

1.1 Abbreviations

ACORN	A Clinically Oriented Antimicrobial Resistance Network
AMR	Antimicrobial Resistance
BSI	Bloodstream Infection
CAI	Community-Acquired Infection
CRF	Case Record Form
GCP	Good Clinical Practice
GLASS	Global Antimicrobial Surveillance System
HAI	Hospital-Acquired Infection
MIC	Minimum Inhibitory Concentration
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-lite surveillance, from site set up to collection of clinical, laboratory, and site denominator data and IT / data management. The ACORN-lite diagnostic stewardship manual provides 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 adds 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. To date, ACORN-pilot and ACORN2 have been completed, yielding data on >40,000 clinical infections and >1,300 WHO GLASS surveillance pathogen bloodstream infections (BSI) from 19 hospitals across nine African and Asian countries. ACORN2 provided a very detailed and holistic dataset on hospitalised patients with clinically suspected and treated acute bacterial infections. However, it was recognised to be labour intensive and unsuitable for adoption at scale.

ACORN-lite is a simplified version of the ACORN protocol, enrolling hospitalised patients with confirmed target pathogen BSI. Site-level diagnostic stewardship activities will be implemented to optimise blood culture, to minimise bias and assure good diagnostic coverage. Core 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. Additional surveillance pathogens include common community and hospital-acquired bacterial and fungal species.

Basic demographic characteristics, comorbidities, clinician diagnosis, empiric treatment, and markers of clinical severity are recorded on enrolment and hospital outcome data are collected subsequently. Hospital and laboratory-level denominator data will be captured at monthly intervals during surveillance to facilitate the calculation of infection rates.

Clinical and microbiology laboratory data entry can be done either directly via a web browser into the surveillance REDCap database or via paper case record forms (CRF) with subsequent entry into REDCap. An online dashboard can be used for real-time surveillance data visualisation and reporting. The ACORN-lite surveillance workflow is summarised in Figure 1.

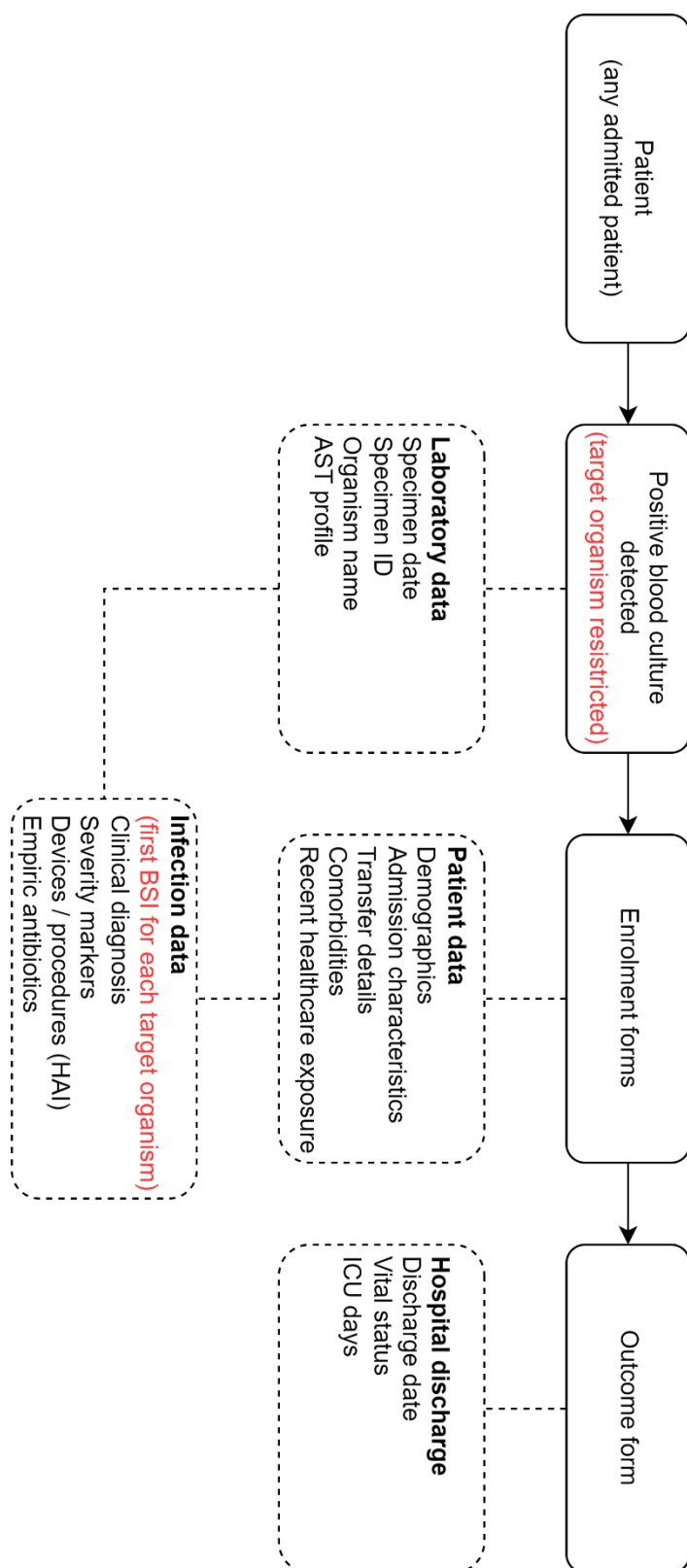


Figure 1. ACORN-lite surveillance workflow

2 Site preparation

2.1 Purpose and Scope

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

2.2 Requirements

- ACORN-lite site preparation checklist.
- REDCap and ACORN-lite dashboard user login details (provided by the ACORN IT team).
- Internet connected device (e.g. laptop or tablet) with web browser for access to the ACORN-lite REDCap databases and project dashboard.
- 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-lite requires engagement with and buy in from hospital management, clinical, and laboratory staff. Early engagement with these groups is critical. The ACORN-lite site timeline / activity summary is outlined in Figure 2.



Figure 2. ACORN-lite surveillance site timeline and activity summary

2.3.1 Determine the key personnel for the ACORN-lite 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-lite 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 Prepare wards and clinical staff for ACORN-lite surveillance

ACORN-lite aims to enrol all hospitalised patients with a target pathogen BSI, which may lead to identification of surveillance cases on any acute care ward / unit where blood cultures are performed. Consideration should be given to harmonisation with other surveillance activities, where possible. Once surveillance staff have been identified, complete the:

- REDCap site summary form (this can be completed using the paper version first, ACORN Form 1).
- REDCap laboratory self-assessment (see section 4).
- Diagnostic stewardship checklist (see section 3).

Prior to commencement of surveillance the ACORN-lite site team should approach the senior clinician(s) and nurse(s) on key acute care wards, along with senior microbiology laboratory staff, to explain the purpose and scope of ACORN-lite. Describe the clinical, laboratory, and diagnostic stewardship components.

- Devise and implement a plan to meet ACORN-lite diagnostic stewardship requirements (see section 3).
- Organise and deliver ACORN-lite orientation presentations to clinical staff working on key acute wards.

Determine how surveillance participants will be identified and followed up:

- Participant details will be recorded in a surveillance logbook:
 - Logbooks will contain patient identifying information so should be kept securely at all times.
 - The ACORN ID is a unique patient identifier, assigned at first enrolment:
 - *AL[For ACORN-lite]NNNNN[5 digit patient ID]*
 - e.g. AL00001 (patient 1), AL00305 (patient 305)
 - These ACORN IDs can be rendered completely unique by concatenating the site ID code prior to analysis, e.g. KH001-AL00305 (Cambodia site 1, patient 305)
 - It does not matter if the patient is readmitted subsequently with another target pathogen BSI: continue to use their original ACORN ID
- Plan how surveillance staff will be alerted to target pathogen 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. If the latter, a system of flagging relevant notes could be implemented, e.g. by adding a coloured / ACORN-lite 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-lite information poster should be displayed on each acute care 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-lite patient information sheet. This may be delegated to nursing staff or a ward administrative office but could also be done by an ACORN-lite site team member during daily surveillance work.
- Random spot checks should be done to ensure that information posters remain in situ during surveillance and that, if delegated, all admissions are given a patient information sheet.

2.3.4 Select method for clinical data collection and entry

Data can be collected either:

- Directly into REDCap via an internet connect device and a web browser. Note: the REDCap mobile app must not be used for ACORN-lite data collection due to known instability issues.
- On paper CRFs and then subsequently entered into REDCap.

2.3.5 Confirm laboratory data access

For target pathogen blood culture specimens, the following data will be required to be entered into REDCap:

- Specimen collection date
- Organism name
- Antimicrobial Susceptibility Test (AST) data
 - Testing protocol (CLSI or EUCAST)
 - For each drug tested:
 - Name
 - Zone diameter (mm)
 - and/or
 - MIC value (ug/ml)
 - and/or
 - Categorical result (susceptible [S] / intermediate [I] / resistant [R])

It is preferable the either zone diameters or MIC values are entered into REDCap, with or without categorical results, as this will permit re-analysis of raw AST data if updates to breakpoints occur in the future.

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-lite 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-lite 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-lite diagnostic stewardship checklist.
- Access to / knowledge of existing local diagnostic stewardship materials.

3.3 Procedure

A member of the ACORN-lite 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 4).

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-lite 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-lite 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 Laboratory assessment

4.1 Purpose and Scope

The purpose of the site laboratory self-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 online REDCap tool focuses on assessment of surveillance data areas of laboratory practice:

- Capture of patient and specimen details
- Ability to detect, identify and perform AST for desired pathogen-drug combinations

4.2 Requirements

- Knowledge of local microbiology laboratory capacity, specimen processing capabilities, and quality management system.
- An internet connected device for direct data entry into REDCap via a web browser.

4.3 Procedure

The online REDCap self-assessment tool should be completed prior to participating in ACORN-lite to identify any gaps.

On completion of the self-assessment a report is auto-generated within REDCap providing a summary of readiness for ACORN-lite surveillance. The report provides a summary of readiness at two levels (see Figure 3):

- Essential: assessment of readiness for surveillance of WHO GLASS target pathogens.
- Non-essential: assessment of readiness for surveillance of additional ACORN-lite target pathogens.

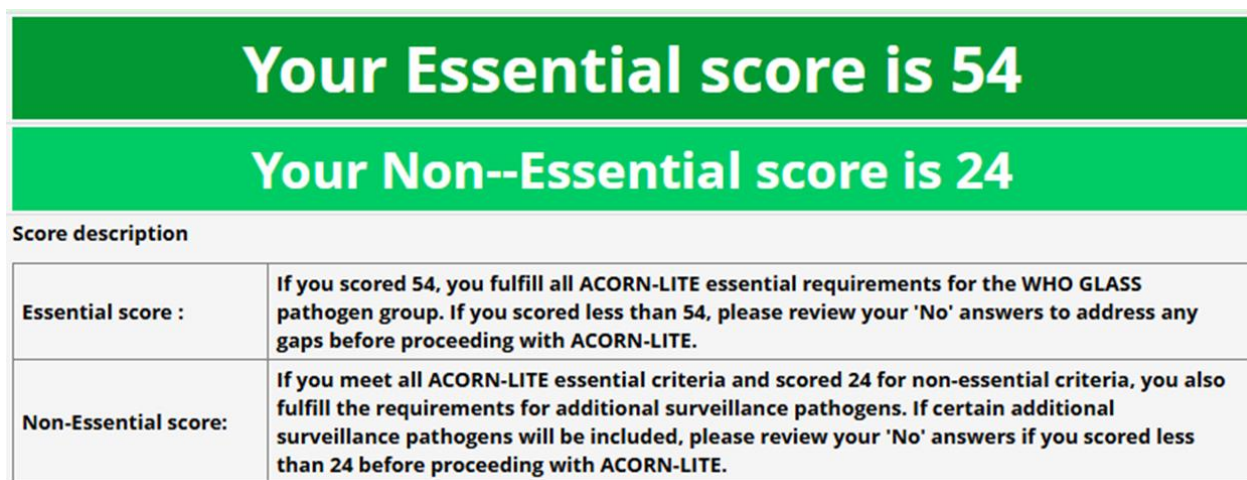


Figure 3. REDCap laboratory self-assessment tool report summary

If less than perfect scores are obtained, all “no” answers should be reviewed to see if corrective action is needed prior to commencement of ACORN-lite surveillance.

An optional REDCap Laboratory Information questionnaire is provided for the local ACORN-lite team to gather standardised laboratory information required to support future publication of surveillance data.

4.4 Additional laboratory resources

A Laboratory Recommendations document will be provided to all sites, documenting key laboratory recommendations for ACORN-lite participation. This document is intended to support non-accredited labs, and promote best practice for ACORN-lite related activities.

Recommendation areas covered include:

- Specimen receipt, testing and reporting.
- Equipment and supply inventories.
- Quality including AST IQC recording and review.
- Safety including provision of PPE and safety audits.

5 Patient enrolment and follow-up

5.1 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.

5.2 Requirements

- ACORN-lite enrolment logbook.
- Data capture tools: either internet connected device for direct data entry into REDCap via a web browser or paper CRF for subsequent data entry into REDCap.

5.3 Surveillance Population

All hospitalised patients of any age (i.e. neonates, children, and adults) with a blood culture positive for one of the target pathogens.

5.4 Identification of Patients

Potentially eligible patients are identified at the point one of the surveillance target pathogens is identified from a clinically collected blood culture. The microbiology laboratory team should alert the ACORN-lite surveillance team to enable prompt review and enrolment.

5.5 Surveillance Procedure Summary

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

- Confirm verbally that the patient or parent / guardian / caretaker / legally 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 with target pathogen BSI during the surveillance period.
- Complete the recruitment logbook.
- Complete F01 – Enrolment form.
- Complete F02 – Infection episode form.

If this patient has additional eligible BSI episodes during the admission, complete a new F02 for each episode. First BSI episodes for each target pathogen during the current hospitalisation are considered eligible (see Figure 4).

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

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 in REDCap.

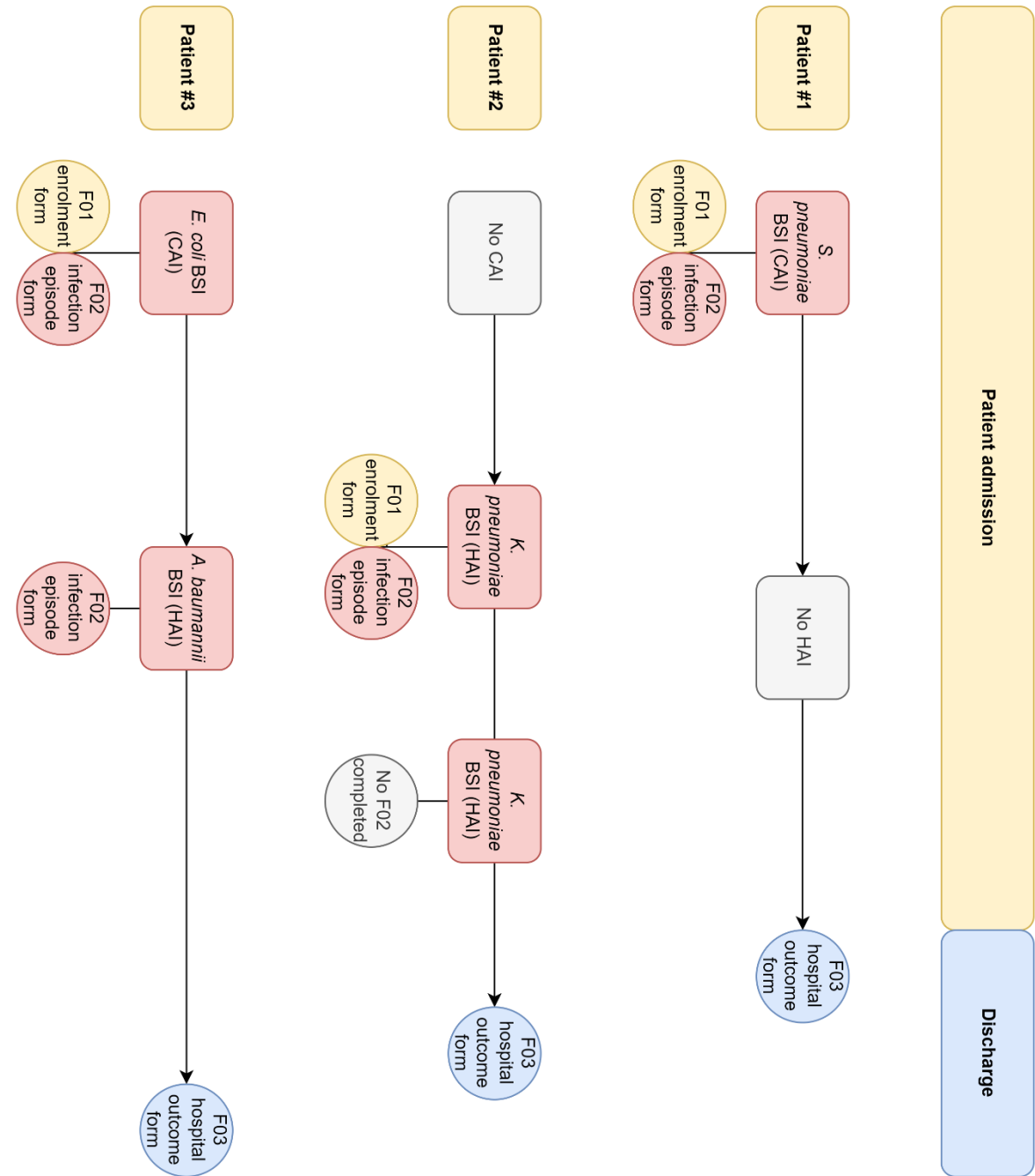


Figure 4. Patient enrolment and follow-up summary

6 Data management and IT

6.1 Purpose and scope

To describe data entry and management using REDCap and data visualisation using the ACORN-lite dashboard.

6.2 Requirements

- An internet connected device with a web browser.

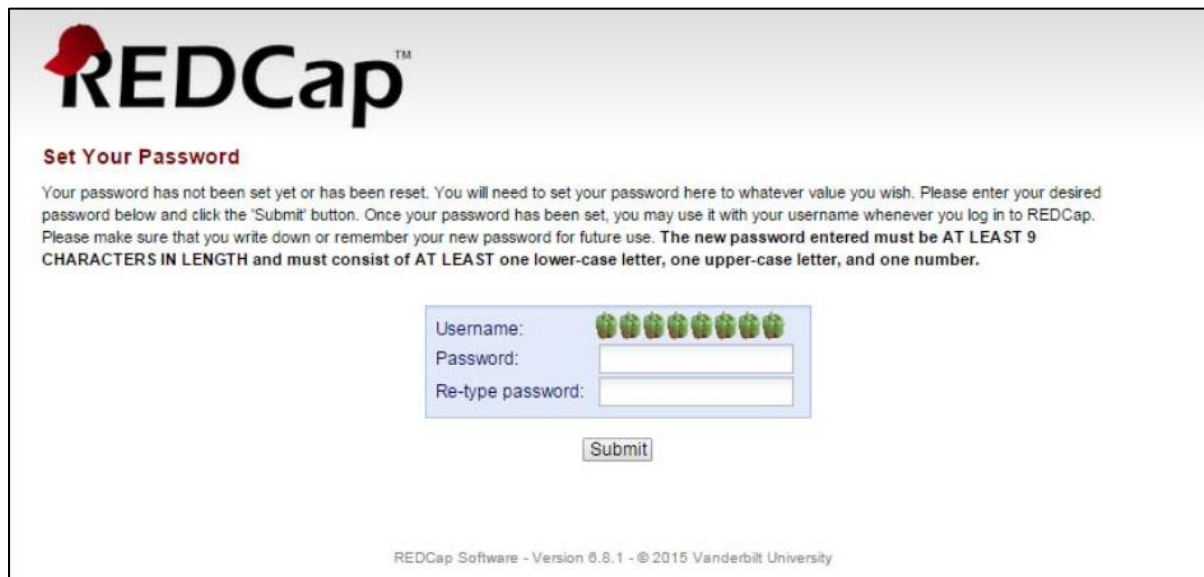
6.3 REDCap

REDCap is a secure web application for building and managing online surveys and databases. The ACORN IT team has set up a database in REDCap to enter ACORN-lite clinical surveillance data. The ACORN-lite REDCap database should be hosted on a secure server and managed according to local data policies.

6.4 Accessing the ACORN REDCap Database

Make sure you have been assigned a unique username. This will have been set up by the local IT or database team. If you do not have one or it does not work please contact the REDCap database manager.

When your user account is set up, you will receive an email with the subject “REDCap access granted” which contains your username. Click on the link ‘Set your new REDCap password’ in the email. This will take you to the password setup page in REDCap.



You will see your username in the dialog box. Click in the ‘password’ field to set your password. The password should be AT LEAST 9 CHARACTERS IN LENGTH and must consist of AT LEAST one lower-case letter, one upper-case letter, and one number.

Open any browser (it has been tested with the most common browsers including Safari, Chrome, Firefox, Edge) and go to your ACORN-lite REDCap production database.

Bookmark this page in your browser.

Important note: you must verify that you are logged into the correct database for data entry (as you will have access to a test database during training).



REDCap

Log In

ACORN

Please log in with your user name and password. If you are having trouble logging in, please contact [REDCap support team](#).

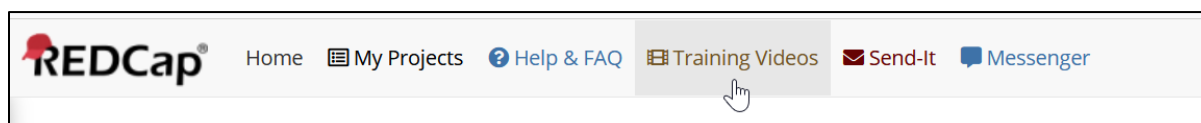
Username:

Password:

[Forgot your password?](#)




Enter your login details.

Once logged in the “Training Videos” section gives 3 short videos to help you quickly get started with REDCap if you have never used it before.

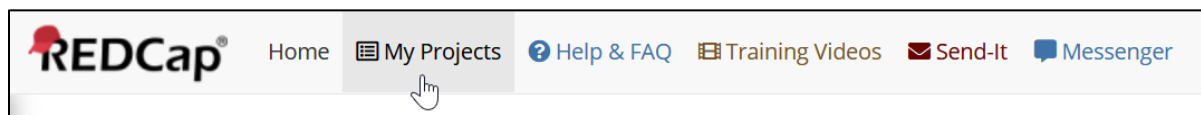


REDCap Training Videos

Just Getting Started?
Explore these overviews of fundamental concepts and features.

Title	Description	Watch Video
Brief Overview	A quick summary of what REDCap is and what it can do.	 4 minutes
Detailed Overview	This video provides an overview of basic functions and features within a REDCap project. It will serve as a starting point for learning about the basic concepts of REDCap, what REDCap projects are, how to create them, and how to use them.	 14 minutes
Data Entry Overview	A focused exploration of basic data entry workflow. Suitable for training data entry staff.	 19 minutes

Once comfortable with the basics, click on “My Projects”



You will see a list of the ACORN projects you have access to:

My Projects Organize		Filter projects by title				
Project Title	Records	Fields	Instrument	Type	Status	
ACORN-Lite	89	11	246	3 forms	■	⚙️
ACORN-Lite Site Information	91	5	81	2 forms	■	⚙️
ACORN-Lite Laboratory	92	8	155	2 forms	■	⚙️

- **ACORN-Lite** is for clinical data.
- **ACORN-Lite Site Information** is for site level data.
- **ACORN-Lite Laboratory** is for site laboratory quality assessment and monitoring data.

To access a project, click on the project title. You will then see the Project Homepage:

Logged in as Jill | [Log out](#)

[My Projects](#)

[REDCap Messenger](#)

[Contact REDCap administrator](#)

Project Home and Design

[Project Home](#) · [Codebook](#)

Project status: **Development**

Data Collection

[Record Status Dashboard](#)
- View data collection status of all records

[Add / Edit Records](#)
- Create new records or edit/view existing ones

Show data collection instruments

Applications

[Calendar](#)

[Data Exports, Reports, and Stats](#)

[Customize & Manage Locking/E-signatures](#)

[Data Quality](#) and [Resolve Issues](#)

Help & Information

[Help & FAQ](#)

[Video Tutorials](#)

[Suggest a New Feature](#)

[Contact REDCap administrator](#)

ACORN-Lite PID 89

[Project Home](#)

The tables below provide general dashboard information, such as a list of all users with access to this project, general project statistics, and upcoming calendar events (if any).

Current Users (6)

User	Expires
jill (Jill Hopkins)	never
naomi (Naomi Walthira)	never
olivier (Olivier Celhay)	never
pault (Paul Turner)	never
prapass (Prapass Wannapini)	never
vanapol (Vanapol Vanapol Cl)	never

Project Statistics

Records in project	11
Most recent activity	18-03-2025 10:18
Space usage for docs	0.24 MB

Upcoming Calendar Events (next 7 days)

Time	Date	Description
		No upcoming events

6.5 Data Entry

Go to Data Collection -> Record Status Dashboard

Data Collection

[Record Status Dashboard](#)

[Add / Edit Records](#)

There you can see all the current records and their status based on your user settings.

In the section below, the process for data entry for clinical data is summarised. The procedure is identical for entry, and correction, site-level data, and laboratory assessment data.

6.5.1 Clinical Data Entry from Paper CRFs

If you are recording ACORN-lite data manually onto paper CRFs and need to enter that data into the database you will need to create a New Record for each Patient. The flow of data entry in REDCap follows the same as the paper CRFs.

F01 Enrolment – Complete 1 for each and every patient

F02 Infection Episode – Complete 1 for each and every patient. Some patients will have more than 1.

F03 Infection Hospital Outcome - Complete 1 for each and every patient

In REDCap all 3 forms are linked in 1 record. 1 record is equivalent to a single hospital admission: if the patient is readmitted, another F01 is completed etc.

Click the Green “Add New Record” Button on the Record Status Dashboard page

You will see the Record Home Page with the list of Forms and their Status

[+ Add new record](#)

NEW Record ID 12

Data Collection Instrument	Status
F01 Admission enrolment	<input type="radio"/>
F02 Infection episode	<input type="radio"/>
F03 Discharge	<input type="radio"/>

Click on the Status Icon to access the form

- Enter the data from the paper CRF into the REDCap form.
- The database questions are the same as in the CRFs, however there are some logic rules in REDCap which means that some questions and/or answers may be hidden based on answers to previous questions.
- Below each question in red text are requirements and/or information for the question for clarity and help.
- You can use the Reset button on the right of each question to clear answers to re-enter.

The last question on every form is:

Is marked as delete record.

☐ Yes
☐ No

[reset](#)

Make sure to click No to this question (it is used only by the central ACORN data management team).

Form Status	
Complete?	<div>   Incomplete ▾ </div>

When you complete all questions on this form, select the 'Complete' status from the drop down menu above. If some values are unavailable, select the 'Incomplete' status and save the form.

6.5.2 Finishing the Form

<div> <div>Save & Exit Form</div> <div>Save & Go To Next Form ▾</div> </div> <div>-- Cancel --</div>
--

You can "Save & Exit" if you are finished with the data entry or you can "Save & Go To Next Form" to continue with the data entry.

6.5.3 Searching For and Finding Records

You most likely will not have all the data for each patient at one time and will need to go back and fill in more later (such as discharge data or second infection episode).

To search for a record you need a unique identifier such as the **ACORN ID**.

Go to Data Collection -> Add / Edit Records

Data Collection
<div> <div></div> Record Status Dashboard </div> <div> <div></div> Add / Edit Records </div>

In the Data Search Field, choose a field to search (ACORN ID) and enter the ACORN ID in the search query.

Data Search	
Choose a field to search (excludes multiple choice fields)	<div>acornid (ACORN ID) ▾</div>
Search query Begin typing to search the project data, then click an item in the list to navigate to that record.	<div></div>

The search and result will appear automatically.

Click on the search result to go to that record.

It will take you to F01 first, you can navigate to different forms in the record using the “Save and Go To Next Form” button on the bottom of the form (the button is also on the top right). Or you can use the forms menu on the left.

Save & Go To Next Form

To add an additional F02 Infection Episode, click the small + sign to the right of the form name

6.6 Data Edit/Correction from ODK entry

It is possible to edit the data via REDCap.

If you notice a data entry error follow these steps:

1. Record it in the site “Data Entry Error Log”. It is important to keep an error log with details including the ACORN ID, details of the error (field or question number and what was wrong, for example “wrong birthdate in F01, question 8”) and details of the resolution (for example “entered correct birthdate via REDCap”), and the date and signature of the person who made the change. See example below.
2. Find the correct record using the REDCap search function (see Searching For and Finding Records section above).
3. Edit data as required (record details in Data Entry Error Log).
4. Save updated form in REDCap.

Example of Data Entry Error Log:

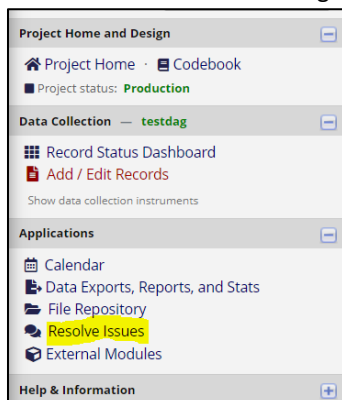
ACORN Data Entry Error Logbook				
Date logged	ACORN ID	Description of problem	Outcome / Action	Sign/Initial
			<input type="checkbox"/> Resolved	
			<input type="checkbox"/> Resolved	

6.7 Data Error Checking

REDCap has some built in and default checks in the database such as validation rules. The data manager will provide regular reports and highlight records requiring manual review. These will be notified to the site data manager by email.

6.7.1 Resolving REDCap data queries [Site users]

1. A summary of assigned queries is accessible on the left hand pane of the home page or by clicking 'Resolve Issues' as in the image below.



2. In the 'Resolve Issues' tab, the user will see a summary of all queries. The 'First update' column tells what error needs fixing. Open the participant's record by clicking on the participant's ID in the 'Record' column. You may update the incorrect or blank data based on the source documents, if available. Save the changes.

Data Resolution Dashboard						
Filters:		Open / unresolved issues (2)				
All fields and rules						
All data access groups						
User assigned (all users) or not assigned						
Click button to view data query	Record (Sorted by DAG)	Data Quality rule and/or Field	User Assigned	Days Open	First Update	Last Update
1 comment	A12345 210813	Rule #30: F03-Check3 (Infection episode diagnosis) : Evaluate = True.	-	0	Naomi (11-10-2021 13:02): "Final diagnosis is blank"	[same as first update]
1 comment	import-acorn1b-100 ACORN-100	Rule #28: F01- Check1 (Age, Admission type, reason, comorbidity) : Evaluate = True	-	0	Naomi (11-10-2021 13:08): "Comorbidity is blank"	[same as first update]

Click here to update query status

Click here to update participant's data

Tells you the error in the data

- Return to the 'Resolve Issues' tab to update the query status by clicking on the 'Comment bubble' in the first box of the image above. A pop-up box will appear as below. Click 'Reply with response', select the applicable response from the drop down list, type OK in the comment box, and click Respond to Query.

Record ID : A12345_210813
Rule: **Rule #30:** F03-Check3 (Infection episode diagnosis) : Evaluate = True.
Status: **Open / Unresolved** (unresponded)

Date/Time	User	Comments and Details
11-10-2021 13:02		Action: Opened query Comment: "Final diagnosis is blank"
11-10-2021 13:08		<div> <div> <input checked="" type="radio"/> Reply with response: -- choose response -- </div> <div> <input type="radio"/> Upload file (optional): Upload file </div> <div> <input type="radio"/> OR <input type="radio"/> Close the query </div> </div> <div> Comment: <input type="text"/> </div>

Respond to query Cancel

- Corrected-Data missing
- Corrected-Typographical error
- Corrected-Wrong source used
- Verified-Confirmed correct (no error)

6.7.2 Resolving REDCap data queries [Data manager]

The data manager will review updated responses from the Data resolution dashboard. If the proposed resolution is satisfactory, the query will be closed, otherwise the query will be reissued ('Sent back for further attention').

Record ID : A12345_210813
Rule: **Rule #30:** F03-Check3 (Infection episode diagnosis) : Evaluate = True.
Status: **Open / Unresolved** (responded)

Date/Time	User	Comments and Details
11-10-2021 13:02		Action: Opened query Comment: "Final diagnosis is blank"
11-10-2021 15:19		Response: Corrected - Wrong source used Comment: "no data update"
11-10-2021 15:19		<div> <input type="radio"/> Close the query <input checked="" type="radio"/> Send back for further attention </div> <div> Comment: <input type="text"/> </div>

Send back for further attention Cancel

6.7.3 Monitoring query status

- Site users, project managers and the data manager may monitor query status from the Data Resolution Dashboard. Summaries of queries can be viewed by using the filtering options (by query status, days open, assigned use). Queries may be exported in Excel format for further reporting, basic metrics can be viewed in the 'Resolution Metrics' tab.
- The data manager will generate data query summaries for review in periodic team meetings or with sites on request.
- If queries are open for more than 14days, the data manager will send the site an email reminder to resolve the queries.

6.7.4 Data error log in ACORN dashboard/app

Data can be checked at any time in the dashboard and an additional error log downloaded for action in REDCap.

6.8 Dashboard

The online ACORN-lite data visualisation and reporting dashboard can be accessed via: <https://acornamr.net/#/>.

7 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).

7.1 F01 – Enrolment form

Field label	Field name	Field type	Details
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).
Participant details			
Date of enrolment	dmdtc	date	The date the patient was first enrolled into ACORN-lite on this admission.
ACORN ID	acornid	text	Anonymous ACORN surveillance ID number. Must be in the following format: ALnnnnn where nnnnn is the 5-digit running number within the site.
Date of birth	brthdtc	date	Patient date of birth. If unknown, leave blank.
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.
Age (Months)	agem	integer	
Age (Days)	aged	integer	
Sex	sex	select one	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”.

Date of admission	hpd_adm_date	date	Admission date of the patient to the hospital.
If neonate (< 28 days): Birth weight (Kg)	brthweight	number	Birthweight in kilograms (Kg). Complete for neonates (<28 days at admission).
If neonate (< 28days): Gestational age (Weeks)	brthga	integer	Gestational age in completed weeks. Complete for neonates (<28 days at admission).
Transfer from another hospital	hpd_is_hosp_date	select one	Enter "YES" if the patient was transferred directly from another hospital.
Transfer from another facility (e.g. long-term care facility)	hpd_is_othfaci_date	select one	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.
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.
Admission type	hpd_admtype	select one	Was the admission an "EMERGENCY" (unexpected / not pre-planned) or "ELECTIVE" (planned).
Primary admission reason	hpd_admreason	select one	Enter the main clinical reason for current hospital admission.
Comorbidities			
Updated Charlson Comorbidity Index conditions	cmb_comorbidities	select multiple	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			

Overnight hospitalisation in 3 months (90 days) before admission	cmb_overnight	select one	Ask patient directly if not recorded in clinical notes.
Regular hospital contact (e.g. dialysis, cancer treatment in the 3 months (90 days) before admission)	cmb_rhc	select one	Ask patient directly if not recorded in clinical notes.
Surgery in the last 3 months (90 days) before admission	cmb_surgery	select one	Ask patient directly if not recorded in clinical notes.

7.1.1 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*
Dementia	Patients with chronic cognitive deficit.	
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.	
Rheumatic disease	Patients with systemic lupus erythematosus, polymyositis, mixed connective tissue disease, polymyalgia rheumatic, and moderate to severe rheumatoid arthritis.	
Mild liver disease	Patients with chronic hepatitis or cirrhosis without portal hypertension.	
Diabetes with end organ damage	Patients with diabetes mellitus AND retinopathy, neuropathy, or nephropathy.	

Hemiplegia or paraplegia	Patients with the dense hemiplegia or paraplegia, whatever it occurred as a result of a cerebrovascular accident (stroke) or other condition.	
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.	
Any malignancy without metastasis	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, Waldstrom's macroglobulinemia, myeloma, and other lymphomas.	
Moderate or severe liver disease	Patients with cirrhosis with portal hypertension with or without a history of variceal bleeding.	
Metastatic solid tumour	Patients with metastatic solid tumors, including breast, lung, colon and other tumors.	
AIDS (excluded asymptomatic infection)	Patients with definite or probable acquired immune deficiency syndrome (AIDS), i.e HIV positive AND CD4 ≤200/mm ³ or AIDS-defining opportunistic infections.	

* 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>

7.2 F02 – Infection episode form

Field label	Field name	Field type	Details
Hospital code	f02_siteid	text	See F01.
ACORN ID	f02_acornid	text	
Date of admission	f02_hpd_adm_date	date	
Date of episode enrolment	inf_episode_enroltdc	date	Enter the date the patient was enrolled for this patient episode (i.e. the date of completing this form).

Ward Type	inf_wardtype	select one	Select appropriate ward category (closest match).
Ward	inf_wardname	text	Local ward name.
Blood culture details			
Date of blood culture collection	inf_culturedtc	date	Date that the blood culture was collected (not the date that it flagged positive)
Received ≥ 1 dose of a systemic antibiotic in the 24 hours before the blood culture collected	inf_is_atb_onfirstday	select one	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.
Organism	inf_org	select one	Select surveillance target pathogen isolated from the blood culture
if other, please specify	inf_org_oth	text	Add organism name (if "OTHER" selected for previous question)
Antimicrobial / AST Standard	atb_xxx_atb	select one	For each antimicrobial, select testing standard used (CLSI or EUCAST)
Result (S/I/R)	atb_xxx_res	text	For each antimicrobial, enter categorical susceptibility result (S / I / R)
Zone diameter (mm)	atb_xxx_zone	integer	For each antimicrobial, enter zone diameter between 6 and 50 mm If the recorded values is >50 mm, just enter 50
MIC (ug/ml)	atb_amk:pos_mic	number	For each antimicrobial, enter a valid MIC value between 0.002 and 1024 ug/ml If the recorded value is "<=" or ">=", just enter the number
Infection details			
Surveillance category	inf_cat_hai	select one	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”.
Clinically suspected infection (reason for IV antibiotic prescription)	inf_suspect_inf_unk	select one	Select this if the clinical infection category is unknown. It will be necessary to check with the treating clinician if this is not documented.
	inf_suspect_inf	select multiple	Enter the MOST LIKELY clinical infection category (see table below). One category is preferred, but it is possible to enter multiple infection categories.
Severity score (participant is ≥18 years): qSOFA score on day of blood culture collection			
Altered mentation (GCS <15)	inf_sev_18upalt_men	select one	Clinical severity based on information documented in the clinical or nursing notes at the time of the main clinical assessment on the day of blood culture collection. 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”.
Respiratory rate (≥22 /min)	inf_sev_18uprr	select one	
Systolic blood pressure (<100 mmHg)	inf_sev_18upsys	select one	
Abnormal core temperature (<36°C or > 38°C)	inf_sev_18upsys_abtemp	select one	
Severity score (participant is <18 years): LqSOFA score on day of blood culture collection			
Prolonged capillary refill time (see explanation below)	inf_sev_under18cap	select one	Clinical severity based on information documented in the clinical or nursing notes at the time of the main clinical assessment on the on the day of blood culture collection. If there are multiple assessments on this day, document the first one. If something is not clear, ask the treating clinician to clarify.
Altered mental state (see explanation below)	inf_sev_under18vpu	select one	
Fast respiratory rate (see explanation below)	inf_sev_under18frr	select one	
Inappropriate tachycardia (see explanation below)	inf_sev_under18tach	select one	

Abnormal core temperature (<36°C or > 38°C)	inf_sev_under18abtemp	select one	If information is not available, record "UNKNOWN".
Reduced level of activity	inf_sev_under18neo_rdact	select one	Clinical severity, neonate only.
Feeding difficulty	inf_sev_under18neo_feed	select one	Clinical severity, neonate only.
Convulsions	inf_sev_under18neo_convul	select one	Clinical severity, neonate only.
HAI-specific questions			
Date of symptom onset	hai_onset_date	date	Enter the date on which symptoms were first noted / recorded for the suspected HAI episode
Medical devices present on the day of HAI symptom onset	hai_have_med_device	select multiple	Select the appropriate devices from the list (multiple selections possible). Select "NONE" if no devices were present on the day of HAI onset.
Admitted to ICU for more than 48 hours (2 days) since admission and day of HAI symptom onset	hai_icu_48hr	select one	Select "YES" if the patient stayed more than 48 hours at the ICU between admission and day of HAI onset.
Surgery since admission and day of HAI symptom onset	hai_sur	select one	Select "YES" if the patient had any surgical procedure between admission and day of HAI onset, requiring local or general anaesthesia.
Blood culture details			
Blood culture collected within 24 hours of admission (CAI) / symptom onset (HAI)	MIC_BLOODCOLLECT	select one	According to clinical records, record whether the patient had a blood culture collected within 24 hours of admission (CAI) / symptom onset (HAI).
Empiric antibiotic treatment			
Systemic antibiotics prescribed on day of blood culture collection	atb_treatment	select multiple	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.
If other antibiotic please specify	atb_treatment_oth	text	Free text to enter the antibiotic name, if not on the list.

7.2.1 F02 Infection categories

Infection category	Examples
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)
Other	Defined diagnosis but not included in the list
Unknown	Reason for antibiotic not documented
Central nervous system	Brain abscess, encephalitis, meningitis, myelitis, spinal abscess, ventriculitis

7.2.2 F02 Paediatric severity definitions

Age group	Fast heart rate (beats per minute)	Fast respiratory rate (breaths per minute)
0 – <3 m	>186	>76
3 – <6 m	>182	>71
6 – <9 m	>178	>67
9 – <12 m	>176	>63
12 – <18 m	>173	>60
18 – <24 m	>170	>57
2 – <3 y	>167	>54
3 – <4 y	>164	>52
4 – <6 y	>161	>50
6 – <8 y	>155	>46
8 – <12 y	>147	>41
12 – <15 y	>138	>35
15 – <18 y	>132	>32
Altered mental state (all ages)	VPU on the AVPU score (i.e. not “alert”)	
Prolonged capillary refill time (all ages)	Capillary refill time ≥3 seconds	

7.3 F03 – Infection and hospital outcomes form

Field label	Field name	Field type	Details
Hospital code	f03_siteid	text	See F01.
ACORN ID	f03_acornid	text	
Date of admission	f03_hpd_adm_date	date	
Discharge details			
Discharge status	ho_disstatus	select one	Vital status of patient at discharge.
Date of discharge	ho_discharge_date	date	Date of hospital discharge.
Total number of days on ICU since admission.	ho_daysicu	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 10 th January and discharged on 13 th January, record 3 days [11 th and 12 th would count for one day each but 10 th / 13 th would count for one day combined]).
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7.4 Forms 1 and 2 - Site denominator data definitions

Admissions: Total number of inpatient admissions to the hospital during the reporting period.

Patient days: Total number of patient days of care, i.e. the sum of the lengths of admission of each patient during the reporting period.

Average length of stay: Average length of hospital admission in days (if "Patient days" are not available).

Beds (all): Total number of beds in the hospital. If changes occurred during the reporting period, record the average number.

Beds (acute only): Number of beds in the hospital, excluding non-acute wards e.g. long-term care / rehabilitation / psychiatry. If changes occurred during the reporting period, record the average number.

ICU beds: Number of high-acuity beds in the hospital (including adult, paediatric, neonatal, and surgical intensive care units). If changes occurred during the reporting period, record the average number.

Blood cultures processed: Total number of blood cultures processed for patients from the hospital, excluding cultures processed for external sites / clinics. If a pair of bottles (i.e. aerobic and anaerobic) are sent routinely, then count this as a single culture set.

8 Update history

Version	Date	Summary of changes
1.0	22-Apr-2025	Document created