capture tools: either Android tablet / ODK Collect for direct data entry or paper CRF for subsequent data entry into REDCap.

8.3 Procedure

Define a day of the week for the HAI PPS: this should be the same day each week. If the PPS falls on a public holiday, skip that week (do not reschedule to another day).

8.3.1 On the day before each PPS

If used, ensure that the tablet computers are in working order and placed on charge.

8.3.2 On the day of the PPS

Visit each surveillance ward, not earlier than 8am.

Complete the "F06 – HAI Ward Form" (ward level denominator data).

Review the clinical records of each patient briefly and identify those with a potential HAI:

- Clinical suspicion of bacterial infection and prescription / commencement of a new IV antibiotic (but not escalation of antibiotic treatment for an existing suspected or proven infection)

  AND

- Onset of infection syndrome at least Day 3 of admission (Day 1 = day of admission)

  AND

- Infection syndrome was not active during the previous weekly review: i.e. onset at least one day following the most recent previous HAI point prevalence survey

Figure 5 below provides examples of HAI episode enrolment during the weekly PPS.

Do the following for each patient meeting the clinical case definition, unless the patient opts-out of surveillance (i.e. declines to participate when the ACORN team approach to gather information):

If the patient has not yet been enrolled into ACORN on this admission:

- Enter details into the enrolment logbook:
  - Patient name.
  - Patient hospital ID.
  - Enrolment date.
  - Admission date.
- Assign an ACORN ID (use ACORN ID from a previous admission if known).
- Complete the "F01 – Enrolment form" (general patient / admission information), if the patient has not yet been included in ACORN during the current admission (i.e. no previous ACORN CAI or HAI during this admission).

- Complete the “F02 – Infection episode form” (information about the current HAI).
- Confirm the details for the day-28 telephone follow-up and record these in the enrolment logbook:
    - Correct telephone number to contact the patient.
    - Date for follow-up (28 days after the enrolment date).

If the patient has already been enrolled into ACORN on this admission:

- Verify patients details and ACORN ID from the enrolment logbook.
- Complete the “F02 – Infection episode form” (information about the current HAI).
- Confirm the details for the day-28 telephone follow-up and update these in the enrolment logbook:
    - Correct telephone number to contact the patient.
    - Date for follow-up (28 days after the enrolment date).

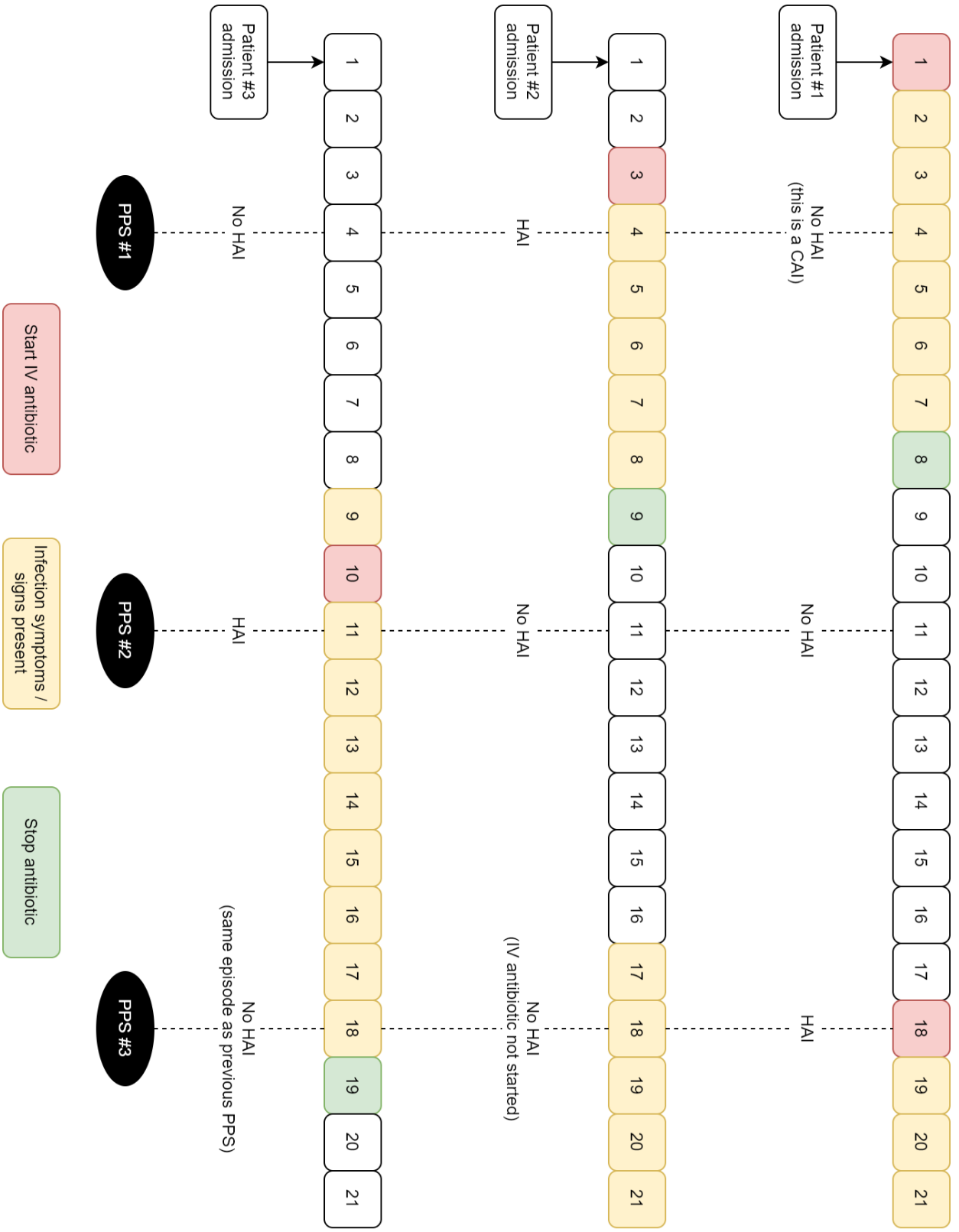

Figure 5. Examples of hospital acquired infection episode enrolment during weekly point prevalence surveys

9 Follow-up of patients enrolled into ACORN surveillance

9.1 Purpose and Scope

To describe collection of follow-up data on participants enrolled into ACORN CAI surveillance or via HAI PPS.

9.2 Requirements

- ACORN enrolment logbook.
- Data capture tools: either Android tablet / ODK Collect for direct data entry or paper CRF for subsequent data entry into REDCap.
- Telephone (28-day follow-up only).

9.3 Procedure

9.3.1 *E. coli* or *S. aureus* blood stream infection

If *E. coli* or *S. aureus* is grown from a blood culture of an ACORN participant infection episode, complete the "F05 – BSI episode form" using either the clinical record or electronic hospital information system as the source document.

9.3.2 Hospital discharge

Additional clinical data capture will occur at the point of hospital discharge and at 28-days post-enrolment (on rare occasion this may occur before hospital discharge). Patients enrolled more than once in an admission (e.g. for a CAI and HAI or multiple HAI) should be followed up at 28 days after the final infection episode enrolment only.

At hospital discharge or shortly afterwards, complete the "F03 – Infection and hospital outcomes form" using either the clinical record or electronic hospital information system as the source document.

9.3.3 Day 28 follow up

At 28 days after enrolment complete the "F04 – 28 days outcome form". If there was more than one enrolment during the admission, this should be 28 days after the final enrolment date.

If the patient remains hospitalised, then use either the clinical record or electronic hospital information system as the source document.

If the patient left the hospital alive before this time (even if expected to die), contact them by telephone.

If the patient is readmitted before the previous 28 day follow up, the previous 28 day follow up should be completed as scheduled (and if enrolled into ACORN during the readmission, then a further day 28 follow up will be required).

10 Data collection summary

The following tables summarise the variables collected at each time point. For variables with “select_one” or “select_multiple” field types, the possible responses may be found in the appropriate CRF document. The “Details” column provides explanation of the data that should be captured, where it may not be immediately obvious from the question (“Field label” column).

10.1 F01 – Enrolment form

Field label	Field name	Field type	Details
Q01. Hospital code	SITEID	text	Enter the hospital code provided by the central ACORN team – will consist of the two letter ISO code for your country followed by three digits (e.g. KH324).
Q02. Hospital name	SITEID_CFM	text	Enter the hospital name.
Participant details			
Q03. Date of enrolment	DMDTC	date	The date the patient was first enrolled into ACORN on this admission.
Q04. Patient ID	USUBJID	text	Local patient ID / hospital number. If no local patient ID system used, enter the ACORN ID here. This ID is used to match patients with specimens in the local laboratory database / LIMS / WHONET.
Q05. Patient ID (Double Entry)	USUBJID_CFM	text	
Q06. ACORN ID	ACORNID	text	Anonymous ACORN surveillance ID number. This will be duplicated if already entered as “Patient ID”. This ID links together the F01 – F05 forms (with the date of admission). Must be in the following format: Axnnnn where x is a dedicated ward number and nnnn is the 4 digit running number within the ward.
Q07. ACORN ID (Double Entry)	ACORNID_CFM	text	
Q08. Date of birth	BRTHDTC	date	Patient date of birth. If unknown, leave blank.

Q09. Age (Years)	AGEY	integer	If date of birth unknown, enter the patient age (at day of enrolment). Enter years only if patient is 1 year or older. Enter months only if patient is 1-11 months. Enter days only if patient is <1 month old.
Q10. Age (Months)	AGEM	integer	
Q11. Age (Days)	AGED	integer	
Q12. Gender	SEX	select_one GENDER	Gender of the patient. If non-binary (i.e. does not identify as female or male), enter "OTHER". If unable to determine (e.g. ambiguous genitalia in a newborn) enter "UNKNOWN".
Q13. Date of admission	HPD_ADM_DATE	date	Admission date of the patient to the hospital.
Q14. Date of admission (Double Entry)	HPD_ADM_DATE_CFM	date	
Q15. Transfer from another hospital	HPD_IS_HOSP_DATE	select_one YESNO	Enter "YES" if the patient was transferred directly from another hospital.
Q16. Transfer from another facility (e.g. long-term care facility)	HPD_IS_OTHFACI_DATE	select_one YESNO	Enter "YES" if the patient was transferred directly from another type of healthcare facility. Examples would include a nursing (old age / elderly / senior care) home or a rehabilitation facility.
Q17. Date of hospitalisation (if transfer from another facility)	HPD_HOSP_DATE	date	If Q15 or 16 answered "YES", enter the date the patient was admitted to the facility they were transferred from.
Q18. Admission type	HPD_ADMTYPE	select_one ADMTYPE	Was the admission an "EMERGENCY" (unexpected / not pre-planned) or "ELECTIVE" (planned).
Q19. Primary admission reason	HPD_ADMREASON	select_one ADMREASON	Enter the main clinical reason for current hospital admission. For CAI patients, this is most likely to be "INFECTIOUS DISEASE".
Comorbidities			

Q20. Comorbidities	CMB_COMORBIDITIES	select_multiple COMORBIDITIES	Record the comorbidities present at the time of hospital admission. Select "NONE" if the patient has no known comorbidities. See below for comorbidity definitions.
Recent healthcare exposure			
Q21. Overnight hospitalisation in 3 months (90 days) before admission	CMB_OVERNIGHT	select_one YESNO	Ask patient directly if not recorded in clinical notes.
Q22. Regular hospital contact (e.g. dialysis, cancer treatment in the 3 months (90 days) before admission)	CMB_RHC	select_one YESNO	Ask patient directly if not recorded in clinical notes.
Q23. Surgery in the last 3 months (90 days) before admission		select_one YESNO	Ask patient directly if not recorded in clinical notes.

10.1.1 Comorbidity definitions

Condition	Definition	Note
Congestive heart failure	Patients who have had exertional or paroxysmal nocturnal dyspnea and who have responded symptomatically (or on physical examination) to digitals, diuretics, or afterload reducing agents. It does not include patients who are on medication but have had no symptomatic response and no evidence of improvement of physical signs.	Updated Charlson Comorbidity Index (uCCI) component*
Chronic pulmonary disease	Patients who are dyspneic with slight activity, with or without treatment and those who are dyspneic with moderate activity despite treatment. Also includes patients who are dyspneic at rest, despite treatment, those who require constant oxygen, those with CO_2 retention and those with baseline PO_2 below 50 mmHg.	Updated Charlson Comorbidity Index (uCCI) component*
Mild liver disease	Patients with chronic hepatitis or cirrhosis without portal hypertension.	Updated Charlson Comorbidity Index (uCCI) component*
Moderate or severe liver disease	Patients with cirrohsis with portal hypertension with or without a history of variceal bleeding.	Updated Charlson Comorbidity Index (uCCI) component*

Connective tissue / rheumatologic disease	Patients with systemic lupus erythematous, polymyositis, mixed connective tissue disease, polymyalgia rheumatic, and moderate to severe rheumatoid arthritis.	Updated Charlson Comorbidity Index (uCCI) component*
Peptic ulcer disease	Patients who have required treatment for ulcer disease, including those who have bled from ulcers.	WHO-GLASS attributable mortality protocol component
Diabetes	Patients with diabetes mellitus treated with insulin or oral hypoglycaemics, but not diet alone, without end-organ damage.	WHO-GLASS attributable mortality protocol component
Diabetes with end organ damage	Patients with diabetes mellitus AND retinopathy, neuropathy, or nephropaty.	Updated Charlson Comorbidity Index (uCCI) component*
Hemiplegia or paraplegia	Patients with the dense hemiplegia or paraplegia, whetever it occurred as a result of a cerebrovascular accident (stroke) or other condition.	Updated Charlson Comorbidity Index (uCCI) component*
Renal disease	Patients with serum creatinine > 2 mg/dL (> 177 µmol/L) or patients on renal dialysis, those who had a renal transplant, and those with uraemia.	Updated Charlson Comorbidity Index (uCCI) component*
Cancer / leukaemia	Patients with solid tumors without documented metastases, but initially treated in the last five years, including breast, colon, lung and a variety of other tumors. Patients with acute and chronic myelogenous leukemia, acute and chronic lymphocytic leukemia, and polycythemia vera. Patients with Hodgkin's lymphoma, Waldestrom's macroglobulinemia, myeloma, and other lymphomas.	Updated Charlson Comorbidity Index (uCCI) component*
Metastatic solid tumour	Patients with metastatic solid tumors, including breast, lung, colon and other tumors.	Updated Charlson Comorbidity Index (uCCI) component*
AIDS	Patients with definite or probable acquired immune deficiency syndrome (AIDS), i.e HIV positive AND CD4 ≤200/mm^3 or AIDS-defining opportunistic infections.	Updated Charlson Comorbidity Index (uCCI) component*
Dementia	Patients with chronic cognitive deficit.	Updated Charlson Comorbidity Index (uCCI) component*
Malaria	Patients with current parasitaemia.	WHO-GLASS attributable mortality protocol component
HIV on ART	HIV positive AND receiving anti-retroviral treatment (ART) AND does not meet the crtieria for AIDS	WHO-GLASS attributable mortality protocol component
HIV without ART	HIV positive NOT receiving anti-retroviral treatment (ART) AND does not meet the crtieria for AIDS	WHO-GLASS attributable mortality protocol component

Malnutrition	Patients with clinically diagnosed malnutrition (by whichever definition is in routine use at the surveillance hospital)	WHO-GLASS attributable mortality protocol component
Tuberculosis	Patients with current TB (i.e. untreated, currently under treatment, and treatment failures). This does not include patients who have successfully completed a standard TB treatment regimen and are conisdered cured.	WHO-GLASS attributable mortality protocol component

* Ternavasio-de la Vega HG et al (2018). The updated Charlson comorbidity index is a useful predictor of mortality in patients with *Staphylococcus aureus* bacteraemia. Epidemiology and Infection 146, 122–2130. https://doi.org/10.1017/S0950268818002480

10.2 F02 – Infection episode form

Field label	Field name	Field type	Details
Q01. Hospital code	SITEID	text	See F01.
Q02. Hospital name	SITEID_CFM	text	
Q03. ACORN ID	ACORNID	text	See F01.
Q04. ACORN ID (Double Entry)	ACORNID_CFM	text	
Q05. Date of admission	HPD_ADM_DATE	date	See F01.
Q06. Date of admission (Double Entry)	HPD_ADM_DATE_CFM	date	
Q07. Date of episode enrolment	HPD_DMDTC	date	Enter the date the patient was enrolled for this patient episode (i.e. the date of completing this form).
Q08. Patient age category	HPD_AGEGROUP	select_one AGEGROUP	Select adult (≥18y), child (1m - 17y), or neonate (<28d) as appropriate.
Q09. Surveillance category	IFD_SURCATE	select_one SURCAT	Community-acquired infection (CAI) or hospital-acquired infection (HAI). For patients transferred in from another hospital and enrolled on the day of admission, categorise as “CAI”.
Q10. Date of symptom onset (HAI only)	HPD_ONSET_DATE	date	Enter the date on which symptoms were first noted / recorded for the suspected HAI episode

Q11. Ward Type	HPD_ADM_WARDTYPE	select_one WARDTYPE	Select appropriate ward category (closest match).
Q12. Ward	HPD_ADM_WARD	text	Local ward name.
Q13.Clinically suspected infection (reason for IV antibiotic prescription)	HO_IV_ANTI_REASON	select_one IV_ANTI_REASON	Enter the MOST LIKELY clinical infection category (see table below). It will be necessary to check with the treating clinician if this is not documented.
Severity score: qSOFA score (participant is ≥18 years) on day of admission (CAI) or symptom onset (HAI)			
Q14. Altered mentation (GCS <15)	SER_GCS_UNDER15	select_one YESNO	Clinical severity based on information documented in the clinical or nursing notes at the time of the main clinical assessment on the day of admission / day of HAI onset. If there are multiple assessments on this day, document the first one. If something is not clear, ask the treating clinician to clarify. If information is not available, record "UNKNOWN".
Q15. Respiratory rate (≥22 /min)	SER_RR_22UP	select_one YESNO	
Q16. Systolic blood pressure (<100 mmHg)	SER_SBP_UNDER100	select_one YESNO	
Q17. Abnormal core temperature (see explanation below)	SER_ABNORMAL_TEMP_ADULT	select_one YESNO	
Severity score: sepsis-6 features (participant is <18 years) on day of admission (CAI) or symptom onset (HAI)			
Q18. Abnormal core temperature (see explanation below)	SER_ABNORMAL_TEMP	select_one YESNO	Clinical severity based on information documented in the clinical or nursing notes at the time of the main clinical assessment on the day of admission / day of HAI onset. If there are multiple assessments on this day, document the first one. If something is not clear, ask the treating clinician to clarify. If information is not available, record "UNKNOWN".
Q19. Inappropriate tachycardia (see explanation below)	SER_INAPP_TACHYCARDIA	select_one YESNO	
Q20. Altered mental state (see explanation below)	SER_ALTER_MENTAL	select_one YESNO	
Q21. Reduced peripheral perfusion or prolonged capillary refill time (see explanation below)	SER_REDUCE_PP	select_one YESNO	
Q22. Reduced level of activity	SER_NEO_REDUCE	select_one YESNO	Clinical severity, neonate only.
Q23. Feeding difficulty	SER_NEO_FEED	select_one YESNO	Clinical severity, neonate only.
Q24. Convulsions	SER_NEO_CONVUL	select_one YESNO	Clinical severity, neonate only.

Medical devices / procedures (HAI only)			
Q25. Medical devices present on the day of HAI symptom onset	HAI_HAVE_MED_DEVICE	select_multiple HAIMEDDEV	Select the appropriate devices from the list (multiple selections possible). Select "NONE" if no devices were present on the day of HAI onset.
Q26. Admitted to ICU for more than 48 hours (2 days) since admission and day of HAI symptom onset	HAI_ICU48DAYS	select_one YESNO	Select "YES" if the patient stayed more than 48 hours at the ICU between admission and day of HAI onset.
Q27. Surgery since admission and day of HAI symptom onset	HAI_HAVE_SUR	select_one YESNO	Select "YES" if the patient had any surgical procedure between admission and day of HAI onset, requiring local or general anaesthesia.
Blood culture details			
Q28. Blood culture collected within 24 hours of admission (CAI) / symptom onset (HAI)	MIC_BLOODCOLLECT	select_one YESNO	According to clinical records, record whether the patient had a blood culture collected within 24 hours of admission (CAI) / symptom onset (HAI).
Q29. Received ≥1 dose of a systemic antibiotic in the 24 hours before the blood culture collected	MIC_REC_ANTIBIOTIC	select_one YESNO	According to the clinical records, record whether the patient received a systemic antibiotic in the 24 hours before the blood culture was collected. Do not include anti-fungal, anti-TB, or anti-viral medication.
Empiric antibiotic treatment			
Q30. Systemic antibiotics prescribed on date of admission (CAI) / symptom onset (HAI)	ANTIBIOTIC	select_multiple ANTIBIOTICLIST	Select all antibiotics prescribed on the day of admission (CAI) or symptom onset (HAI). If episode enrolment occurs on the day of admission / symptom onset, just include antibiotics prescribed up until that time. Do not include anti-fungal, anti-TB, or anti-viral medication.
Q31. If other antibiotic please specify	ANTIBIOTIC_OTHER	text	Free text to enter the antibiotic name, if not on the list.

10.2.1 F02 / F03 Infection categories

Infection category	Examples	Note
Central nervous system	Brain abscess, encephalitis, meningitis, myelitis, spinal abscess, ventriculitis	
Cardiovascular system	Endocarditis, mediastinitis, myocarditis, pericarditis, vascular (arterial or venous) infection	
Eye	Conjunctivitis, dacrocystitis, endophthalmitis, orbital cellulitis	
ENT / Upper respiratory tract	Epiglottitis, mastoiditis, otitis media, retropharyngeal abscess, sinusitis, tonsillitis	
Lower respiratory tract	Bronchitis, bronchiolitis, lung abscess, tracheitis, tracheobronchitis, without evidence of pneumonia	
Pneumonia	Pneumonia	
Gastrointestinal	Colitis, dysentery, gastroenteritis	
Intra-abdominal	Appendicitis, cholangitis, cholecystitis, liver / spleen abscess, pancreatitis, peritonitis	
Necrotising enterocolitis	Neonatal necrotising enterocolitis	
Skin / Soft tissue	Abscess, bites, burn, cellulitis, infectious gangrene, lymphadenitis, lymphangitis, necrotising fasciitis, pyomyositis, ulcer	
Bone / Joint	Disc space infection, osteomyelitis, septic arthritis / bursitis	
Surgical site infection	Post-operative infection (<30 days / <90 days if implant in situ) involving the surgical incision or deeper tissues associated with the procedure	
Urinary tract	Cystitis, pyelonephritis	
Genital	Obstetric / gynaecologic infections (ovarian abscess, salpingitis / PID, endometritis, episiotomy infection), prostatitis, sexually transmitted infections	
Febrile neutropenia	Febrile neutropenic episode (haematology-oncology)	
Sepsis	Clinical sepsis (source unclear / WITHOUT obvious focus / not specified)	F02 only
Melioidosis	Melioidosis, clinically suspected or culture confirmed	F03 only
Typhoid	Typhoid fever, clinically suspected or culture confirmed	F03 only
Other	Defined diagnosis but not included in the list	
Undefined	No clear clinical diagnosis and / or site of infection recorded, but the patient was treated with ≥4 days of antibiotics	F03 only
Unknown	Reason for antibiotic not documented	

Infection rejected	Infection no longer considered the most likely clinical diagnosis (e.g. a patient admitted / treated for suspected pneumonia and enrolled as a CAI is subsequently determined to be congestive cardiac failure, resulting in early cessation of antibiotics)	F03 only

10.2.2 F02 Paediatric severity definitions

Abnormal core temperature	<36.0°C / >38.5°C tympanic OR <35.5°C / > 38.0°C axillary
Inappropriate tachycardia	<1y: ≥160 /min 1-2y: ≥150 /min 3-4y: ≥140 /min 5y and above: ≥130 /min
Altered mental state	GCS<15 OR Sleepiness, irritability, lethargy, floppiness
Reduced peripheral perfusion or prolonged capillary refill time	Cold feet or hands OR ≥3 seconds

10.3 F03 – Infection and hospital outcomes form

Field label	Field name	Field type	Details
Q01. Hospital code	SITEID	text	See F01.
Q02. Hospital name	SITEID_CFM	text	
Q03. ACORN ID	ACORNID	text	See F01.
Q04. ACORN ID (Double Entry)	ACORNID_CFM	text	
Q05. Date of admission	HPD_ADM_DATE	date	See F01.
Q06. Date of admission (Double Entry)	HPD_ADM_DATE_CFM	date	
Final surveillance categorisation (this section repeats up to 5 times, to capture infection episode outcomes)			
Q07. Number of infection episode		integer	Enter the total number (N) of ACORN infection episodes (F02 forms) from this admission.
Q08. Date of episode enrolment	HO_DMDTC	date	*For each of the N infection episodes:* Enter the infection episode enrolment date for this infection episode (i.e. date of enrolment from F02).

Q09.Final infection episode diagnosis	HO_FIN_INFECT_EPISODE_DIAG	select_one FIN_INFECT_EPISODE_DIAG	*For each of the N infection episodes:* Enter the clinician final diagnosis for this infection episode (the most likely one if still >1 possibility, see table above).
Discharge details			
Q18. Discharge status	HO_DISCHARGESTATUS	select_one DISCHARGESTATUS	Vital status of patient at discharge.
Q19. Discharge to	HO_DISCHARGETO	select_one DISCHARGETO	Record where the patient was discharged to. Enter "NA" if the discharge status was "DEAD".
Q20. Date of discharge	HO_DISCHARGE_DATE	date	Date of hospital discharge.
Q21. Total number of days on ICU since admission.	HO_DAYS_ICU	integer	Enter the total number of days of admission to ICU during this hospitalisation. Count the day of admission and the day of discharge as one day (i.e. if admitted on 10th January and discharged on 13th January, record 3 days [11th and 12th would count for one day each but 10th / 13th would count for one day combined]).

10.4 F04 - 28 days outcome form

Field label	Field name	Field type	Details
Q01. Hospital code	SITEID	text	See F01.
Q02. Hospital name	SITEID_CFM	text	
Q03. ACORN ID	ACORNID	Text	See F01.
Q04. ACORN ID (Double Entry)	ACORNID_CFM	text	
Q05. Date of admission	HPD_ADM_DATE	date	See F01.
Q06. Date of admission (Double Entry)	HPD_ADM_DATE_CFM	date	
Q07. Date of 28 days review	D28_DATE	date	Enter date contact was made for day 28 review (or date of final attempt to

			contact if unable to reach the patient by telephone).
Q08. Status at 28 days	D28_STATUS	select_one D28STATUS	Record the vital status of the patient (or confirm unable to contact).
Q09. Date of death (if post-discharge)	D28_DEATH_DATE	date	Enter the date of death, if this occurred after hospital discharge.

10.5 F05 – BSI episode form

Field label	Field name	Field type	Details
Q01. Hospital code	SITEID	text	See F01.
Q02. Hospital name	SITEID_CFM	text	
Q03. ACORN ID	ACORNID	text	See F01.
Q04. ACORN ID (Double Entry)	ACORNID_CFM	text	
Q05. Date of admission	HPD_ADM_DATE	date	See F01.
Q06. Date of admission (Double Entry)	HPD_ADM_DATE_CFM	date	
Additional admission details			
Q07. Ward Type	WARDTYPE	select_one WARDTYPE	Ward type at time of admission: select appropriate ward category (closest match).
Q08. Ward	WARD	text	Local ward name.
Blood culture details			
Q09. Blood culture date	BSI_CULTURE_DATE	date	Date of collection for the blood culture which grew *E. coli* or *S. aureus.* If there was more than one positive blood culture, provide details for the first one.
Q10. Blood culture pathogen	BSI_PAHTOGEN	select_one PATHOGEN	Select either *E. coli* or *S. aureus.*
Q11. Date AST results reported to attending medical doctor	BSI_AST_DATE	date	Enter the date that antimicrobial susceptibility test results were reported to the clinician responsible for the patient.
Q11. Date AST results reported to attending medical doctor	BSI_AST_DATE_UNKNOWN	select_multiple UNKNOWN	Select if AST reporting date is unknown.

Immunosuppression in the 48 hours prior to the blood culture collection date			
Q12. HIV (CD4 ≤200/mm^3)	BSI_IMMUNE_HIV	select_one YESNO	Record details of any immunosuppression in the 2 days (48 hours). If not known, select "UNKNOWN". See below for definitions.
Q13. End-stage renal disease requiring dialysis	BSI_IMMUNE_ENDSTAGE	select_one YESNO	
Q14. Insulin-dependent diabetes mellitus	BSI_IMMUNE_INSULIN	select_one YESNO	
Q15. Active malignancy	BSI_IMMUNE_MALIGNANT	select_one YESNO	
Q16. Cytotoxic chemotherapy ≤6 months	BSI_IMMUNE_CYTOTOXIC	select_one YESNO	
Q17. Prednisolone therapy ≥10mg/day	BSI_IMMUNE_PREDNISOLONE	select_one YESNO	
Q18. Child C cirrhosis	BSI_IMMUNE_CIRRHOSIS	select_one YESNO	
Q19. Neutropenia (≤500/mm^3)	BSI_IMMUNE_NEUTROPENIA	select_one YESNO	
Q20. Haematopoietic stem-cell transplantation	BSI_IMMUNE_HAEMA	select_one YESNO	
Q21. Solid organ transplantation	BSI_IMMUNE_ORGANTRAN	select_one YESNO	
Pitt BSI score			
Q22. Temperature (°C)	BSI_SCORE_TEMP	decimal	Record patient observations on the date of collection for the positive blood culture (or up to 48 hours before if not available). For temperature, record the most extreme (high or low value). For respiratory and heart rates, record the highest values. For systolic blood pressure, record the lowest value. For mental status, record the lowest value: • Alert: normal / full consciousness • Disoriented: confused as to time, place, or person • Stupor: only rousable on vigorous and repeated stimulation.
Q22. Temperature (°C)	BSI_SCORE_TEMP_UNKNOWN	select_multiple UNKNOWN	
Q23. Respiratory rate (/min)	BSI_SCORE_RESPRATE	decimal	
Q23. Respiratory rate (/min)	BSI_SCORE_RESPRATE_UNKNOWN	select_multiple UNKNOWN	
Q24. Heart rate (/min)	BSI_SCORE_HRATE	decimal	
Q24. Heart rate (/min)	BSI_SCORE_HRATE_UNKNOWN	select_multiple UNKNOWN	
Q25. Systolic BP (mmHg)	BSI_SCORE_SYS	decimal	
Q25. Systolic BP (mmHg)	BSI_SCORE_SYS_UNKNOWN	select_multiple UNKNOWN	
Q26. Mental status	BSI_MENTALSTATUS	select_one MENTALSTATUS	
Q27. Acute hypotensive event	BSI_ACUTE_HYPO	select_one YESNO	

			• Comatose: unarousable unresponsiveness.
			• A pragmatic guide for children (comparing to AVPU and GCS) would be:
			  • Alert (A) = GCS 15
			  • Disoriented (V) = GCS 9 - 14
			  • Stuporous (P) = GCS 6 - 8
			  • Comatose (U) = GCS 3 - 5
			
			Select "UNKNOWN" if not recorded.

Q28. Intravenous vasopressor agents required	BSI_48H_INTVAS	select_one YESNO	Record whether the patient required vasopressor / inotrope support. Examples include dopamine, dobutamine, or norepinephrine infusion.
Q29. Mechanical ventilation needed	BSI_48H_MV	select_one YESNO	Record whether the patient required ventilation, defined as intubation and mechanical ventilation, not just oxygen or CPAP.
Q30. Cardiac arrest	BSI_48H_CA	select_one YESNO	Record whether the patient had a cardiac arrest / required CPR.
Antibiotic treatment details – include both empiric and targeted treatment			
Q31. Number of antibiotic treatment	BSI_ANTIBIOTIC_COUNT	select_one NUMATB	Up to 5 drugs can be recorded here. Include only systemic antibiotics (oral or injection), not topical / inhaled agents.
Q32. Drug name	BSI_ANTIBIOTIC1_NAME	select_one ANTIBIOTICLIST	Antibiotic #1 details. If the dose was changed, consider it as the same antibiotic episode (e.g. ceftriaxone given 1g once daily for 1st June, but then changed to 1g twice daily on 2nd June and continued to 8th June: record start date as 1st June and end date as 8th June).
Q33. Drug name (Other)	BSI_ANTIBIOTIC1_NAME_OTHER	text	
Q34. Start date	BSI_ANTIBIOTIC1_STARTDATE	date	
Q35. End date	BSI_ANTIBIOTIC1_ENDDATE	date	
Q36. Route	BSI_ANTIBIOTIC1_ROUTE	select_one ROUTEATB	
Q37. Drug name	BSI_ANTIBIOTIC2_NAME	select_one ANTIBIOTICLIST	Antibiotic #2 details.
Q38. Drug name (Other)	BSI_ANTIBIOTIC2_NAME_OTHER	text	

Q39. Start date	BSI_ANTIBIOTIC2_STARTDATE	date	
Q40. End date	BSI_ANTIBIOTIC2_ENDDATE	date	
Q41. Route	BSI_ANTIBIOTIC2_ROUTE	select_one ROUTEATB	
Q42. Drug name	BSI_ANTIBIOTIC3_NAME	select_one ANTIBIOTICLIST	Antibiotic #3 details.
Q43. Drug name (Other)	BSI_ANTIBIOTIC3_NAME_OTHER	text	
Q44. Start date	BSI_ANTIBIOTIC3_STARTDATE	date	
Q45. End date	BSI_ANTIBIOTIC3_ENDDATE	date	
Q46. Route	BSI_ANTIBIOTIC3_ROUTE	select_one ROUTEATB	
Q47. Drug name	BSI_ANTIBIOTIC4_NAME	select_one ANTIBIOTICLIST	Antibiotic #4 details.
Q48. Drug name (Other)	BSI_ANTIBIOTIC4_NAME_OTHER	text	
Q49. Start date	BSI_ANTIBIOTIC4_STARTDATE	date	
Q50. End date	BSI_ANTIBIOTIC4_ENDDATE	date	
Q51. Route	BSI_ANTIBIOTIC4_ROUTE	select_one ROUTEATB	
Q52. Drug name	BSI_ANTIBIOTIC5_NAME	select_one ANTIBIOTICLIST	Antibiotic #5 details.
Q53. Drug name (Other)	BSI_ANTIBIOTIC5_NAME_OTH	text	
Q54. Start date	BSI_ANTIBIOTIC5_STARTDATE	date	
Q55. End date	BSI_ANTIBIOTIC5_ENDDATE	date	
Q56. Route	BSI_ANTIBIOTIC5_ROUTE	select_one ROUTEATB	
BSI details			
Q57. Was BSI primary or secondary	BSI_IS_PRIMARY	select_one BSIP	Primary bacteraemia means no source identified (pathogens are introduced directly into the blood stream, e.g. by central line, translocation from mucous membranes, by trauma, nosocomial introduction, or infections of intravascular sites such as heart valves, intravascular devices, aneurisms, etc). Secondary bacteraemia have a defined focus (e.g. urinary tract or abscess). Select “UNKNOWN” if it is not possible to determine / no attempt has been made to investigate for a source.

Q58. If secondary, what was the likely source	BSI_SEC_SOURCE	select_one BSISS	Select the most likely source from the list. Select "UNKNOWN" if no source identified.
Q59. Other, please specify	BSI_SEC_SOURCE_OTH	text	Record details if "OTHER" source selected.
Q60. Presence of implanted prosthesis	BSI_IS_COM_IMPLANT	select_one YESNO	For *S. aureus* BSI only. Record whether the patient had any prosthetic material (e.g. joint replacement, pacemaker, heart valve).
Q61. Duration of BSI >2 days	BSI_IS_COM_2DAYS	select_one YESNO	Select "YES" if there were further blood cultures positive for *S. aureus* more than 2 days after the first one. If only a single blood culture was collected (i.e. no follow-up blood cultures after the first one), then select "UNKNOWN".
Q62. BSI-related fever >3 days	BSI_IS_COM_FEVER	select_one YESNO	Select "YES" if the fever (>38°C) lasted more than 3 days from the date of collection for the first positive blood culture.

10.5.1 Immunosuppression definitions

Immunosuppression item	Definition / Examples
HIV (CD4 ≤200/mm^3)	Patient with HIV infection AND confirmed CD4 count of ≤200/mm^3. OR Patient with HIV infection (CD4 count not available) AND AIDS-defining illness (e.g. cryptococcal meningitis).
End-stage renal disease requiring dialysis	Patient with renal failure needing dialysis within the 48 hours prior to the blood culture collection date.
Insulin-dependent diabetes mellitus	Patient with diabetes mellitus currently treated with insulin.
Active malignancy	Non-cured malignancy (cancer), i.e. untreated or currently treated solid or haematologic malignancy.
Cytotoxic chemotherapy ≤6 months	Receipt of chemotherapy (e.g. methotrexate) within the previous 6 months.
Prednisolone therapy ≥10mg/day	Receipt of at least 10mg prednisolone per day within the 48 hours prior to the blood culture collection date.
Child C cirrhosis	Child-Pugh / Child-Pugh-Turcotte score is a severity score for liver disease patient with cirrhosis: Class C (score 10 – 15) is the most severe with high mortality. Further details can be found here: https://www.mdcalc.com/child-pugh-score-cirrhosis-mortality.

Neutropenia (≤500/mm^3)	Neutrophil count of ≤500/mm^3 from complete / full blood count within the 48 hours prior to the blood culture collection date.
Haematopoietic stem-cell transplantation	Autologous, allogeneic, syngeneic stem-cell ("bone marrow") transplant within the 48 hours prior to the blood culture collection date.
Solid organ transplantation	Transplant of solid organ (e.g. kidney, liver) within the 48 hours prior to the blood culture collection date.

10.6 F06 HAI ward form

Field label	Field name	Field type	Details
Q01. Hospital code	SITEID	text	See F01.
Q02. Hospital name	SITEID_CFM	text	
Q03. Date of survey	SURVEY_DATE	date	Enter the date of the current PPS.
Q04. Ward Type	WARDTYPE	select_one WARDTYPE	Select the primary categorisation of the ward. If patients from more than one specialty are housed on this ward, select the usual dominant patient type.
Q05. Ward	WARD	text	Local ward name.
Q06. Mixed ward (Yes, if patients from multiple services/specialities are housed on the ward.)	MIXWARD	select_one YESNO	Select "NO" if only patients from only one specialty (e.g. medicine OR surgery OR ICU) are housed on the ward. Select "YES" if patients from more than one specialty (e.g. medicine AND surgery). Do not categorise sub-specialities as mixed (e.g. medical cardiology and medical renal patients should be grouped as "MEDICAL").
Q07. Total number of beds	WARD_BEDS	integer	Enter the total number of in-use beds on the ward (e.g. if there are a total of 25 beds but 3 are closed due to staff shortages, record 22
Q08. Total number of patients resident in a bed at 8am on the day of the survey	WARD_PATIENTS	integer	Enter the total number of patients admitted to a bed at 8am on the day of the survey (i.e. do not include patients discharged before 8am or admitted after 8am). Note that the number of medical + surgical + ICU patients must add up to the total number of patients

Q09. Number of medical patients	WARD_MED_PATIENTS	integer	Enter the total number of medical specialty patients admitted to a bed at 8am on the day of the survey. Enter “0” if there are no patients for this category (do not leave blank).
Q10. Number of surgical patients	WARD_SUR_PATIENTS	integer	Enter the total number of surgical specialty patients admitted to a bed at 8am on the day of the survey. Enter “0” if there are no patients for this category (do not leave blank).
Q11. Number of ICU patients	WARD_ICU_PATIENTS	integer	Enter the total number of ICU patients admitted to a bed at 8am on the day of the survey. Enter “0” if there are no patients for this category (do not leave blank).

11 Update history

Version	Date	Summary of changes
1.0	09-Sep-2021	Document created
2.0	12-Oct-2021	Updated figures (typo correction) Added comment re skipping PPS if it falls on a public holiday (section 8.3)
2.1	24-Feb-2022	Updated data collection summary (Q02 hospital name and ACORN ID format)
3.0	21-Apr-2022	Clarified how to deal with delays in patient transfer from Emergency Departments to ACORN surveillance wards (section 7.3)