Healthcare Associated Infections Surveillance

Standard Operating Procedure

Government of Nepal
Ministry of Health and Food Safety
Department of Health Services
Nursing and Social Security Division

Preliminaries

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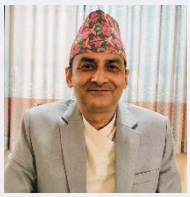

Foreword

Health care-associated infections (HAIs) continue to pose a significant threat to patient safety and public health, both globally and in Nepal. The development of the **Standard Operating Procedure (SOP) for Health Care-Associated Infection Surveillance** reflects Nepal's commitment to strengthening Infection Prevention and Control (IPC) systems and achieving the Sustainable Development Goals (SDGs), particularly Target 3.d, which focuses on enhancing national capacity for early warning, risk reduction, and the management of health emergencies. HAI surveillance is also recognized as a key indicator of IPC core capacity under the International Health Regulations (IHR 2005). By institutionalizing this SOP, Nepal is strengthening its health security, improving patient safety, and fulfilling its international commitments to prevent and control infectious diseases.

This SOP provides a standardized framework to guide health institutions in implementing effective and consistent HAI surveillance. It supports evidence-based decision-making, strengthens IPC practices, and contributes to achieving universal health coverage by improving the quality and safety of healthcare services across all levels of the health system.

The Ministry extends its sincere appreciation to all partners and stakeholders for their valuable technical contributions to the development of this SOP. We are confident that its effective implementation will strengthen HAI surveillance, enhance patient safety, and contribute to a more resilient health system in Nepal.

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Dr. Bikash Devkota

Secretary

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Foreword

It is with great pride and a deep sense of responsibility; I present the Standard Operating Procedure (SOP) for Health Care-Associated Infection (HAI) Surveillance. This document represents a significant milestone in our collective efforts to strengthen infection prevention and control (IPC) practices across all tiers of the healthcare system.

Health care-associated infections remain a critical challenge to patient safety, healthcare quality, and public health. These infections not only place an additional burden on our healthcare infrastructure but also erode the trust that patients place in our services. In recognition of this, the Department of Health Services has prioritized the establishment of a robust, evidence-based, and contextually relevant surveillance system to detect, monitor, and respond to HAIs in a timely and effective manner.

This SOP is the product of extensive collaboration among public health professionals, clinicians, epidemiologists, frontline healthcare workers, and technical partners. It provides a standardized and practical framework for surveillance activities, ensuring consistency in data collection, analysis, and reporting. More importantly, it equips healthcare facilities with the tools necessary to identify infection trends, implement timely interventions, and improve patient outcomes.

The Department of Health Services remains committed to support the effective implementation of this SOP through capacity building, technical guidance, and continuous monitoring. Together, we can ensure that every health facilities are equipped to prevent, detect, and respond to healthcare-associated infections with confidence and competence.

I extend our sincere appreciation to the World Health Organization for its immense support in strengthening IPC and the HAI surveillance program in Nepal. I am also deeply grateful to the National Steering Committee, Technical Working Committee members (IPC), and the Nursing and Social Security Division for their tireless effort, technical expertise, and unwavering dedication in bringing this important document to completion.

As we move forward, I call upon all stakeholders, healthcare providers, administrators, and policymakers to adopt and implement this SOP. Let us work together to uphold the highest standards of care and protect the health and dignity of every patient we serve.

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Dr Anuj Bhattachan
Acting Director General
Department of Health Services
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Acknowledgement

The development of the **Standard Operating Procedure (SOP) for Health Care-Associated Infection (HAI) Surveillance** marks an important milestone in strengthening infection prevention and control (IPC) systems in Nepal. On behalf of the Nursing and Social Security Division, I extend my sincere appreciation to all who, through their dedication, expertise, and collaboration, made this document possible.

I express my heartfelt gratitude to the National Technical Working Committee on IPC for its invaluable technical guidance and strategic leadership throughout the development process. I also sincerely acknowledge the Section Chief, technical teams, content writers, clinicians, and professional societies and health care professionals for their valuable contributions and unwavering commitment. My sincere thanks are extended to the World Health Organization (WHO) for its continued technical support and partnership in advancing IPC and HAI surveillance in Nepal.

This SOP reflects our collective commitment to improving patient safety and the quality of healthcare services. I am confident that it will serve as a valuable resource for strengthening HAI surveillance and enhancing IPC practices across all levels of the health system.

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Ms. Hira Kumari Niraula
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Acknowledgement

It has been a privilege to lead the development process of the *Standard Operating Procedure (SOP) for Health Care-Associated Infection (HAI) Surveillance* as Section Chief of the Program Division. This document is the result of dedicated teamwork, technical collaboration, and a shared commitment to strengthening infection prevention and control (IPC) practices across Nepal's health system.

I would like to express my sincere appreciation to the National Steering Committee and the Technical Working Committee of IPC for their expert guidance and valuable contributions throughout the development process. Their insights were instrumental in shaping the document that is technically sound and operationally feasible. My heartfelt thanks go to the content writers and all the contributors for their expert input greatly enriched the technical depth and relevance of this document.

Special thanks to the World Health Organization (WHO) for its exceptional partnership and technical support. As part of its ongoing efforts, NSSD reaffirms its commitment to strengthening the Antimicrobial Stewardship Program through the HAI surveillance initiative, ensuring data-driven strategies to combat antimicrobial resistance, healthcare associated infection and enhance patient safety.

Finally, I express my deepest appreciation to my team at the Program Division and all supporting hands who worked diligently behind the scenes. Your commitment, coordination, and perseverance have been vital in bringing this important initiative to completion.

I look forward to its effective implementation and the positive impact it will have on patient safety and health system resilience.

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Ms. Bala Rai
Chief, Nursing Capacity Development Section
Nursing and Social Security Division
Date:

Contents

 # This document was approved by a ministerial-level decision in November 2025.

A. Abbreviations

AMR: Anti-Microbial Resistance

AMS: Anti-Microbial Stewardship

BSI: Blood Stream Infections

CAUTI: Catheter Associated Urinary Tract Infections

CLABSI: Central Line Associated Blood Stream Infection

CSD: Curative Service Division

DUR: Device Utilization Ratio

EHR: Electronic Health Record

HAI: Healthcare Associated Infections

IHR: International Health Regulations

IPC: Infection Prevention and Control

IR: Interventional Radiology

JEE: Joint External Evaluation

LOA: Location of Attribution

MD: Management Division

MDR: Multi-Drug Resistant

NNIS: National nosocomial infections surveillance system

NSSD: Nursing and Social Security Division

OR: Operating Room

SOP: Standard Operating Procedure

SSI: Surgical Site Infection

TWC: Technical Working Committee

UTI: Urinary Tract Infection

VAP: Ventilator Associated Pneumonia

WHO: World Health Organization

XDR: Extensively Drug Resistant

B. Terminologies

Benchmarking: Comparing HAI incidence rate and other performance metrics against standards or best practices to identify areas for improvement.

Case Definition: Standardized criteria used to identify and classify HAIs for surveillance purposes

Colonization: The presence of bacteria or fungi on or in a body site without causing disease or symptoms.

Date of Event (DOE): The date when the first criterion required to meet the case definition occurs within the surveillance window period. It is the earliest date on which relevant symptoms appear, or a diagnostic test result used to meet the infection criteria become positive.

Note: Use the specimen collection date as the event date when a laboratory test is required to confirm the case, not the result date.

Denominator Data: It refers to the population at risk for HAIs, such as the total number of patient-days or device-days (e.g., central line-days, urinary catheter-days). This data is used to calculate infection rates and provide context for the numerator data.

Device days: It refers to the total number of days that patients have a specific medical device e.g. central line, mechanical ventilator, urinary catheter etc. in place during a defined surveillance period.

Example: Daily count of patients with a specific device in place

Day	Number of Patients with specific device
1	5
2	4
3	6
Total Device Days	15

Device Utilization Ratio (DUR): The device utilization ratio (DUR) is used during reporting to contextualize the HAI incidence. This is important because facilities that have high rates of devices usage will likely have higher device associated infection rates. DUR can be calculated by dividing the device days by patient-days.

Event Timeframe: It refers to the specific period during which the onset of an infection is associated with healthcare exposure, based on standardized criteria. It helps determine whether an infection to be considered as a healthcare-associated infection (HAI) rather than a community-acquired one. To avoid duplicate reporting and ensure accurate infection tracking 14-Day Rule for the event timeframe should be applied here.

In HAI Surveillance event timeframe is a **14-day calendar period**, beginning with the **date of the first documented infection event (Day 1)**.

During this period:

- No new infections of the **same HAI type** are reported for the same patient.
- Any **additional organisms** identified from the same infection site within this timeframe are considered part of the **same HAI event**, not a new one.

Examples of Applying the Event Timeframe:

- The patient's BSI (bloodstream infection) event date is June 1, which is the date when a blood sample was collected and tested positive for Staphylococcus aureus. Streptococcus pneumoniae was isolated in a blood sample collected on June 10 from the same patient. Since this sample was collected within the Event Timeframe (June 1–14), it should be included as part of the same BSI event. It is important to remember that the Event Timeframe remains the same; a new Event Timeframe is not constructed around the second positive blood culture in this example.
- The patient's BSI (bloodstream infection) event date is June 1, which is the date when a blood sample was collected and tested positive for Staphylococcus aureus. On June 20, another positive blood culture is collected from the same patient. This collection date is outside the Event Timeframe of June 1 – 14. Regardless of whether the organism(s) isolated is different from those isolated previously, if the remaining BSI criteria are once again met, a new BSI event should be reported with a new date of event.

Healthcare-associated Infection: An infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission. It is also known as a nosocomial or hospital-acquired infection. The primary aim of HAI surveillance is to gather and analyze data on healthcare-associated infections to enhance healthcare quality, improve patient safety and outcomes, and guide the development and implementation of infection prevention and control (IPC) policies.

Incision: It refers to a surgical cut made through the skin or mucous membrane during the primary operative procedure, including laparoscopic trocar sites. If a trocar site is later used to place a drain, it is still considered part of the primary surgical incision.

Infection Prevention and Control (IPC): Programs and practices designed to prevent the spread of infections.

Location of Attribution (LOA) The inpatient location where the patient was assigned on the date of event (DOE) is the location of attribution (LOA) (see date of event definition). Non-bedded patient locations, for example, Operating Room (OR) or Interventional Radiology (IR) are not eligible for assignment of LOA for HAI events. Location of attribution must be assigned to a location where denominator data (for example, patient days, device days) can be collected.

Numerator Data: Numerator data refers to the number of new cases of a specific infection (HAI) occurring within a defined population during a specified time period.

Outbreak: The occurrence of more cases of a particular infection beyond expected levels in a specific area or among a specific group of people over a particular period.

Outbreak Investigation: The process of identifying the source and controlling the spread of infections during an outbreak.

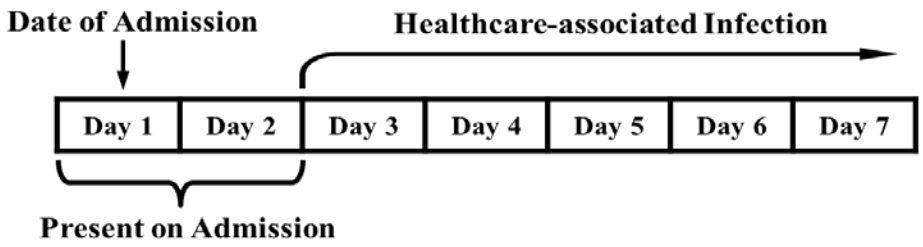
Pathogen: A microorganism that can cause disease, such as bacteria, viruses, fungi, or parasites.

Patient-days: represent the cumulative number of days that all patients occupy a hospital bed during a defined surveillance period.

Example Table for Calculating Patient-Days

Patient ID	Admission Date	Discharge Date	Length of Stay (days)
1	2023-01-01	2023-01-10	9
2	2023-01-05	2023-01-12	7
3	2023-01-10	2023-01-20	10
4	2023-01-15	2023-01-25	10
5	2023-01-20	2023-01-30	10
Total Patient-Days (Sum of all Lengths of Stay)			**46 days**

Present on Admission: a case where the date of event occurs ≤ 2 calendar days after hospital admission, with date of admission as Day 1. (In surgical cases there won't be present on admission (POA) there will be PATOS i.e., present at the time of surgery)

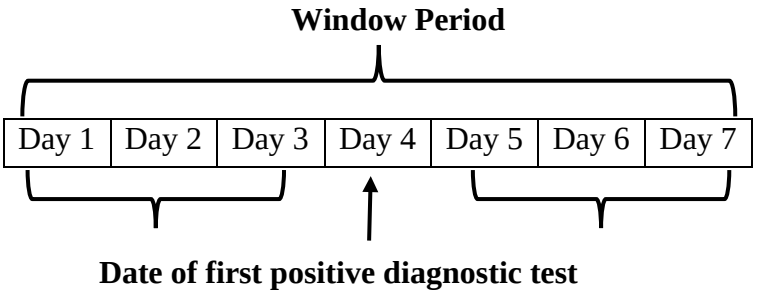


Surveillance: The systematic collection, analysis, and interpretation of health data to monitor and prevent HAIs

Surveillance Unit: The unit within a health facility where HAI (Health Care-Associated Infection) surveillance is conducted.

Total number of admissions: It refers to the count of all patients who were formally admitted to a healthcare facility or specific unit during a defined surveillance period (e.g., a month, quarter, or year).

Window Period: The 7-day timeframe in which all criteria of the case definition must be met. It includes the date of the first positive diagnostic test (defined as the laboratory specimen collection date) and 3 calendar days before and after the first positive diagnostic test.



Note: The first positive diagnostic test must be used to meet case definition criteria.

Chapter 1: Background

1.1 Introduction

Healthcare-associated infections (HAIs) remain a significant threat to patient safety and well-being worldwide, originating from various microorganisms such as bacteria, viruses, and fungi. Common HAIs include bloodstream infections (BSIs), hospital-acquired pneumonia (HAP), ventilator-associated pneumonia (VAP), urinary tract infections (UTIs), and surgical site infections (SSIs). Globally, HAIs are among the most common adverse events in healthcare, representing a major public health problem with substantial impacts on morbidity, mortality, and quality of life.[1] On average, approximately 10% of patients experience healthcare-associated infections (HAIs). However, the incidence is significantly higher in low- and middle-income countries and among high-risk groups, such as those in intensive care units.[2] These infections also pose a considerable economic burden on patients, households and society.[3] However, most of the HAIs are preventable through the use of appropriate infection prevention and control (IPC) measures.[4] Recent data from the CDC's 2023 National and State Healthcare-Associated Infections Progress Report shows that HAIs remain a critical issue in healthcare settings, emphasizing the need for continuous monitoring and improvement in IPC practices.[5]

A large international study conducted across 45 countries in all WHO regions estimated the incidence density of several key healthcare-associated infections among ICU patients. The study reported an incidence density of 5.3 central line-associated bloodstream infections (CLABSI) per 1,000 central line-days. Similarly, the incidence density of catheter-associated urinary tract infections (CAUTI) was found to be 3.16 per 1,000 urinary catheter-days. Additionally, the incidence density of ventilator-associated events (VAE) was estimated at 11.47 per 1,000 mechanical ventilator-days. These findings underscore the significant burden of device-associated

[1] WHO, The burden of health care-associated infection worldwide. https://www.who.int/news-room/feature-stories/detail/the-burden-of-health-care-associated-infection-worldwide
[2] WHO, Key fact and figure. https://www.who.int/campaigns/world-hand-hygiene-day/key-facts-and-figures
[3] Magill, S. S., Edwards, J. R., Bamberg, W., Beldavs, Z. G., Dumyati, G., Kainer, M. A., ... & Fridkin, S. K. (2014). Multistate point-prevalence survey of health care–associated infections. New England Journal of Medicine, 370(13), 1198-1208. Link??
[4] Puro, V., Coppola, N., Frasca, A. et al. Pillars for prevention and control of healthcare-associated infections: an Italian expert opinion statement. Antimicrob Resist Infect Control 11, 87 (2022). https://doi.org/10.1186/s13756-022-01125-8
[5] CDC 2023 National and State Healthcare-Associated Infections Progress Report https://www.cdc.gov/healthcare-associated-infections/php/data/progress-report.html

infections in intensive care settings globally and highlight the critical need for effective infection prevention and control (IPC) strategies.[6]

In South Asia, the prevalence of healthcare-associated infections (HAIs) mirrors global trends, with the recent regional data indicating the high rates of HAIs due to factors such as overcrowded hospitals, limited resources, and inadequate IPC practices.[7] A study from India reported that the prevalence of HAIs in tertiary care hospitals is approximately 4.4% to 19.2%.[8] In Pakistan, a systematic review found that the prevalence of HAIs ranged from 5.9% to 25% in various healthcare settings.[9] Similarly, in Bangladesh, the prevalence of HAIs was found to be around 4% in a medical college hospital.[10] These figures underscore the substantial challenge that healthcare-associated infections (HAIs) present to healthcare systems in South Asia. Given our focus on HAI surveillance, it is essential to understand how surveillance operates in these countries, the number of surveillance sites, and the benefits of having HAI surveillance units at hospitals for patients, hospitals, and the health system.

In Nepal, healthcare-associated infections (HAIs) are a growing public health concern. Recent epidemiological data reveal that the prevalence of HAIs in hospitals ranges from 5% with surgical site infections as common type of HAIs[11] to 43% with hospital-acquired pneumonia (HAP-41% of all HAIs) as common type of HAIs[12] regardless of department of the study. A point prevalence survey conducted in a tertiary care academia hospital in Kathmandu reported an overall HAI prevalence of HAI was 11.25% of which most common was UTI (72.2%) followed by pneumonia (16.6%) and surgical site infections (11.1%) of all HAIs.[13]Another study conducted in a tertiary

[6] Rosenthal VD, Dusznska W, Ider BE, Gurskis V, Al-Ruzzieh MA, Myatra SN et al. International Nosocomial Infection Control Consortium (INICC) report, data summary of 45 countries for 2013-2018, adult and pediatric units, device-associated module. Am J Infect Control. 2021;49:1267-74. doi: 10.1016/j.ajic.2021.04.07
[7] Moi Lin Ling, Anucha Apisarnthanarak, and Gilbert Madriaga. The Burden of Healthcare-Associated Infections in Southeast Asia: A Systematic Literature Review and Meta-analysis. Healthcare epidemiology CID 2015:60 (1 June)
[8] Mehta, Y., Gupta, A., Todi, S., Myatra, S., Samaddar, D. P., Patil, V., ... & Ramasubban, S. (2014). Guidelines for prevention of hospital acquired infections. Indian Journal of Critical Care Medicine, 18(3), 149-163.
[9] Saleem, Zikria et al. A multicenter point prevalence survey of healthcare–associated infections in Pakistan: Findings and implications American Journal of Infection Control, Volume 47, Issue 4, 421 - 424
[10] Haque, M. J. ., Yasmin, F. ., Arif, M. A. ., Rahman, N. ., Parven, R. ., Asaduzzaman, M., & Alam, M. Z. . (2023). Point-Prevalence Survey for the Hospital-Acquired Infections and Infection Prevention and Control Status of Different Wards of Rajshahi Medical College Hospital. TAJ: Journal of Teachers Association, 36(1), 9–15. https://doi.org/10.3329/taj.v36i1.68274
[11] Koju P, Liu X, Zachariah R, Bhattachan M, Maharjan B, Madhup S, Shewade HD, Abrahamyan A, Shah P, Shrestha S, Li H, Shrestha R. Incidence of healthcare-associated infections with invasive devices and surgical procedures in Nepal. Public Health Action. 2021 Nov 1;11(Suppl 1):32-37. doi: 10.5588/pha.21.0039. PMID: 34778013; PMCID: PMC8575378.
[12] Shrestha S. K., Trotter A., Shrestha P. K. Epidemiology and Risk Factors of Healthcare-Associated Infections in Critically Ill Patients in a Tertiary Care Teaching Hospital in Nepal: A Prospective Cohort Study // Infectious Diseases Research and Treatment. 2022. Vol. 15. p. 117863372110711.
[13] Shrestha SK, Shrestha S, Ingnam S. Point prevalence of healthcare-associated infections and antibiotic use in a tertiary care teaching hospital in Nepal: A cross-sectional study. J Infect Prev. 2022 Jan;23(1):29-32. doi: 10.1177/17571774211035827. Epub 2021 Aug 29. PMID: 35126679; PMCID: PMC8811238.

care hospital in Kathmandu reported an overall HAI prevalence of 13.83%, with UTI being the most frequent type of infection 35.8%. [14]

Another study at a teaching hospital in Pokhara found an HAI prevalence of 18.5%, highlighting similar challenges [15]. Factors contributing to this high prevalence include limited healthcare infrastructure, insufficient knowledge and training of healthcare workers in infection prevention and control (IPC), lack of experience, lack of supplies and a lack of standardized surveillance systems. [16]These findings underscore the critical need for enhanced IPC practices and standardized surveillance systems to effectively combat HAIs in Nepalese healthcare settings.

The economic burden of HAIs is substantial, starting with the individual and extending to society. For the individual, HAIs can lead to prolonged hospital stays, increased medical costs, and loss of income due to extended recovery times. The emotional and psychological toll on patients and their families is also considerable, as they navigate the complexities of long-term treatment and care. For healthcare facilities, the financial strain includes the cost of additional treatments, extended hospital stays, and the implementation of more intensive IPC measures. The societal burden includes lost productivity, increased insurance premiums, and the diversion of healthcare resources from other critical areas. These economic impacts underscore the importance of effective HAI surveillance and prevention strategies.

HAI surveillance serves as a proactive systematic and structured approach to data collection, analysis, and response to infections acquired during healthcare delivery. HAI surveillance provides healthcare facilities with real-time data on the incidence, prevalence, and patterns of HAIs, enabling timely interventions and targeted prevention strategies. In addition, it also helps in identifying the emerging trends and potential outbreaks, facilitating swift and effective responses to mitigate further transmission of diseases. Moreover, it offers valuable insights into the effectiveness of existing infection control measures, guiding continuous improvement efforts.

[14] ShresthaP. D., RaiS., & GaihreS. (2019). Prevalence of Hospital Acquired Infection and its Preventive Practices among Health Workers in a Tertiary Care Hospital. Journal of Nepal Health Research Council, 16(41), 452-456. https://doi.org/10.33314/jnhrc.v16i41.1157
[15] Acharya, R. P., & Shrestha, S. (2018). Surveillance of hospital-acquired infections in a tertiary care hospital of Nepal: A prospective study. Journal of Infection and Public Health, 11(4), 535-539.
[16] Alhumaid S., Al Mutair A., Al Alawi Z., Alsuliman M., Ahmed G.Y., Rabaan A.A., Al-Tawfiq J.A., Al-Omari A. Knowledge of infection prevention and control among healthcare workers and factors influencing compliance: A systematic review. Antimicrob. Resist. Infect. Control. 2021;10:86. doi: 10.1186/s13756-021-00957-0

Establishing a standardized HAI Surveillance Standard Operating Procedure (SOP) is therefore imperative.

The HAI Surveillance SOP is a foundational document that outlines standardized procedures and protocols for consistent and comprehensive surveillance across all healthcare settings in Nepal. The purpose of this document is to ensure the reliability and validity of collected data and promotes uniformity in reporting practices, enabling benchmarking and comparison of HAI incidence rate within and across healthcare facilities and with international standards. By establishing a clear data collection, analysis, and reporting framework, the SOP becomes an indispensable tool for healthcare professionals, infection control specialists, and policymakers, contributing to enhancing patient safety and the overall quality of healthcare services in Nepal.

1.2 Legislative Mandates

i. International Health Regulation (IHR-2005):

International Health Regulations (IHR) serve as a crucial legislative framework for Infection Prevention and Control (IPC) programs. Key components for monitoring and evaluating a country's capacities under IHR include After-Action Reviews, Joint External Evaluations (JEE), States Party self-assessment Annual Reporting (SPAR), and Simulation Exercises. IHR mandates member states to annually review and report their capacities based on SPAR tool. IPC is a core capacity assessed in both SPAR and JEE. In Nepal, the JEE was conducted to evaluate the country's capacity to manage COVID-19, with IPC being a fundamental aspect of this evaluation. As a core capacity, the primary goals of IPC are to prevent healthcare-associated infections (HAIs) and curb the emergence and spread of antimicrobial resistance (AMR), which are measured by:

- Development and implementation of National IPC program, strategy and action plan
- Development and implementation of the Healthcare Associated Infection (HAIs) surveillance Program, with effective *monitoring and reporting of HAIs.*
- Established national standards and resources for safe health facilities.

HAI surveillance is one of the indicators of this technical area.

State Party Self- Assessment Annual Reporting (SPAR):

It is a mechanism established by the World Health Organization (WHO) to evaluate and monitor the implementation of the International Health Regulations (IHR-2005) by its member states. Each Member State conducts an annual self-assessment to evaluate its capabilities and readiness across various core components. Infection Prevention and Control (IPC) is one of these components, with surveillance of Healthcare-Associated Infections (HAIs) serving as a key indicator.

ii. National Action Plan on Antimicrobial Resistance (2080):

Strategic Priority 3: Reduce the incidence of infection through effective infection prevention and control (IPC)

Objectives: *Develop and implement infection prevention and control plan and interventions in healthcare settings.*

Activities: Develop and implement standardized surveillance programs on healthcare-associated infections (HCAIs) in hospitals with clear case definitions, methodologies, structures, and reporting mechanisms.

iii. National IPC guideline (2079)

Chapter 2: Infection Prevention and Control Program

a. **Provision of IPC committee at health facility:** One of the responsibilities is to "Conduct regular surveillance of Healthcare associated infections and submit reports to central/ federal IPC technical working committee."

b. **National IPC Technical Working Committee:** The responsibilities of TWC include:

- ✓ TWC should develop and revise policy, plan, strategy, guideline, Standard Operating Procedure and Learning Resource Package on IPC and Anti-Microbial Resistance (AMR)
- ✓ Submit developed policy, plan, strategy, guideline, standard operating procedure to steering committee for approval.
- ✓ Coordinate, collaborate and provide necessary suggestions to those health facilities, conduct research on IPC, HAIs Surveillance, AMR, and clinical audit.

c. **Federal (National) Infection Prevention and Control Steering Committee:** The responsibilities include:

- ✓ Prepare action plan for the development and revision of standards, protocol, guideline, Standard Operating Procedure and learning resource package on infection prevention and control.
- ✓ Recommend the developed standard, protocol, guideline, standard operating procedure and learning resource package on infection prevention and control for endorsement at Ministry.

iv. **Public Health Service Act (2075)** -

Section 16 (2) states: Health institutions shall ensure:

“Each health institution shall adopt necessary precautionary measures to prevent and control transmission of any kind of disease."

v. Nepal Health Sector Strategy Plan (2023-2031):

Strategic Direction No 4:

Promote equitable access to quality health services.

Result No 4.1: Improve quality of Health Service

Output No 4.1.1: Ensure Improved mechanism for Quality of Health services.

Strategic Action Plan of output 4.1.1 are:

- ✓ Accreditation quality control and monitoring and evaluation body at national level.
- ✓ Ensure quality of health services and establish accreditation bodies at national level to accredit health facilities.
- ✓ Establish monitoring indicators and statistical system to measure quality of health services.
- ✓ Develop and revise treatment guidelines and protocol to minimize AMR

1.3 Rationale for the development of HAI SOP

As mandated by the International Health Regulations (IHR) - State Party Self- Assessment Annual Reporting (SPAR), the Joint External Evaluation (JEE) of IHR core capacities of Nepal conducted

in 2022 highlighted the necessity for a comprehensive plan to initiate HAI surveillance in selected federal hospitals by the end of 2023. The development of a Standard Operating Procedure (SOP) for HAI surveillance is pivotal for enhancing infection control practices and improving patient safety in Nepal.

The importance of healthcare-associated infection (HAI) surveillance goes beyond individual patient care, impacting the broader public health landscape. Reliable surveillance data helps identify trends and risk factors, which are essential for informed decision-making at both national and subnational levels. This data supports the development and implementation of targeted interventions, efficient resource allocation, and the formulation of policies aimed at reducing the overall burden of HAIs.

The development of a SOP for HAI surveillance is an essential step towards improving infection control practices, enhancing patient safety, and strengthening the overall healthcare system in Nepal. It aligns with international mandates and recommendations, ensuring that Nepal is equipped to effectively monitor, prevent, and control HAIs, thereby improving public health outcomes.

1.4 Objectives of HAI surveillance SOP

Primary objectives

- To establish standardized and uniform HAI Surveillance practices.
- To ensure uniform and accurate data collection, recording and reporting of HAIs from healthcare facilities.
- To provide stepwise guidance for initiating HAI surveillance healthcare in facilities of Nepal.
- To align surveillance practice with global standards.

Secondary Objectives

- To facilitate training and capacity building on HAI surveillance.
- To prepare and implement an action plan to address gaps from the findings of surveillance.
- To support identification and response of emerging and reemerging threats.
- To utilize HAI surveillance data as key quality indicators for IPC improvement programs.

1.5 Scope

This HAI Surveillance SOP applies to all healthcare facilities in Nepal, including public and private hospitals at both national and subnational levels. The scope of Healthcare Associated Infection surveillance covers the following key areas:

Identification and Monitoring:

Tracking major HAI events using standardized case definitions, including:

- Bloodstream Infections (BSI), including Central Line-Associated BSI (CLABSI)
- Urinary Tract Infections (UTI), including Catheter-Associated UTI (CAUTI)
- Surgical Site Infections (SSI)
- Hospital-Acquired Pneumonia (HAP), including Ventilator-Associated Pneumonia (VAP)

1. **Data Collection and Analysis:** Gathering data from multiple sources, including patient records, laboratory results, and clinical observations, and analyzing this data to identify trends and outbreaks
2. **Reporting:** Communicating findings to healthcare providers, hospital administration, and public health authorities to inform infection control strategies and policy decisions.
3. **Prevention and Control:** Implementing measures to prevent and control HAIs based on surveillance data, such as improving hand hygiene practices, sterilization procedures, and antibiotic stewardship.
4. **Evaluation and Feedback:** Regularly reviewing the effectiveness of surveillance activities and making necessary adjustments to improve accuracy and impact.
5. **Training and Education:** Providing ongoing education and training to healthcare staff on HAI surveillance protocols.

1.6 Target audience/users

The primary target users of this document are hospital staff engaged in patient care. In addition, it is intended for other users who are directly or indirectly involved in the recording, reporting, research, policymaking, and planning related to Healthcare-Associated Infections (HAIs).

The examples are listed below

- Policy makers and program planners
- Infection Control Professionals
- Healthcare Providers
- Data Collectors
- Hospital Administrators and Managers
- Quality Improvement Teams
- Public Health Officials
- Regulatory and Accreditation Bodies
- Educators and Trainers
- Researchers
- Emergency Response Teams
- Rapid Response Teams
- AMS committee
- Other relevant stakeholders

Chapter 2: HAI Surveillance

2.1 Introduction

HAI surveillance is the ongoing, systematic collection, analysis, interpretation and dissemination of HAI data to help guide clinical and public health decision-making and action (i.e., information for action). It helps describe the microbiological profiles of pathogens responsible for Healthcare-Associated Infections (HAIs). Based on the most frequently occurring infections, it provides critical information that supports the planning and customization of IPC interventions.

2.2 Objectives of HAI Surveillance

The purpose of HAI surveillance is to generate reliable and timely evidence on healthcare-associated infections to support evidence-based decision-making, guide IPC policy development and implementation, and strengthen patient safety and quality of care.

The key objectives of HAI surveillance are as follows:

- Identify baseline rates and monitor trends of healthcare-associated infections.
- Evaluate the effectiveness of infection prevention and control (IPC) measures.
- Support benchmarking and comparison of HAI rates and trends across hospitals and at national, regional, and international levels, where applicable.
- Inform the development, implementation, monitoring, and improvement of IPC policies, programs, and strategies.

2.3 Methods of HAIs Surveillance

Selecting HAI (Healthcare-Associated Infection) surveillance methods depends on the available resources, regional settings, and healthcare systems. The strategy should align with local circumstances, considering factors like the Infection Prevention and Control (IPC) program's status, professional expertise, and the availability of clinical, laboratory, radiology, and IT services. Key elements include the hospital's microbiology lab capabilities and the use of imaging techniques for diagnosing infections.

Most of the routine HAI surveillance in-patient health facilities should be conducted by responsible hospital staff in an active, patient-based, prospective, priority-directed manner that yields risk-

adjusted incidence rates. This methodology will be most useful for the detection of HAI in health care settings.

A. Active and passive HAIs surveillance

Active HAI surveillance involves healthcare workers regularly assessing patients for signs of infections, collecting data frequently to identify new infections promptly. Conducted by trained infection control professionals, it uses various data sources within and beyond health facilities to find infections quickly and accurately.

Passive HAI surveillance involves retrospectively collecting data from medical records and reports submitted by healthcare providers. This method relies on routine reporting without active solicitation or follow-up and is conducted by personnel without a primary surveillance role, using routine patient records and lab reports.

B. Patient-based and laboratory-based HAIs surveillance

Patient-based surveillance actively monitors patients for HAIs through direct observation, clinical assessments, and medical record reviews. It identifies infections based on clinical signs and symptoms during hospital stays and post-discharge follow-ups, relying on healthcare professionals to systematically collect and analyze data.

Laboratory-based surveillance identifies HAIs through lab test results and microbiological data, detecting pathogens in clinical specimens like blood, urine, or tissue samples. It provides objective evidence of infections and tracks the prevalence and spread of specific pathogens in healthcare settings.

C. Prospective and retrospective HAIs surveillance

Prospective surveillance involves the ongoing collection and analysis of data on HAIs as they occur, allowing for real-time monitoring and immediate response to infection trends. Conducted by infection control professionals, it includes reviewing patient records and lab reports during hospitalization and post-discharge follow-ups (e.g., phone calls, OPD visits).

Retrospective surveillance analyzes data collected after HAIs occur, reviewing past records to identify trends and risk factors. It helps evaluate infection control measures and understand the historical burden of HAIs, revealing patterns not apparent in real-time monitoring.

D. Priority-directed and comprehensive HAIs surveillance

Priority-directed surveillance focuses on monitoring specific HAIs or high-risk areas within a healthcare facility. It targets infections of particular concern due to their severity, frequency, or outbreak potential, allowing facilities to effectively identify and control significant infection risks.

Comprehensive surveillance systematically monitors all types of HAIs across a healthcare facility. It captures a complete picture of infection rates and trends, helping to identify patterns, evaluate infection control measures, and guide policy and practice improvements.

E. Risk-adjusted rates and crude rates HAIs surveillance

Risk-adjusted rates account for variations in patient and facility characteristics, adjusting infection rates based on factors like patient age, health conditions, and facility type. This method provides a more accurate comparison of infection rates across different settings like, inter- and intra-facility rate comparisons.

Crude rates represent the raw, unadjusted number of HAIs in a specific population or setting. They calculate the total infections without considering risk factors or patient demographics, providing a straightforward measure of infection prevalence but not the true risk in diverse environments. Crude rates assume an equal distribution of risk factors for all events; however, they cannot be used for inter-facility comparisons.

F. Prevalence versus incidence HAIs surveillance

Prevalence of health care-associated infections

The prevalence of HAI refers to the proportion of the patient population within a health care facility who have acquired an infection while receiving medical care. It is typically expressed as a percentage (proportion). Prevalence surveys of HAI estimate active infections in a health care facility only at the time they are conducted, for example, either on a single day (point prevalence) or over a specified number of days (period prevalence) (Table 1). They can also be used to target specific areas or wards in the health facility where infection rates are known or suspected to be high. Data from each patient is collected only once during the time of the survey. Prevalence surveys can be repeated at regular intervals to show change. They may be quicker and less expensive than incidence.

Table 1: Prevalence Calculation of Health Care-Associated Infections

Measure of occurrence	Description	Calculation formula with Example
Point prevalence	Proportion of patients with a HAI at a specific point of time, expressed as a percentage.	$Point\ Prevalance = \frac{\text{Number of patients with at least one HAI on the survey day}}{\text{Total number Patient surveyed}} \times 100$ Example: On 27 Magh of 2080 (single day), 26 of 250 patients in the hospital have an active HAI. Calculation of HAI Point prevalence using given formula is as follow. HAI Point Prevalence= 26/250*100 Resulting Point Prevalence of HAI of 27 Magh 2080 = 10.4%.
Period prevalence	Proportion of patients with HAI over a specified period. Example: a week or a month	$Period\ Prevalance = \frac{\text{Number of patients who develop HAI during the given period}}{\text{Total number Patients surveyed during the given period}} \times 100$ Example: On the Month of Baishak of 2081, 18 of 150 surgical patients developed Surgical Site Infection (SSI). Calculation of HAI period prevalence using given formula is as follows. HAI Period Prevalence= 18/150*100 Resulting in a Period Prevalence of SSI for the month of Baishak 2081 = 12%.
Device associated prevalence	Proportion of patients with a device-related infection. Example: CAUTI at the time of the survey.	$Device\ Associated\ Prevalance = \frac{\text{Number of Patients with devices associated HAI}}{\text{Total number Patients with that device}} \times 100$ Example: During the survey period, 6 of 56 patients with urinary catheter developed Catheter Associated Urinary Tract Infection (CAUTI). Calculation of device associated prevalence using given formula is as follows. Device Associated Prevalence= 6/56*100 Resulting in a Period Prevalence of CAUTI for the month of Baishak 2081 is 10.71%.
Ward-specific prevalence	Proportion of patients with HAI within specific wards or units. Example: ICU, surgical ward at the time of the survey.	$Ward\ Specific\ Prevalance = \frac{\text{Number of Patients with atleast one HAI in a Specific ward}}{\text{Total number Patients in that ward}} \times 100$ In hospital A, 5 out of 30 patients admitted in the ICU developed HAI at the time of survey. Calculating a ward-specific HAI Prevalence of that ICU using given formula is as follows. Ward-specific HAI prevalence: 5/30*100 Resulting in a ward specific HAI Prevalence = 16.66%

Incidence of health care-associated infections

The incidence of HAI refers to the rate or frequency of new infections that occur within a health care facility over a defined period of time. Conducting surveillance using incidence is prospective, more reliable, but resource intensive, as it requires well-trained and dedicated teams to systematically screen entire patient charts and perform data collection and interpretation. Case finding by a well-trained surveillance team increases HAI detection. Incidence is the best way to track trends of HAI over time and to study specific types of infection which require follow-up with patients at risk. The incidence of HAI refers to the rate or frequency of new infections that occur within a health care facility over a defined period.

Table 2: Incidence Calculation of Health Care-Associated Infections

Incidence rate of HAI is calculated in the form of incidence proportion and incidence density.	
Incidence proportion (also known as 'cumulative incidence')	
Description	Measures the proportion of patients who develop HAI within a defined surveillance period.
Calculation	$HAI\ Incidence\ Proportion = \frac{\text{Number of patients who developed a HAI}}{\text{Total number of patients admitted}} \times 100$
Example	We want to calculate the incidence proportion of HAI in a surgical ward of a hospital over a 1-month period: • surveillance period: January 1 to January 31 (One month period) • total number of patients admitted: 200. • number of patients who developed HAI: 10. Incidence proportion = 10/200 = 0.05 x 100 = 5% Incidence proportion is 5%. This means that 5% of patients admitted to the surgical ward during the surveillance period developed a HAI.
	Incidence density
Description	Measure of the frequency with which new cases of HAI occur in a population over a specified period, considering the time each patient is at risk.
Calculation	$HAI\ Incidence\ density = \frac{\text{Number of patients who developed a HAI}}{\text{Total patient days}} \times 1000$
Example	We want to calculate the incidence density of HAI in an ICU of a hospital over a 1 month period: • surveillance period: January 1 to January 31. • total number of patients admitted: 100. • number of patients who developed HAI: 5. • total patient days: 1500 (sum of each patient's length of stay in days). HAI Incidence density using given formula = 5*1000/1500 The incidence density per 1000 patient-days = 3.3 Incidence density is 3.3 HAI per 1000 patient days. This means that for every 1000 days of patient care in the ICU, there were 3.3 infections.

Table 3: Calculation of Device-specific Health Care-Associated Infections incidence

Device-specific incidence density	
Description	Measure of the frequency of HAI among patients with a specific device in place, considering the total number of days the device was used.
Calculation	$$Device\ Specific\ Incidence\ density = \frac{\text{Number of patients with device who developed a HAI}}{\text{Total device days}} \times 1000$$ Note: To express the result as a whole number, multiply the proportion by a constant (1000).
Example	We want to calculate the device-specific incidence density of CAUTI in a hospital ward over a 1-month period: • surveillance period: January 1 to January 31. • total number of patients with a urinary catheter: 50. • number of patients who developed a CAUTI: 8. • total catheter days: 600 (sum of each patient days with a catheter in place). Device-specific incidence density = 8/600 = 0.0133 The device-specific density per 1000 device-days: 0.0133 x 1000 = 13.3 Device-specific incidence density is 13.3 CAUTI per 1000 catheter-days. This means that for every 1000 days of catheter use, there were 13.3 new cases of CAUTI.
Other epidemiological measures: Device utilization ratio	
Description	Measures the proportion of patients who have a specific device in place during a surveillance period.
Calculation	$$\frac{\text{Total number of device days}}{\text{Total number of patient days}} \times 100$$
Example	We want to calculate the device utilization ratio for urinary catheters in a medical ward over a 1-month period: • surveillance period: January 1 to January 31. • total number of patient-days: 1000 (sum of each patient's days in the ward); • total number of device-days for urinary catheters: 400 (sum of each patient's days with a urinary catheter in place). Device utilization ratio = 400/1000=0.4 ×100=40% Device utilization ratio is 40%. This means that, on average, 40% of patients had a urinary catheter in place during the surveillance period.

Note: In this standard operating procedure, we are using active, patient-based, prospective, priority-directed, outcome HAI surveillance methodology.

2.4 Measuring Numerator and Denominator Data Framework for HAI Surveillance

A. Numerator Data

The numerator represents the number of Health Care-Associated Infections (HAIs) identified during a specified surveillance period. It varies based on the specific type of HAI being monitored.

i. Numerator data to be collected

a. **Demographic Information**

- Patient name
- Date of birth
- Gender
- Hospital identification number

b. **Infection Details**

- Date of HAI onset
- Site/type of infection (e.g., bloodstream, urinary tract, surgical site)
- Pathogen identification (if available)
- Diagnostic criteria used (e.g., lab results, radiological findings, clinical signs)

c. **Clinical Context**

- Date of hospital admission
- Department or unit (e.g., ICU, general ward)
- Use of invasive devices (e.g., catheter, ventilator)

d. **Clinical Outcome**

- Patient status (recovered, ongoing infection, deceased)
- Length of hospital stay

ii. Sources of numerator data

a. Patient Medical Records, including:

- Admission, discharge, and transfer records
- Procedure and operative notes
- Microbiology laboratory results
- Radiology imaging reports
- Physician progress notes
- Nursing observation sheets
- Records of antibiotic administration

b. Post-Discharge Surveillance for Surgical Site Infections (SSI):

- Follow-up records from surgery clinics
- Physician office visit notes
- Emergency department records

iii. Numerator data collection methods

Step 1: Initial Clinical Assessment

- Clinical staff should review patient medical records daily, focusing on:
  - Clinical signs and symptoms
  - Laboratory and radiological findings
  - Procedures performed
  - Use of medical devices related to potential HAIs
- Relevant data sources include admission, discharge, and transfer records.
- Findings should be documented using the **Trigger Form (Annex 2)**

- **Step 2: Surveillance Staff Review the records**
    - Surveillance personnel should examine both the patient medical records and the completed **Trigger Form (Annex 2)** to identify suspected HAI cases.

Step 3: Case Confirmation and Reporting

- Based on the type of HAI suggested by the clinical and diagnostic information, surveillance staff should complete the appropriate **HAI Case Reporting Form (Annex 4,5,6,7)** for each type of HAI.
- Determine the surveillance period and target population (e.g., ICU patients, surgical wards).

B. Denominator Data

The denominator representing the population at risk over the same period. It is usually expressed in terms of total admission, device days or patient days. It provides a context for the numerator.

Denominator data to be collected

Table 4: List of Denominator Required for HAI Surveillance

SN	Indicators	Required denominators
1	General HAI Incidence density (Incidence rate) Incidence proportion,	• Total number of patients admitted • Total patient-days
2	Surgical Procedures (for SSI)	• Total number of surgeries performed • Number of specific surgical procedures performed (e.g., C-section, hip replacement, appendectomy etc.)
3	Device specific incidence density	• Total device Days
4	CLABSI incidence density	• Total number of central line days
5	VAP incidence density	• Total number of ventilator days
6	Catheter-Associated UTI (CAUTI) incidence density	• Total number of urinary catheter days
7	Device utilization ratio	• Total number of patient days
6	HAP (Hospital-Acquired Pneumonia) incidence density	• Total number of patient days
7	BSI (Bloodstream Infection) incidence density	• Total number of patient days
8	UTI (Urinary Tract Infection) incidence density	• Total number of patient days
9	MDRO Incidence Proportion	• *Total number of HAI detected during the surveillance period
10	Specific MDRO (e.g.MRSA) Incidence proportion	• *Total number of HAI detected during the surveillance period

* Here we are calculating the incidence proportion of MDROs among healthcare-associated infection (HAI) cases. Therefore, the appropriate denominator is the ***total number of HAI*** cases detected during the specified period.

Note We are collecting and analyzing the data of each month so we can say surveillance period as “in a given month” e.g. in the month of January, February March or Baishak, Jestha, Ashar etc.

Sources of denominator data

- Patient Medical Records, including:
    - Admission, discharge, and transfer records
    - Operative notes
    - Device insertion notes
    - Device Utilization Logs
    - Records of central lines, urinary catheters, ventilators, etc.
- Daily Census Reports
- Unit-based or hospital-wide patient counts
- Specialized logs for neonatal intensive care units
- Standardized Surveillance Forms
- Forms used to track patient-days, device-days, and other denominator metrics

Denominator Data collection methods

a. Collect data at the same time every day for each unit or ward under surveillance.
b. Clinical staff should:
    - Record the daily number of inpatients.
    - Record the daily number of patients with devices (central line, ventilator, urinary catheter).
    - Use the Denominator Record Form (Annex 3) for documentation.
c. For SSI surveillance:
    - Obtain surgical data from operating room logs and patient charts.

At the end of each month, IPC personnel or surveillance staff should:

- Compile and review all denominator data.
- Use it to calculate HAI incidence density, proportion using formula provided on table 7.

Chapter 3: Healthcare Associated Infections

3.1 Definition

A general definition of HAI is an infection occurring in a patient during the process of care in a hospital or other health care setting, which was not present or incubating at the time of admission. These infections can be acquired in any setting where health care is delivered, such as hospitals, outpatient clinics, long-term care facilities, rehabilitation, home care and other health care settings. HAI can affect any part of the body and include common infections such as BSI, UTI, SSI and HAP.

3.1.1 Surveillance Definition

Surveillance definitions for HAIs typically encompass several key components: specific clinical criteria, microbiological and radiological evidence, and timing. These elements ensure that HAIs are accurately identified and distinguished from community-acquired infections.

Table 5: HAI Surveillance definitions

HAI Surveillance definitions typically include:	
Specific clinical criteria	***signs and symptoms*** **t**hat must be present to **be considered** as HAI. For example, depending on the type of infection, these may include fever (>38°C), cough, purulent sputum, tachypnea (respiratory rate >20 breaths/min), purulent discharge at the incision site, flank or suprapubic pain, increased urinary frequency or urgency, suprapubic tenderness, chills, hypotension, or swelling at the site of infection etc.
Microbiological and radiological evidence	***such as cultures or blood tests, and radiological findings, like X-rays or CT scans,*** that confirm the presence of an infection.
Timing	A specified time frame in which the infection must develop in relation to health care exposure or a specific health care intervention. This time interval is usually ***at least 48 hours from admission to the health care facility or care delivery.***

Table 6: Comparison between HAI surveillance case definitions and clinical diagnosis

	HAI Surveillance Case Definition	Clinical diagnosis
Purpose	To identify and monitor selected infections within health care settings for surveillance and public health purposes.	To guide patient care or treatment of individual patients with infections based on their specific signs, symptoms and clinical presentation.
Objective versus subjective	Standardized and based on clinical and laboratory criteria, focusing on **objective measures** such as signs, symptoms and laboratory results, among others.	Apply all available **subjective and objective criteria,** including patient history, physical examination, laboratory tests and imaging. They require specific confirmation tests and are usually more detailed.
Population versus individual	Population level.	Individual level, considering patient-specific factors such as comorbidities, clinical course and response to treatment.
Consistency versus accuracy	Designed to be specific to ensure consistency and comparability of data across different health care facilities.	Accurate and based on the patient's clinical presentation.
Temporal aspect	It includes a temporal aspect; for example, the definition includes time-based criteria such as infection occurring ≥48 hours after hospital admission.	Focuses on the current clinical presentation of the patient, current signs and symptoms, laboratory and imaging findings, patient's condition at the time of assessment.

3.1.2 Calculation of HAI Incidence

HAI Incidence refers to the occurrence of new cases of healthcare-associated infections (HAIs) within a specific population, location (such as a hospital or ICU or any department/unit), and time period. It helps measure the risk or frequency of patients acquiring infections during their stay in a healthcare facility. HAI incidence may be expressed as either an incidence proportion (cumulative incidence) or an incidence density (incidence rate). Incidence density is the preferred measure when accounting for varying lengths of patient stay or exposure time.

Table 7: Calculation of HAI Incidence

Scenario: During the month of July 2024, a total of 360 patients were admitted to Hospital A for treatment. Among them, 46 patients developed at least one type of healthcare-associated infection. The total number of patient-days for these patients was 1,560 (i.e., the sum of each patient's length of stay in days).		
Indicator	Formula	Interpretations
HAI Incidence proportion	**Given:** • Number of patients who developed HAI = 46 • Total number of patients admitted = 360 $= \frac{\text{Total Number Patient who developed HAI}}{\text{Total number Patient admitted}} \times 100$ $= \frac{46}{360} \times 100$ = 12.78% HAI Incidence proportion is expressed in %.	The HAI incidence proportion is 12.78%, indicating that approximately 13 out of every 100 patients admitted to Hospital A in July 2024 developed a healthcare-associated infection.
HAI incidence density	**Given:** • Number of patients who developed HAI = 46 • Total patient-days = 1,560 $\frac{\text{Number of patients who developed a HAI}}{\text{Total Patient days}} \times 1{,}000$ $= \frac{46}{1560} \times 1000$ = 29.48 Incidence density is expressed in per 1000 patient days.	The HAI incidence density is 29.48 per 1,000 patient-days, indicating that for every 1,000 days of patient care provided in Hospital A during July 2024, approximately 29 to 30 healthcare-associated infections occurred.

 # Note: Calculation of each type of HAI incidence has been mentioned in specific types of HAI.

3.2 Common types of HAIs

A. Bloodstream Infections

BSI occur when microorganisms (bacteria, viruses, fungi, and protozoa) enter the bloodstream, potentially leading to severe complications like sepsis, organ dysfunction or septic shock. Clinical symptoms of BSI may include fever, chills and hypotension. These infections are often associated with the use of intravascular devices such as central lines (CLABSI) or peripheral cannulas. The risk increases with the frequent and unsafe insertion and handling of these devices, during surgical procedures or using contaminated equipment. BSI can also arise as secondary infections when

pathogens spread from the primary site of infection (such as the lungs, urinary tract or surgical wound) into the bloodstream. Additional risk factors for BSI, especially those acquired in ICUs, include a high severity of illness at admission, prolonged ICU stay, immunosuppression, liver disease, and admission to a surgical ward.

Requirement

- Demographic information form
- Trigger data form/algorithm
- BSI/CLABSI case definition /report form
- Patient record file
- Common denominator Record form (Annex-3)

Table 8: Blood Stream Infection Surveillance Case Definition

Bloodstream infection(s) (BSI)	
To diagnose Healthcare Associated Bloodstream Infections (BSIs), the timing criteria must be met along with the following surveillance criteria: there should be ***at least 48 hours' time interval from admission to the healthcare facility or the start of care delivery.***	
Confirmed BSI (BSI-A1)	One positive blood culture for a recognized pathogen. It excludes common skin commensals such as coagulase negative staphylococci, Micrococcus sp., Propionibacterium acnes, Bacillus sp., Corynebacterium sp. A single positive culture for these commensals is considered as contamination.
Confirmed BSI (BSI-A2)	1. Patient has at least one of the following signs or symptoms: fever (> 38°C) **OR** chills **OR** hypotension (Systolic pressure ≤ 90 mmHg); **AND** 2. two positive blood cultures for a common skin commensal(s) (from two separate blood samples) within 48 hours. (Common skin commensals include coagulase-negative staphylococci, Micrococcus sp., Propionibacterium acnes, Bacillus sp., Corynebacterium sp.)
Central Line-Associated (Central vascular catheter associated) BSI (CLABSI)	BSI-A1 **OR** BSI-A2 **AND** a central vascular catheter in place at the time of or within ≤ 2 days prior to first meeting a component of the confirmed BSI definition. *

* (1. *Central line catheter was in place when the first BSI criterion was met. 2. Central line catheter had been removed within the previous 2 days before the first BSI criterion was met.)*

Inclusion criteria

Case that meets the surveillance case definition

Exclusion criteria

- Patients with positive blood cultures obtained from both the central venous catheter and a peripheral vein, but with different organisms, indicating contamination.

Case Findings

Assess patient medical record files and fill in the trigger questions in the trigger form (Annex 2).

- Every day during the morning handover, record the total number of patients with appropriate information in the denominator record form (annex 3)
- If trigger indicators (Q1a and Q2a/2b/3a) are present, inform the IPC focal person/surveillance Officer /designated person.

Case Recording and Reporting (Algorithm Annex 9 B)

- Visit ward under surveillance daily at specific time or when informed by ward nurse/link nurse/ ward in charge.
- Identify the case triggered by the ward nurse/link nurse/ ward in charge.
- Gather the patient record files/ admission discharge notes.
- Fill up the remaining trigger information on trigger form.
- Compare trigger information with case definition.
- Fill up the demographic information form (Annex 1) and use case recording form for BSI cases (Annex 4).
- Collect the denominator form from the ward once a month (Annex 3) for the surveillance month. Calculate the monthly rate of BSIs, by type, using the formula provided in Table 9.

Analysis Plan

Bloodstream infections (BSIs) will be stratified into Type 1 BSI, Type 2 BSI, and central line-associated BSI (CLABSI), with overall BSI also reported. For each category, the incidence proportion and incidence density will be calculated. Additionally, the central line utilization ratio will be assessed to contextualize infection rates.

Denominators

BSI Incidence Density: Total number of patient-days

BSI Incidence Proportion: Total number of patients admitted

Device-specific incidence (CLABSI) density: Number of central line days

Device Utilization Ratio: Total number of patient days

Note: Please refer to annex 3 for denominator forms and table 4 for list of denominators

Table 9: Calculate Healthcare Associated Blood Stream Infection rate

In the intensive care unit of Hospital A, 5 cases of laboratory-confirmed bloodstream infections were reported during the month of January 2024.

- Total number of central line days was 500
- Total number of patients admitted to the ICU was 200
- Total number of patients with central lines was 50
- Total number of patient days was 1,000.

Calculate BSI incidence density, proportion and device utilization ratio.

SN	Formula with Calculation	Interpretation
BSI Incidence Proportion	$= \frac{\text{Number of patients who developed a BSI}}{\text{Total number of patients admitted}} \times 100$ $= \frac{5}{200} \times 100$ $= 2.5\%$ BSI Incidence Proportion is 2.5%	This indicates that 2.5% of all patients admitted to the ICU during January 2024 developed a bloodstream infection (BSI).
BSI Incidence Density	$= \frac{\text{Number of patients who developed a BSI}}{\text{Total number of patient days}} \times 1000$ $= \frac{5}{1000} \times 1000$ $= 5$ The BSI incidence density is 5 per 1,000 Patient-days.	This means that for every 1,000 days of patient care in the ICU, there were 5 patients developed a bloodstream infection.
Device-specific incidence (CLABSI) density	$= \frac{\text{Number of CLABSI cases}}{\text{Number of central line days}} \times 1{,}000$ $= \frac{5}{500} \times 1000$ $= 10$ CLABSI incidence density is 10.	The CLABSI rate is 10 per 1,000 central line-days, indicating that for every 1,000 days of central lines used in the ICU, there were 10 patients developed a central line-associated bloodstream infection during January 2024
Device (Central line) Utilization Ratio	$\frac{\text{Total number of central line days(Device days)}}{\text{Total number of patient days}} \times 100$ $= \frac{500}{1000} \times 100$ $= 0.5 \times 100$ $= 50\%$ Device Utilization Ratio is 50%.	This means 50% of patients had a central line in place in the ICU during January 2024.

B. Urinary Tract Infections

UTI is an infection that can affect any part of the urinary system, including the urethra, bladder, ureters, and kidney. While most UTI are caused by the bacterium Escherichia coli, other microorganisms such as Klebsiella pneumoniae and Pseudomonas aeruginosa can also be responsible. Clinical symptoms of UTI include frequent urination, a strong urge to urinate, a burning sensation during urination and pelvic pain. If left untreated, UTI can lead to serious complications such as sepsis or organ failure.

Several risk factors can increase the likelihood of developing UTI. Approximately 75% of health care-associated UTI are associated with the insertion of a urinary catheter, leading to CAUTI. Inadequate IPC practices such as improper catheter care, prolonged catheter use, and the use of non-sterile equipment contribute significantly to the risk of acquiring a UTI. Patient-related factors include female sex (due to shorter female urethra), advanced age, altered mental status, chronic diseases and immunosuppression.

Requirement

- Demographic information form
- Trigger data form/algorithm
- UTI/CAUTI case definition/ report form
- Patient medical record file
- Common denominator form (Annex 3)

Table 10: UTI Surveillance Case Definition

Urinary tract infection(s) (UTI)		
To diagnose Healthcare Associated Urinary Tract Infections (UTIs), the timing criteria must be met along with the following surveillance criteria: there should be ***at least 48 hours' time interval from admission to the healthcare facility or the start of care delivery.***		
Type A (UTI-A)	Microbiologically confirmed symptomatic UTI (UTI-A)	1. Patient has **at least one** of the following signs or symptoms with no other recognized cause: • fever (> 38°C); **OR** • urinary urgency; **OR** • increased urinary frequency; **OR** • dysuria; **OR** • flank pain; **OR** • supra-pubic pain; **OR** • suprapubic tenderness; **AND** 2. a positive urine culture ($\geq 10^5$ microorganisms per mL of urine with no more than two species of microorganisms).

Type B (UTI-B)	Not microbiologically confirmed symptomatic UTI (UTI-B)	1. Patient has at least two of the following signs or symptoms with no other recognized cause: • fever (> 38°C); **OR** • urinary urgency; **OR** • increased urinary frequency; **OR** • dysuria; **OR** • flank pain; **OR** • supra-pubic pain; **OR** • suprapubic tenderness; **AND** 2. at least one of the following findings: • positive dipstick for leukocyte esterase and/or nitrite; **OR** • pyuria with ≥ 10 white blood cells (WBC)/mL or ≥ 3 WBC/high-power field of unspun urine; **OR** • microorganisms seen on Gram stain of unspun urine; **OR** • at least two urine cultures with repeated isolation of the same uropathogen (Gram-negative bacteria or Staphylococcus saprophyticus) with ≥ 10^2 colonies/mL urine in non-voided specimens; **OR** • ≤ 10^5 colonies/mL of a single uropathogen (Gram-negative bacteria or S. saprophyticus) in a patient being treated with an effective antimicrobial agent for a UTI.
Type-C (UTI-C)	Not microbiologically-confirmed symptomatic UTI	1. Patient has **at least three** of the following signs or symptoms with no other recognized cause: • fever (> 38°C); **OR** • urinary urgency; **OR** • increased urinary frequency; **OR** • dysuria; **OR** • flank pain; **OR** • supra-pubic pain; **OR** • suprapubic tenderness; **AND** 2. clinician • diagnosed for UTI **OR** • institutes therapy for a UTI
Type -D (CAUTI)	Catheter-associated UTI	1. UTI-A **OR** UTI-B **OR** UTI-C definitions. **AND** 2. An indwelling urinary tract catheter in place ≤ 2 days prior to first meeting a component of the confirmed UTI definition *

*(1. *An indwelling urinary catheter was in place when the first UTI criterion was met. 2. An indwelling urinary catheter had been removed within the previous 2 days before the first UTI criterion was met.)*

Inclusion criteria

- Case that meets the surveillance case definition

Exclusion criteria

- Patients with urinary tract infection (cystitis or pyelonephritis) before admission or within 2 days of admission.
- Nephrostomy tubes, ileo-conduits, or suprapubic catheters are excluded unless an indwelling urinary catheter (IUC) is also present.

Case Findings (algorithm annex 9 A)

- Assess patient medical record files and fill in the trigger questions in the trigger form (Annex 2).
- Every day during the morning handover, record the total number of patients with appropriate information in the denominator record form (annex 3)
- If trigger indicator (**Q 1a** and Q **2a/2d/3b**) is present, inform the IPC focal person/surveillance Officer /designated focal person.

Case Recording and Reporting (Algorithm Annex 9 B)

- Go to the ward under surveillance daily at specific time or when informed by ward nurse/link nurse/ ward in charge
- Identify the case triggered by the ward nurse/link nurse/ ward in charge
- Gather the patient record files/ admission discharge notes.
- Fill up the remaining trigger information on trigger form.
- Compare trigger information with case definition.
- Fill up the demographic information form (Annex 1) and use case recording form for UTI cases (Annex 5).
- On the last day of the month, collect the denominator form from the ward (Annex 3) to calculate the rate of UTI/CAUTI of the corresponding month.
- Calculate the monthly rate of Urinary Tract Infections by type, using the formula provided in Table 11.

Analysis Plan

- Urinary tract infections (UTIs) will be stratified into UTI-A, UTI-B, UTI-C and Catheter-Associated UTI (CAUTI), with overall UTI also reported. For each category, the incidence proportion and incidence density will be calculated. Additionally, the catheter utilization ratio will be assessed to contextualize the infection rates

Denominator

- UTI Incidence Density: Total Number of Patient-days
- UTI Incidence proportion: Total number of patients admitted
- CAUTI: Total urinary catheter days
- Device Utilization (Urinary Catheter) Ratio: Total number patient-days

Note: Please refer to annex 3 for denominator forms and table 4 for list of denominators.

Table 11: Calculation of UTIs

In the intensive care unit of Hospital A, 5 cases of Urinary Tract Infections were reported during the month of January 2024.
- Total number of Urinary catheter days was 500
- Total number of patients admitted to the ICU was 200
- Total number of patients with Urinary catheter days was 50
- Total number of patient-days was 1,000.

Calculate UTI incidence density, proportion and device utilization ratio.

SN	Formula with Calculation	Interpretation
UTI Incidence Density	$= \frac{\text{Number of patients who developed a UTI}}{\text{Total number of patient} - \text{days}} \times 1000$ $= \frac{5}{1000} \times 1000$ $= 5$ The UTI incidence density is 5 per 1,000 Patient-days.	This means that for every 1,000 days of patient care in the ICU, there were 5 patients developed a urinary tract infection.
UTI Incidence Proportion	$= \frac{\text{Number of patients who developed a UTI}}{\text{Total number of patients admitted}} \times 100$ $= \frac{5}{200} \times 100$ $= 2.5\%$ UTI Incidence Proportion is 2.5%	This indicates that 2.5% of all patients admitted to the ICU during January 2024 developed a urinary tract infection (UTI).
CAUTI Incidence Density	$= \frac{\text{Number of CAUTI cases}}{\text{Number of urinary catheter days}} \times 1{,}000$ $= \frac{5}{500} \times 1000$ $= 10$ CAUTI Incidence Density is 10 per 1,000 urinary catheter days	The CAUTI rate is 10 per 1,000 urinary catheter days, indicating that every 1,000 days of urinary catheter used in the ICU, there were 10 patients developed a CAUTI during January 2024
Device (Urinary catheter) Utilization Ratio	$\frac{\text{Total number of urinary catheter days(Device days)}}{\text{Total number of Patient days}} \times 100$ $= \frac{500}{1000} \times 100$ $= 0.5 \times 100$ $= 50\%$ Device utilization Ratio is 50%.	This means 50% of patients had urinary catheter in place in the ICU during January 2024.

C. Surgical Site Infection

Surgical Site Infections (SSI) are among the most common complications following surgical procedures, whether in hospitalized patients or those undergoing surgery in outpatient services. They occur when bacteria enter through surgical incisions or are introduced during the postoperative phase, such as through dressing changes or other routes. Clinical signs and symptoms of SSI vary, based on the infection type and severity, and can include redness, swelling, pain, tenderness and the drainage of pus or fluid from the incision site. They can be superficial infections involving the skin and subcutaneous tissue or more serious, involving deeper tissues, organs or implanted material.

Risk factors for SSI can be categorized as either patient-related or procedure-related. Patient-related risk factors include underlying medical conditions, immunosuppression, advanced age, smoking and obesity. Procedure-related risk factors include the duration of surgical procedures, the quality of aseptic technique and practices used, inadequate sterilization, the use of foreign material (such as implants) and a prolonged preoperative stay. SSI pose significant threats to patient health, leading to high morbidity, discomfort, and extended hospital stays. On average, SSI increase hospital stays by 10 days[17] and can raise the cost of surgery by 300-400%.[18] SSI also contribute to higher rates of hospital readmission and negatively impacts health outcomes.[19]

Requirement

- Demographic information form
- Trigger data form/algorithm
- SSI case definition /report form
- Patient record file
- Common denominator form

The infection window period (IWP), present on admission (POA), healthcare-associated infection (HAI), and repeat infection timeframe (RIT) definitions do not apply to the SSI protocol.

[17] Jenks PJ, Laurent M, McQuarry S, Watkins R. Clinical and economic burden of surgical site infection (SSI) and predicted financial consequences of elimination of SSI from an English hospital. J Hosp Infect. 2014;86:24-33. doi: 10.1016/j.jhin.2013.09.012

[18] Jenks PJ, Laurent M, McQuarry S, Watkins R. Clinical and economic burden of surgical site infection (SSI) and predicted financial consequences of elimination of SSI from an English hospital. J Hosp Infect. 2014;86:24-33. doi: 10.1016/j.jhin.2013.09.01

[19] Mengistu DA, Alemu A, Abdukadir AA, Mohammed Husen A, Ahmed F, Mohammed B et al. Incidence of surgical site infection among patients: aystematic review and meta-analysis. Inquiry. 2023;60:469580231162549. doi: 10.1177/00469580231162549

Date of Event (DoE) for SSI:

For an SSI, it is the earliest date when any signs, symptoms, or test result that contributes to meeting the SSI definition is first observed. This date must fall within the surveillance period i.e 30 days.

Example: If a patient had surgery on January 1st, and:

- Redness and swelling appear on January 10th
- Pus is observed on January 12th
- Culture is positive on January 14th

Then, the Date of Event (DoE) is January 10th, because that is the date when the first SSI elements occurred.

Timeframe for SSI elements:

A. Surveillance Period

- 30 days for procedures without implants.

B. Timing of Elements

a. While there is no strict rule for how close in time the elements of an SSI must occur, all elements used to meet an SSI criterion should generally occur within a 7–10-day window.

Example:

- If a patient shows signs of infection (e.g., redness, swelling) on **Day 1**,
- Pus is observed on **Day 4**,
- a positive culture is reported on **Day 8**,

Mentioned elements occur within 7-10 days' timeframe so these can be grouped together as one SSI event.

*But if the signs are **spread too far apart in time** (e.g., 15–20 days), they may not be considered part of the same infection episode.*

3. There should be no more than 2–3 days between individual elements (e.g., signs, symptoms, lab results) to ensure they are related to the same infection event.

C. Patient-Reported Symptoms

- Patient or caregiver-reported signs and symptoms (e.g., pus, redness, pain) if they occur within the surveillance period.

Table 12: SSI Surveillance Case Definition

Surgical Site Infection	
Surgical Site Infection Type A (SSI-A)	Postoperative patients within 30 days following a surgical procedure with 1. evidence of SSI based on microbiology for positive culture (wound site culture positive) **OR** 2. Radiology (suggestive of infection) **OR** 3. Histopathological criteria (for abscess or similar findings) **Stratify by depth if the following information is available:** a) superficial: AND infection involves only skin and subcutaneous tissue of the incision; b) deep incisional: AND infection involves deep soft tissue (for example, fascia, muscle) of the incision; c) organ/space: AND infection involves any part of the anatomy (for example, organs and spaces) other than the incision that was opened or manipulated during a surgical procedure.
Surgical Site Infection Type B (SSI-B)	Postoperative patients within 30 days following a surgical procedure with 1. reopening of the wound for suspected infection **OR** 2. Abscess (or similar findings) found during direct examination or during reoperation (for deep and organ/space SSI). **Stratify by depth if the following information is available:** a) superficial: AND infection involves only skin and subcutaneous tissue of the incision; b) deep incisional: AND infection involves deep soft tissue (for example, fascia, muscle) of the incision; c) organ/space: AND infection involves any part of the anatomy (for example, organs and spaces) other than the incision that was opened or manipulated during a surgical procedure.

Surgical Site Infection Type C (SSI-C)	Postoperative patients within 30 days following a surgical procedure with 1. evidence of purulent discharge at the incision or surgical site. **<u>Stratify by depth if the following information is available:</u>** a) superficial: AND infection involves only skin and subcutaneous tissue of the incision; b) deep incisional: AND infection involves deep soft tissue (for example, fascia, muscle) of the incision; c) organ/space: AND infection involves any part of the anatomy (for example, organs and spaces) other. than the incision that was opened or manipulated during a surgical procedure.
Surgical Site Infection Type D (SSI-D)	Postoperative patients within 30 days following a surgical procedure; AND 1. diagnosis of an SSI is made by the surgeon or attending physician or designee.

Inclusion criteria

- Case that meets the surveillance case definition

Exclusion Criteria

- Patients with evidence of an alternative source of infection unrelated to the surgical site.
- Patients with pre-existing infection or colonization at the surgical site prior to surgery.
- Diagnosis/treatment of cellulitis (redness/warmth/swelling), by itself, does not meet superficial incisional SSI criteria.
- A stitch abscess alone (minimal inflammation and discharge confined to the points of suture penetration).
- A localized stab wound or pin site infection; depending on the depth, these infections might be considered either a skin (SKIN) or soft tissue (ST) infection.

Case Finding (algorithm annex 9 A)

Surveillance staff shall evaluate all patients and seek out possible cases in each ward under surveillance or post-discharge surveillance by screening a variety of methods such as

- Direct inspection of the wound
- Medical records/surgical/OT notes/physician's notes/ admission, readmission.
- Laboratory/X-ray, other diagnostic test reports.

- Information from the patients and families
- Surveys by mail or telephone.
- OPD and emergency record

Assess patient medical record files and fill in the trigger questions in the trigger form (Annex 2).

Every day during the morning handover if patient is admitted, record the total number of patients with appropriate information in the denominator record form (annex 3)

If trigger indicator (Q 1a/1b and Q 2e/3c) is present, inform the IPC focal person/surveillance Officer /designated focal person.

Case Recording

- Only surgical procedures that meet the definition of an operative procedure should be included in SSI surveillance.
- All procedures included must be monitored for:
    - Superficial SSIs
    - Deep SSIs
    - Organ/space SSIs
- All patients undergoing the defined surgical procedures must be monitored for cases that meet the SSIs case definition.
- For each confirmed SSIs case, the SSIs Case Report Form (Annex 6) must be completed.
- On the last day of the month, collect the denominator form from the ward (Annex 3) to calculate the rate of SSIs of the corresponding month.
- Calculate the monthly rate of SSIs by type using the formula provided in Table 13.

Analysis Plan

Surgical site infections (SSIs) will be stratified by type SSI-A, SSI-B, SSI-C, and SSI-D, with overall SSI also reported. For a given surveillance period, the denominator will be the total number of procedures performed within each SSI category, while the numerator will be the number of SSIs identified in the same period. Using this data, incidence proportion will be calculated for each SSI category.

Denominator

- Total number of surgeries performed during that month
- Number of specific surgical procedures performed (e.g., C-section, hip replacement, appendectomy etc.)

Table 13: Calculation of SSI Incidence

Hospital A performed 200 eligible surgical procedures in January 2024. A total of 15 SSI cases were identified among these procedures, comprising 4 cases associated with caesarean section, 7 cases associated with hip replacement surgery, and 4 cases associated with appendectomy. The distribution of surgical procedures performed during the reporting month (January) was as follows:

- Total number of surgeries performed = 200
- Total number of C-Section performed = 35
- Total number of Hip replacements performed = 26
- Among 15 SSI cases 9 cases were diagnosed SSI- Type A

Calculate SSI incidence proportion of that month.

SN	Formula with Calculation	Interpretation
Surgical Site Infection Incidence Proportion	$= \frac{\text{Number of patients who developed a SSI}}{\text{Total number Surgeries performed}} \times 100$ $= \frac{15}{200} \times 100$ $= 7.5$ The SSI incidence proportion for all surgeries is 7.5%.	The SSI incidence proportion for all surgeries in January 2024 was 7.5%, meaning that approximately 8 out of every 100 surgical patients developed a surgical site infection during this month.
Surgery specific SSI Incidence Proportion (C- section)	$= \frac{\text{Total Number of C–Section who developed a SSI}}{\text{Total number of C–section performed}} \times 100$ $= \frac{4}{35} \times 100$ $= 11.42\%$ The SSI incidence proportion for C-section surgeries is 11.42%	The SSI incidence proportion for C-section surgeries in January 2024 was 11.42%, meaning that approximately 11 out of every 100 patients who underwent a C-section developed a surgical site infection.
Surgery specific SSI Incidence Proportion (Hip-replacement)	$\frac{Total\ Number\ of\ hip\ replacement\ who\ developed\ a\ SSI}{Total\ number\ of\ hip\ replacement\ performed} \times 100$ $= \frac{7}{26} \times 100$ $= 26.92\%$ The SSI Incidence Proportion for hip replacement surgery is 26.92%	The SSI Incidence Proportion for hip replacement surgeries is 26.92%, This means that approximately 27 out of every 100 patients who underwent hip replacement surgery developed a surgical site infection during the follow-up period.
SSI Incidence Proportion for (SSI Type A)	$\frac{\text{Number of patients who developed a SSI type A}}{\text{Total number Surgeries performed}} \times 100$ $= \frac{9}{200} \times 100$ $= 4.5\ \%$ The incidence proportion of SSI Type-A is 4.5%.	The incidence proportion of SSI Type A is 4.5%. This means 4.5 out of every 100 surgical patients developed a Type A surgical site infection during the follow-up period.

Note: SSI cases should be counted in the month when the surgery was performed, not in the month when the infection was detected. SSI detected in August following a surgery performed in July should be included in the July SSI rate, not in the August SSI rate.

D. Pneumonia

Respiratory tract infections are one of the most common HAI, particularly in critical care, and affect more than one-quarter of patients admitted to ICUs. HAP occurs when infectious agents

such as bacteria, viruses or fungi enter the lungs, leading to infection. Pneumonia associated with mechanical ventilation, also known as ventilator-associated pneumonia (VAP), is among the most frequent healthcare-associated infections, affecting a high proportion of critically ill patients [20]. In six ICUs in France, VAP affected 5–40% of patients receiving invasive mechanical ventilation for more than 2 days, with a significant variation depending on the ICU type and criteria used to identify VAP[21]. VAP is associated with substantial morbidity and mortality, with an estimated attributable mortality rate of around 10%. Mortality rates are higher among surgical patients and those with mid-range severity scores at admission [22].

Requirements

- Demographic information form
- Trigger data form/algorithm
- HAP/VAP case definition/ report form
- Patient medical record file
- Common denominator form (Annex 3)

Table 14: Pneumonia Surveillance Case Definition

Healthcare Acquired Pneumonia	
To diagnose Healthcare Acquired Pneumonia (HAP), the timing criteria must be met along with the following surveillance criteria: there should be ***at least 48 hours' time interval from admission to the healthcare facility or the start of care delivery.***	
Microbiologically confirmed Healthcare Acquired Pneumonia (PNM-A)	1. Patient has **at least two** of the following: • fever (>38°C); **OR** • cough; **OR** • purulent sputum; **OR** • tachypnoea (respiratory rate >20 bpm); **OR** • worsening gas exchange (SpO_2 <94% or decrease from baseline of >3%, new or increased need for supplemental O2); **OR** • documented auscultation indicative of pneumonia; **OR** • compatible findings such as "crackles" or "bronchial breath sounds"; AND 2. Radiological criteria suggestive of pneumonia • chest X-ray **OR** • computed tomography (CT) scan

[20] Howroyd F , Chacko C, MacDuff A, Gautam N, Pouchet B , Tunnicliffe B, et al. Ventilator-associated pneumonia: pathobiological heterogeneity and diagnostic challenges. Nat Commun. 2024;15(1):6447. doi: 10.1038/s41467-024-50805-z
[21] Seguin P, Laviolle B, Dahyot-Fizelier C, Dumont R, Veber B, Gergaud S et al. Effect of oropharyngeal povidone-iodine preventive oral care on ventilator-associated pneumonia in severely brain-injured or cerebral hemorrhage patients: a multicenter, randomized controlled trial. Crit Care Med. 2014;42:1-8. doi: 10.1097/CCM.0b013e3182a2770f
[22] Papazian L, Klompas M, Luyt CE. Ventilator-associated pneumonia in adults: a narrative review. Intensive Care Med. 2020;46:888-906. doi: 10.1007/s00134-020-05980-0

	AND 3. microorganisms are isolated from any positive microbiology from the respiratory sample (quantitative or non-quantitative, including serology, antigen in urine, etc.). AND/OR 4. blood culture.
Radiologically confirmed PNM (PNM-B)	1. Patient has **at least two** of the following: • fever (>38°C); **OR** • cough; **OR** • purulent sputum; **OR** • tachypnoea (respiratory rate > 20 bpm); **OR** • worsening gas exchange (SpO_2<94% or decrease from baseline of >3%, new or increased need for supplemental O_2); **OR** • documented auscultation indicative of pneumonia; **OR** • compatible findings such as “crackles” or “bronchial breath sounds”; AND 2. Radiological criteria suggestive of pneumonia. • chest X-ray **OR** • CT scan
Clinical PNM (PNM-C)	1. Patient has **at least three** of the following: • fever (>38°C); **OR** • cough; **OR** • purulent sputum; **OR** • tachypnoea (respiratory rate > 20 bpm); **OR** • worsening gas exchange (SpO_2<94% or decrease from baseline of >3% or new or increased need for supplemental O_2); **OR** • documented auscultation indicative of pneumonia; **OR** • compatible findings such as “crackles” or “bronchial breath sounds”
Ventilator-associated pneumonia (VAP)	1. **At least one** of following PNM • PNM-A **OR** • PNM-B **OR** • PNM-C; AND 2. mechanical ventilation/intubation in place ≤ 2 days prior to first meeting a component of the pneumonia definition*

***** *(1. A mechanical ventilator was in place, or patient was intubated when the first HAP criterion was met. 2. The mechanical ventilator had been discontinued, or the patient was extubated within the previous 2 days before the first HAP criterion was met.)*

Exclusion Criteria:

- Patients with evidence of community-acquired pneumonia or pneumonia incubating at the time of admission.
- Patients with pneumonia that are attributable to other causes (e.g., aspiration pneumonia, lung abscess).

Case Findings (algorithm annex 9 A)

- Assess patient medical record files and fill in the trigger questions in the trigger form (Annex 2).
- Every day during the morning handover, record the total number of patients with appropriate information in the denominator record form (annex 3)
- If trigger indicator (**Q 1a** and **Q2a/2c/3d**) is present, inform the IPC focal person/ surveillance Officer /designated focal person.

Case Recording and Reporting (Algorithm Annex 9 B)

- Go to the ward under surveillance daily at specific time or when informed by ward nurse/link nurse/ ward in charge.
- Identify the case triggered by the ward nurse/link nurse/ ward in charge.
- Gather the patient record files/ admission discharge notes.
- Fill up the remaining trigger information.
- Fill up the demographic information form (Annex 1) and use the case recording form for type of HAP cases (Annex 7).
- On the last day of the month, collect the denominator form from the ward (Annex 3) to calculate the rate of HAPs for the corresponding month.
- Calculate the monthly rate of HAP by type using the formula provided in Table 15.

Analysis Plan

Healthcare-Acquired Pneumonia (HAP) will be stratified into PNM-A, PNM-B, PNM-C and Ventilator-Associated Pneumonia (VAP), with overall HAP also reported. For each category, the incidence proportion and incidence density will be calculated. Additionally, the Mechanical Ventilator utilization ratio will be assessed to contextualize infection rates.

Denominator

Denominators for

- HAP incidence density: Total patient-days.
- HAP Incidence Proportion: Total number of patients admitted.
- VAP incidence density: Total ventilator days
- Device Utilization Ratio: Total number of patient days

Note: Please refer to annex 3 for denominator forms and table 4 for list of denominators.

Table 15: Calculation of HAP Incidence

In the intensive care unit of Hospital A, 5 cases of Healthcare-Acquired Pneumonia (HAP) were reported during the month of January 2024.

- Total number of patients admitted to the ICU was 200
- Total number of Mechanical ventilator days was 500
- Total number of patients on Mechanical ventilator was 50
- Total number of patient days was 1,000.

Here we are calculating WARD specific HAP rate.

SN	Formula with Calculation	Interpretation
HAP Incidence density (HAP Rate)	$= \frac{\text{Number of patients who developed a HAP}}{\text{Total number of patient days}} \times 1000$ $= \frac{5}{1000} \times 1000$ $= 5$ The HAP incidence density was 5 per 1,000 Patient-days.	The HAP incidence density in the ICU was 5 per 1,000 patient-days. This means that for every 1,000 patient-days in the ICU, approximately 5 patients developed a healthcare-acquired pneumonia.
HAP Incidence proportion	$= \frac{\text{Number of patients who developed a HAP}}{\text{Total number of patients admitted}} \times 100$ $= \frac{5}{200} \times 100$ $= 2.5\%$ The HAP incidence proportion was 2.5%,	The HAP incidence proportion among ICU patients in January 2024 was 2.5%, indicating that approximately 3 out of every 100 patients admitted to the ICU developed a healthcare-acquired pneumonia
VAP incidence density (VAP Rate)	$= \frac{\text{Number of VAP cases}}{\text{Number of mechanical ventilator days}} \times 1{,}000$ $= \frac{5}{500} \times 1000$ $= 10$ The VAP rate was 10 per 1,000 mechanical ventilator-days.	The VAP rate in the ICU during January 2024 was 10 per 1,000 mechanical ventilator-days. This means that for every 1,000 days of mechanical ventilation, approximately 10 patients developed ventilator-associated pneumonia (VAP).
Device (Mechanical Ventilator) Utilization Ratio	$\frac{\text{Total number of mechanical ventilator days(Device days)}}{\text{Total number of Patient days}} \times 100$ $= \frac{500}{1000} \times 100$ $= 0.5 \times 100$ $= 50\%$ The mechanical ventilator utilization ratio was 50%.	The mechanical ventilator utilization ratio in the ICU during January 2024 was 50%, indicating that ventilators were in use for half of the total patient-days.

"Organisms isolated during HAI surveillance should be assessed for multidrug resistance (MDROs), especially those commonly associated with antimicrobial resistance, to inform infection prevention and control (IPC) strategies."

Multi-Drug-Resistant Organisms (MDROs):

Multi-Drug-Resistant Organisms (MDROs) are defined as microorganisms, predominantly bacteria, that are resistant to one or more antibiotics in three or more classes of antimicrobial agents. This resistance makes infections caused by MDROs difficult to treat and control. Common examples of MDROs include Methicillin-resistant Staphylococcus aureus (MRSA), Vancomycin-resistant Enterococci (VRE), and certain strains of Escherichia coli and Klebsiella pneumoniae.

Requirement

- Demographic information form
- Trigger data form
- MDRO case definition/ report form
- Patient Medical record file
- Common denominator form

Definition: MDROs are microorganisms, predominantly bacteria that have developed resistance to at least one agent in three or more classes of antibiotic, making them difficult to treat with standard antibiotic therapy.

Reportable MDROs

- MRSA-Methicillin Resistance Staphylococcus Aureus
- VRSA- Vancomycin Resistant Staphylococcus Aureus
- VRE- Vancomycin Resistant Enterococcus
- MDR and XDR E. coli
- Carbapenem resistant Enterobacteriaceae
- MDR and XDR Klebsiella Pneumoniae
- MDR and XDR Acinetobacter spp.
- MDR and XDR Pseudomonas
- Clostridium difficile

Clinical Criteria:

- Presence of infection or colonization with a microorganism known to be resistant to multiple classes of antimicrobial agents.
- Clinical signs and symptoms may vary depending on the specific MDRO and the site of infection.

Microbiological Criteria:

- Isolation and identification of a microorganism (only organism causing HAIs) with known resistance to multiple classes of antimicrobial agents, as determined by susceptibility testing.

Table 16: Methodology to detect Multidrug Resistance organisms

Organism	Method of detection	Note
MRSA	Staphylococcus aureus isolate showing a zone of inhibition of ≤21 mm against cefoxitin (30mcg) discs or a MIC value of ≥4 µg/mL against oxacillin and ≥8 µg/mL against cefoxitin.	
VRSA	Staphylococcus aureus isolate showing a MIC value of ≥16 µg/mL against Vancomycin.	Disc diffusion against Vancomycin is not recommended
VISA	Staphylococcus aureus isolate showing a MIC value of 4-8 µg/mL against Vancomycin.	
VRE	Enterococcus species showing a zone of inhibition of ≤ 14mm using 30mcg Vancomycin discs or MIC value of ≥ 32 µg/mL.	
CRE/CRAB/CRP	Isolates of Enterobacteriaceae Acinetobacter and Pseudomonas showing resistance to at least one of the carbapenems (imipenem, meropenem, ertapenem, doripenem)	
MDR	Any bacterial isolate showing resistance to at least one antimicrobial drug in three or more antimicrobial categories	Do not include antibiotics exhibiting intrinsic resistance for specific pathogen
XDR	Any bacterial isolates showing susceptibility to only one or two antimicrobial categories. (Such as colistin, polymyxin B, tigecycline etc.)	Do not include antibiotics exhibiting intrinsic resistance for specific pathogen
PDR	Any bacterial isolates showing resistance to all agents in all antimicrobial categories.	
C. difficile	Clostridioides difficile is isolated	
Candida auris	Candida auris is isolated.	

Case Findings (algorithm annex 9A)

- Examine the medical records of patients who fulfill the criteria for healthcare-associated infections (HAIs) and have documented microbial isolation. Subsequently, complete the trigger questions outlined in trigger form (Annex 2).
- Every day during the morning handover, record the total number of patients with appropriate information in the denominator record form (annex 3)

- If trigger indicator (Q1 or Q 2/3) is present, inform the IPC focal person/surveillance Officer /designated focal person.

Case Recording and Reporting (Algorithm Annex 9 B)

- Visit the designated surveillance ward daily at a scheduled time, or upon notification by the ward nurse, link nurse, or ward in-charge.
- Confirm HAI cases reported by the ward staff that meet the criteria MDROs surveillance.
- Gather the patient record files/ admission discharge notes.
- Fill up the remaining trigger information.
- Verify the presence of a multidrug-resistant organism based on microbiological criteria and laboratory results among HAI diagnosed cases.
- Fill in the demographic information form (Annex 1) and use case recording form for MDRO cases (Annex 10).
- Calculate the monthly MDRO incidence proportion for the surveillance month the provided formula provided in Table 17.

"In this context, we are calculating the incidence proportion of MDROs among healthcare-associated infection (HAI) cases. Therefore, the appropriate denominator is the *total number of HAI* cases detected during the specified period."

Denominator

- Total number of HAI cases

Note: Please refer to annex 3 for denominator forms and table 4 for list of denominators

Analysis Plan

MRSA, VRSA, VISA, VRE, MDR, XDR, CRE will be stratified by Multi Drug Resistant Organisms and proportions will be calculated and compared. Using numerator and denominator data, incidence will be calculated for total.

Calculation of Incidence proportion

Incidence proportion (also called cumulative incidence) is the proportion of a population that develops a condition (e.g., MDRO-related HAI) over a specified period.

Table 17: Calculation of MDRO Incidence proportion

MDRO incidence Proportion calculation among HAI detected Cases	
Scenario: In January 2024, Hospital A reported 42 total healthcare-associated infection (HAI) cases. Among these, 26 cases were caused by multidrug-resistant organisms (MDROs). The breakdown of MDROs was: • 10 cases of MRSA (Methicillin-resistant *Staphylococcus aureus*) • 4 cases of VRE (Vancomycin-resistant *Enterococcus*) • 6 cases of VRSA (Vancomycin-resistant *Staphylococcus aureus*)	
Here we are calculating incidence proportion of MRSA	
MDRO Incidence proportion	$= \frac{\text{Total number of MDRO on HAI cases}}{\text{Total Number of HAI cases}} \times 100$ $= \frac{26}{42} \times 100$ = 61.90% Approximately 61.9% of all healthcare-associated infection (HAI) cases in January 2024 were caused by multidrug-resistant organisms (MDROs).
Here we are calculating incidence proportion of MRSA	
MRSA Incidence proportion	$= \frac{\text{Total number of MRSA isolated on HAI cases}}{\text{Total Number of HAI cases}} \times 100$ $= \frac{10}{42} \times 100$ = 23.81% Approximately 23.8% of all healthcare-associated infection (HAI) cases in January 2024 at Hospital A were caused by MRSA.

Inclusion criteria (organism only isolated from HAI cases)

- Those cases that meet the criteria for any type of healthcare-associated infection (HAI), has a microorganism isolated through laboratory investigation, and fulfills the surveillance case definition.

Exclusion Criteria:

- Patients with infections or colonization involving only non-MDRO pathogens.
- Patients with a history of MDRO colonization or infection that has been clinically and microbiologically confirmed as resolved, and who have had no recurrence or positive cultures within a defined clearance period (e.g., 6 months).

- Patients with community-acquired infections do not meet the criteria for healthcare-associated infections (HAIs).

3.3 HAI Surveillance During Public Health Emergencies and Outbreaks

Effective surveillance of healthcare-associated infections (HAIs) is essential for the early detection, containment, and mitigation of outbreaks within healthcare settings. It plays a critical role in protecting both patients and healthcare workers by enabling timely interventions and informed decision-making.

Objectives of HAI Surveillance During Public Health Emergencies

- **Early detection of HAI cases and potential outbreaks**

  Early detection of suspected cases and outbreaks in healthcare settings enables targeted interventions to reduce the risk of outbreak amplification and prevent further community transmission.
- **Monitoring the HAI burden**

  Understanding HAI burden helps evaluate the effectiveness of IPC interventions and monitor unintended patient safety harms from measures used to maintain essential health services during public health emergencies.
- **Informing infection prevention and control (IPC) strategies**

  Adapting IPC strategies to the evolving context of public health emergencies ensures that interventions suit local healthcare systems and guide prevention efforts in both healthcare and community settings.
- **Rational resources allocation**

  Ensuring resources are allocated and reallocated according to the specific needs of IPC interventions, which may differ from broader epidemiological patterns.
- **Data for decision-making**: Using incidence and outbreak data to guide decision-making, resource distribution and policy development during both response and recovery phases.

HAIs Outbreak:

Outbreaks of HAI are defined as hospital-associated or health care facility-associated infections among patients or staff that represent an increase in incidence over expected baseline rates.

Commonly detected organisms in HAIs outbreak:

- Carbapenem-resistant Enterobacterales (CRE)
- Methicillin-resistant Staphylococcus aureus (MRSA)
- Multidrug-resistant Klebsiella spp. or Pseudomonas spp
- Diarrheal pathogens (e.g., Salmonella spp., Shigella spp., Campylobacter spp., norovirus)
- Respiratory pathogens (e.g., influenza, Respiratory syncytial virus -RSV, SARS COV-2
- Other pathogens like; M. tuberculosis, HBV, HCV, HIV, HAV, HEV, etc.
- Any others emerging pathogens

Integration with Early Warning Systems

Integration of HAI surveillance with Early Warning, Alert, and Response Systems (EWARS) is critical. During public health emergencies and other context if any notifiable diseases/organism detected health facilities should inform national reporting system which enables:

- Timely alerts for suspected HAIs
- Prompt case notification and outbreak response
- Implementation of IPC measures, including safe screening practices and immediate action upon identification of suspected cases

During the HAI outbreak occurred due to common organisms or emerging organisms please follow the steps mentioned to investigate the HAI outbreak.

Steps involved in HAI outbreak investigation

Step 1: Verify the diagnosis using clinical and microbiological data.

Step 2: Confirm the existence of an outbreak by comparing current infection rates with baseline hospital data.

Step 3: Notify key stakeholders including IPC teams, hospital leadership, and public health authorities, EWAR systems.

Step 4: Develop a case definition specific to the healthcare setting: compare with existing case definition of common HAIs as given in this SOP.

Step 5: Find cases systematically and develop a line list using hospital records, lab reports, and surveillance logs.

Step 6: Conduct environmental and device audits (e.g., hand hygiene, sterilization, equipment uses).

Step 7: Perform descriptive epidemiology (i.e. Describe data by person, time and place-ward/unit)

Step 8: Develop and evaluate hypotheses (e.g., contaminated IV fluids, poor catheter care).

Step 10: Implement immediate IPC measures (e.g., cohorting, enhanced cleaning, staff retraining).

Step 11: Communicate findings internally and to health authorities.

Step 12: Monitor outcomes and maintain surveillance to prevent recurrence.

Chapter 4: HAI Surveillance Process

4.1 HAIs Surveillance at National and Facility Level

Surveillance of Healthcare-Associated Infections (HAIs) should be conducted at both national and sub-national healthcare facilities, following the national HAIs surveillance Standard Operating Procedures (SOP) approved by the Ministry of Health and Food Safety (MoHFS). The scope and type of HAI surveillance may differ among healthcare facilities, depending on the services and resources available. The primary role of Infection Prevention and Control Practitioners (IPCPs) is to facilitate the implementation of the Infection Prevention and Control (IPC) program and the HAIs surveillance program at both national and sub-national hospitals.

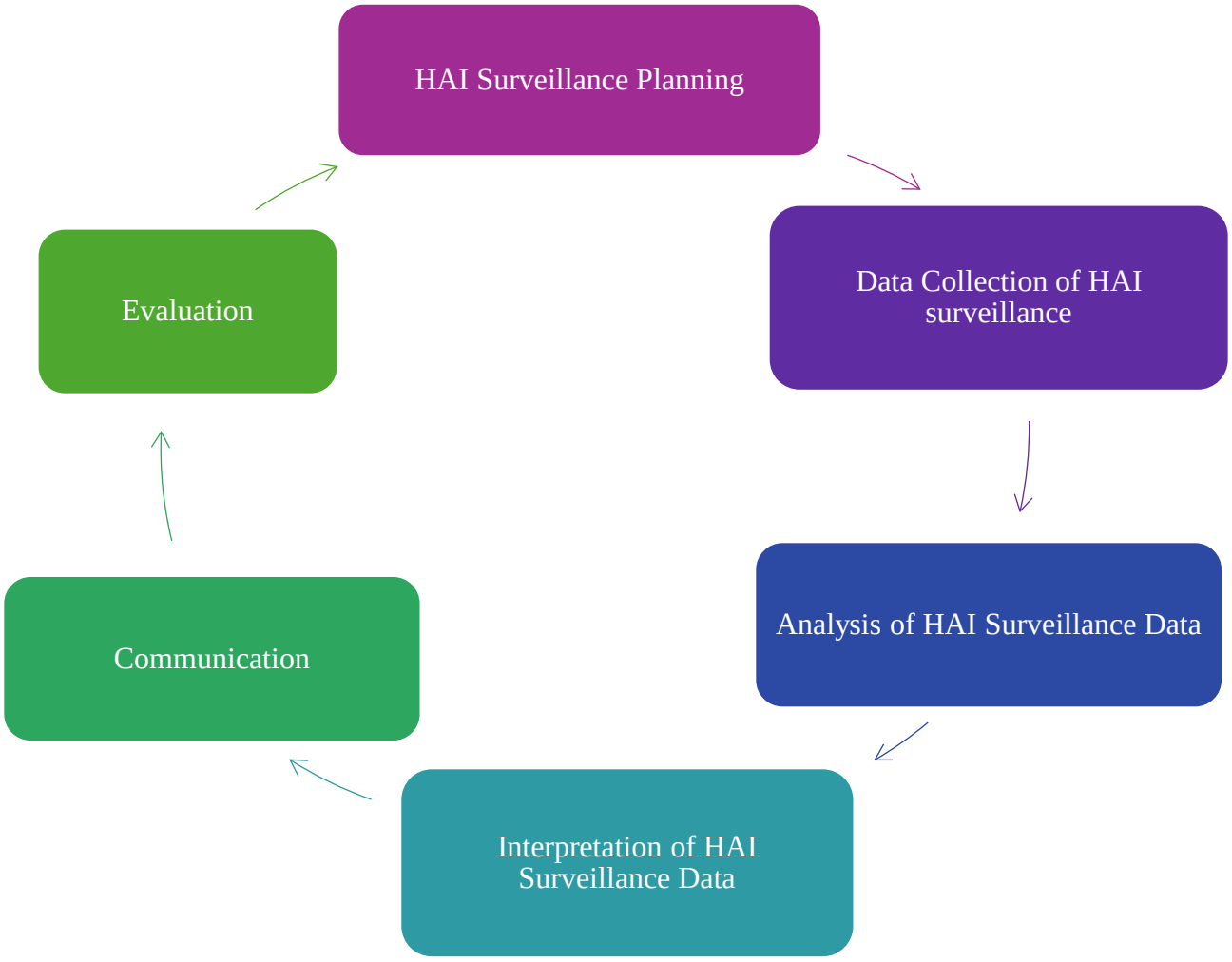


Figure 1: HAI Surveillance Process

Table 18: HAI surveillance Steps at National Level and Facility Level

National Level	Facility level
• Develop a national-level HAI Surveillance plan ensuring following points are included.	• Develop a facility- based HAI Surveillance plan which is aligned with National Plan with responsible focal point including surveillance team.
HAI Surveillance Planning	
• Develop a national HAI Surveillance plan, designating a responsible focal point unit or section (Government authority), and outlining goals, objectives, and surveillance methods. • Determine the types of HAIs to be monitored and allocate necessary resources, including budget. • Adapt and agree on standardized HAI case definitions. • Develop Standard Operating Procedures for HAI surveillance to ensure consistent and uniform monitoring.	• Develop a facility-based HAI Surveillance plan with designating a responsible focal point/ unit within the facility to align with national HAI surveillance plan. • Identify the types of HAIs to be monitored within the facility as per national plan and available services of health facility and allocate necessary resources, including budget. • Adapt and agree on standardized HAI case definitions specific to the facility. • Develop or adapt Standard Operating Procedures for HAI surveillance to ensure consistent and uniform monitoring within the health facility.
Select Health Facilities to conduct HAI surveillance • After piloting, surveillance should be started in selected hospitals in the first phase for all HAI events with selected indicators.	• After piloting, start surveillance for all HAI events with selected indicators according to national SOP. • Indicators should be selected based on available services of the health facilities.
Define surveillance events with indicators.	**Select indicators as recommended by National HAI SOP**
Following are the indicators of which data should be shared to National level from Health facility in monthly basis. **Indicators:** • Healthcare-Associated Infections (HAI) incidence density • Healthcare-Associated Infections (HAI) incidence Proportion • BSI incidence density • BSI incidence Proportion • CLABSI incidence density • UTI incidence density	Hospitals should use following indicators: • Healthcare-Associated Infections (HAI) incidence density • Healthcare-Associated Infections (HAI) incidence Proportion • BSI incidence density • BSI incidence Proportion • CLABSI incidence density • UTI incidence density • UTI incidence Proportion • CAUTI incidence density

• UTI incidence Proportion • CAUTI incidence density • SSI incidence Proportion • HAP incidence density • HAP incidence Proportion • VAP incidence density. • MDRO (among HAI identified cases) incidence Proportion • Device Utilization Ratio	• SSI incidence Proportion • HAP incidence density • HAP incidence Proportion • VAP incidence density. • MDRO (among HAI identified cases) incidence Proportion • Device Utilization Ratio
Implement developed SOP for HAI surveillance program • Implementation of the Surveillance should be started phase wise. In the first phase, selected government and private health facilities in Kathmandu should begin implementing HAI surveillance Phase 1: Selected Federal and Province Hospitals Phase 2: Selected Federal and Provincial Hospitals Phase 3: Remaining Targeted Hospitals	**Implement HAI surveillance program** • Hospitals should start HAI surveillance from all departments based on the type of services they provide with all indicators. Hospital based surveillance program should be aligned with national program.
Data Collection of HAI Surveillance	
• Develop/adapt standardized HAI surveillance data collection protocols and tools. • Suggest health workers who should be responsible for HAI surveillance data collection at facility level. • Organize capacity building /orientation/ workshop (hands on training) for health workers (Surveillance staffs) of selected health facilities on HAI Surveillance process: SOP, data collection, reporting. • Other relevant staff of the hospitals should be oriented on overall process of HAI surveillance. • Use developed standardized tools for HAI surveillance according to SOP for data collection.	• Adapt standardized HAI surveillance data collection protocols and tools from national HAI Surveillance SOP. • Identify relevant data collectors/ surveillance staff as suggested by National Surveillance SOP. (Role and responsibilities) • Send designated surveillance staff for capacity building orientation/workshop. • Orient and involve relevant other staff of hospital for overall process of HAI surveillance. • Designated focal point (NSSD) should gather the data monthly from health facility

• Collect data from hospitals based on numerators and denominators of selected events on monthly basis.	where HAI Surveillance program is implemented. This data should be collected based on given indicators ensuring standardized collection methods across all facilities. • This could involve electronic health record (EHR) systems or manual data entry into national reporting systems. • While collecting data, ensure that the raw data on numerators and denominators for the month are submitted alongside the indicator-based data reporting.
Ensure completeness and accuracy of data. • Verify that all relevant data points are captured and recorded correctly. Regular audits and validations concerning health facilities should be conducted. • Develop Automated systems / software to check data consistency, completeness, and timeliness.	**Ensure completeness and accuracy of data.** • Capture all relevant data as per given data collection tool. • Collect data on HAI from relevant wards on daily basis. • Use software or system as recommended by national level to enter and report data.
Follow up with health facilities if any discrepancies or missing data • Communicate with hospital focal person or medical recorder within 5 days to clarify and correct errors. • This might involve rechecking records or identifying the need for additional training for staff on proper data entry.	• Follow up with relevant ward/ surveillance staff if any discrepancies or missing data.
Analysis of HAI Surveillance Data	
• Calculate and analyze overall and specific HAI Incidence rate and ratio as mentioned in SOP • Calculate and analyze HAI incidence rate based on given data.	• Facility should calculate and analyze overall, and specific HAI incidence rate and ratio as mentioned in SOP. • Facility should calculate and analyze HAI incidence rate based on given data.
• Plot HAI incidence rates and device utilization ratio on monthly basis to	• Plot HAI incidence rate and device utilization ratio on monthly basis to identify trends, seasonal, and annual variations.

identify trends, seasonal, and annual variations.	
Interpretation of HAI Surveillance Data	
• Compare current data to historical data to identify improvements or deteriorations.	• Facility should compare current data against historical data to identify improvements or deteriorations of IPC measures and other interventions applied.
• Compare HAI incidence rate and ratios to assess progress on infection prevention and control (IPC) compliance.	• Facility should compare HAI incidence rate and ratios to assess progress on infection prevention and control (IPC) compliance.
• Compare HAI incidence rate and ratios between hospitals, national or regional level to identify relative performance.	• Facility should compare HAI incidence rate and ratios between ward, identify relative performance.
Communication	
• Prepare reports on HAI incidence rate and ratios and related metrics for internal use, regulatory compliance, and external stakeholders. • Prepare detailed report on monthly basis and disseminate through website/ dashboard also on monthly basis. (These reports should include data visualizations, trends, and actionable insights.	• Facility should prepare reports on HAI incidence rate and ratios and related metrics for internal use, regulatory compliance.
Communicate findings and outcomes to all relevant stakeholders. • Conduct meeting, workshop with relevant stakeholders and disseminate finding and outcome of the surveillance program every trimester.	• Facility should communicate findings and outcomes to all relevant stakeholders like management, clinicians, consultants, lab, wards etc.
• Utilize the surveillance information and recommendations to improve surveillance/ IPC practices. • Coordinate with concerned health facilities.	• Facility should utilize surveillance information and recommendations to improve surveillance/ IPC practices. • Coordinate with concerned wards.
Evaluation	
Evaluate the overall surveillance program at national level. • Systematic evaluation of the surveillance system should be done by	• Evaluate the overall surveillance program at facility level.

the program division (focal unit) to ensure effectiveness of the program. • Determine if the surveillance system accurately captures HAI data, provides actionable insights, and leads to measurable improvements in infection control.	• Determine if the surveillance system accurately captures HAI data, provides actionable insights, and leads to measurable improvements in infection control.
• Update SOP and HAI surveillance program based on the findings of the evaluation.	• Adapt updated SOP and HAI surveillance program as recommended by National program.
• Design and implement appropriate infection prevention measures.	• Design and implement appropriate facility-based infection prevention measures.
• Measure the effectiveness of IPC intervention.	• Measure the effectiveness of IPC intervention.

4.2 Role and Responsibilities of Organizations in HAIs Surveillance

Ministry of Health and Population (MOHP)

- Provide overall plan, policy and strategic direction for the HAIs surveillance program across the country.
- Allocation of resources and decision making for HAIs surveillance program implementation.
- Oversee program compliance with national and international health regulations.
- Coordination, Monitoring and Evaluation of program implementation with consultation of stakeholders.

Department of Health Services (DoHS)

- NSSD is the responsible division for implementing HAI surveillance program.
- Develop and establish the national HAIs surveillance Program.
- Coordinate and provide technical guidance to the national, provincial and local levels for HAIs Surveillance program implementation and decision-making process.
- Coordinate with stakeholders and collect recommendations and suggestions from them who are directly and indirectly working in HAIs surveillance program.
- Provide guidance and support to implement HAI surveillance program at all levels including health facility.

- Coordinate with relevant divisions and centers at any time for HAI surveillance program Implementation.
- Collect, analysis, interpret and identify trends, gaps of HAIs in the program implemented facilities and disseminate findings/ reports with the relevant stakeholders.
- Collect feedback and recommendations from relevant stakeholders for the HAIs surveillance program implementation.
- Update and amend the HAIs surveillance SOP as required.
- Prepare annual work plan for HAI surveillance program and implement.
- Regular monitoring and evaluation of program implementation.

National IPC Steering Committee

In addition to the roles and responsibilities outlined in the National Infection Prevention and Control (IPC) Guideline 2079, the following roles are specific to healthcare-associated infection (HAI) surveillance:"

- Ensure standardization of healthcare-associated infection (HAI) surveillance protocols and practices across all healthcare facilities nationwide.
- Facilitate coordination among ministries, healthcare institutions, and partner organizations to support the effective implementation of the national HAI surveillance program.
- Monitor and evaluate the implementation and performance of HAI surveillance activities at both national and subnational levels.
- Promote and secure the necessary financial, technical, and human resources to enhance the capacity of infection prevention and control (IPC) and healthcare-associated infection (HAI) surveillance systems.

IPC Technical committee

In addition to the roles and responsibilities outlined in the National Infection Prevention and Control (IPC) Guideline 2079, the following roles are specific to healthcare-associated infection (HAI) surveillance:"

- Ensure alignment of standard operating procedures (SOPs) and surveillance programs with global standards and best practices.
- Oversee training and capacity building initiatives for IPC and surveillance personnel at all levels.

- Support mentorship programs and promote continuous professional development in IPC and HAI surveillance.
- Monitor and evaluate the implementation of HAI surveillance activities at national and subnational levels.
- Provide technical guidance for the establishment and maintenance of a national HAI surveillance database.
- Review and interpret surveillance data to identify trends, detect outbreaks, and inform timely interventions.
- Ensure timely dissemination of surveillance findings to relevant stakeholders for evidence-based decision-making.
- Encourage operational research to improve HAI surveillance and IPC practices.

National Health Training center and Provincial Health Training Centre

- Develop, revise and roll out training modules (Learning Resource Package) of HAIs surveillance.
- Coordinate with Nursing and Social Security Division (NSSD) and relevant program division for need assessment of IPC and HAIs Surveillance training and conduct regular and refresher training as required.

National Public Health Laboratory and Provincial Public Health Laboratory

- Analyze AMR/ MDRO related data.
- Provide confirmatory testing for suspected cases identified through surveillance.
- Share laboratory data with DOHS and relevant divisions.

Health facilities

- From a dedicated surveillance team (IPC officer, focal person, link nurse as per need) responsible for overseeing HAI surveillance activities as per the SOP (clinical staffs involved in surveillance program e.g., nurse, doctors, paramedics, lab personnel, data manager, data collectors etc.
- Assign responsibilities of dedicated team (IPC officer and data collection officer) and provide orientation on process of data collection, TOR and responsibilities.
- Allocate necessary Human resources, financial resource, equipment, and supplies, for the effective implementation of HAIs surveillance activities.
- Ensure all team members receive adequate training/ orientation in data collection, analysis, and reporting procedures.

- Collect data on HAIs as per the HAIs surveillance SOP and facilitate timely, accurate reporting of HAIs data to relevant focal unit or program divisions (Nursing and Social Security Division).
- Provide ongoing training and capacity building sessions to surveillance team members and relevant staff to ensure competency in HAIs surveillance methodologies and SOP compliance.
- Ensure quality assurance measures to validate accuracy, completeness, timeliness of HAI surveillance data and conduct regular audits as per HAIs SOP.
- Collaborate with relevant stakeholders within and outside the healthcare facility, including National IPC TWC, program divisions for the effective implementation of HAIs surveillance program along with regular dissemination of findings.
- Monitor continuously for the adherence to HAIs surveillance SOP and collect feedback from HAIs surveillance team members, National TWC to identify best practices, areas for improvement and address any deviation from the SOP.
- Provide feedback and recommendations to program division for strengthening HAI surveillance program.

Clinical Staffs (physicians/ nurses/ paramedics)

- Clinical staff should be aware of ongoing surveillance and familiar with case definitions of HAIs under surveillance.
- Clinical staff should monitor a patient's suggestive signs and symptoms of infections, perform head-to-toe assessments, check procedure details, collect investigations reports (e.g.: cultures, radiological findings etc.) and report to surveillance staff.
- Clinical Staffs should collaborate with infection control professionals (microbiologists, epidemiologists, IPC focal person, nurses) and other healthcare professionals involved in HAIs surveillance to collect, analyze, and interpret the surveillance information effectively.

Hospital Laboratories

- Laboratory personnel should report results of microbiological testing to healthcare providers and infection prevention and control teams on desired format (according to SOP) and assist in the surveillance of antimicrobial resistance patterns.

Surveillance staff/data collectors/IPC Focal persons/ IPC Nurse)

- Coordinate with clinical staff of relevant wards and collect necessary information for HAIs surveillance.
- Carry out day to day activities of HAI Surveillance such as, case findings, case determinations, data collection, data analysis to identify trends, patterns, and potential outbreaks then report to concerned authorities.
- Collaborate with concerned authorities to implement infection control measures based on surveillance findings.
- Monitor implementation of IPC practices & SOP including hand hygiene, preventive bundle, sterilization & disinfection, antimicrobial stewardship program.

Medical recorder

- Recording and reporting of all collected data to relevant focal units or divisions (MOHP/ DOHS/ EDCD/ NSSD/ CSD/ MD) using defined recording and reporting platform/form and format.
- Maintain comprehensive medical records.
- Ensure confidentiality of patient's information.

Data Manager

- Ensure accuracy, completeness and timeliness of the data and provide feedback to surveillance staff.
- Conduct epidemiological analysis to identify trends, patterns, related cases to healthcare-associated infections in coordination with surveillance staff.

4.3 Miscellaneous

Piloting and Implementation:

- The SOP was piloted in the selected hospitals at national and provincial level.
- Initiate implementation of the HAI surveillance program in selected hospitals following the approved SOP and gradually expand the program to additional health facilities based on evaluation findings and implementation readiness.
- Provide ongoing support during the initial phase of implementation, addressing queries and conducting follow-up training if necessary.

Revision of the Document:

- Based on available studies, research, updates on case definition and criteria, integrated health information system, this document will be revised every 5 years or as needed, by IPC focal unit/program division with the help from national IPC technical committee and update accordingly to ensure it remains relevant and effective.

Monitoring and Evaluation:

- Regularly monitor the program's performance and evaluate its effectiveness.
- Continuously collect feedback on effectiveness and any difficulties in implementation of SOPs.
- Make necessary adjustments based on relevant feedback and findings.
- Engage stakeholders in monitoring and evaluation activities who are directly involved in HAI surveillance program.
- Prepare monthly/biannual/annual reports summarizing the SOP's performance, areas for improvement, and success in reducing HAIs within the facility.

Report dissemination:

Prepare monthly/biannual/annual HAI surveillance reports and share with Key stakeholders.

Note: This document is intended for HAI surveillance; however, since clinical criteria, signs, symptoms and pathogen profiles differ in the neonatal population, it is recommended to develop revised or separate surveillance documents specifically tailored to neonates or avoid applying the case definitions in this document to neonates to ensure accurate diagnosis and reporting.

5. Annexes:

Annex 1: Demographic Information

<table>
<tr><td colspan="2">Date:
DD/MM/YY</td><td colspan="3">Patient code (IP No/Hospital No.):</td><td colspan="2">Ward:</td><td colspan="2">Gender: M / F / Others (Specify)….</td></tr>
<tr><td colspan="6">Disabilities if any: (mention)…….</td><td colspan="3">Ethnicity:</td></tr>
<tr><td colspan="2">Date of birth:
DD/MM/YY</td><td colspan="3">Date of admission:
DD/MM/YY</td><td colspan="4">Date of ward admission (Trans in) if any:</td></tr>
<tr><td colspan="9">Diagnosis upon admission:</td></tr>
<tr><td rowspan="2">Co-morbidities
☑ if any</td><td>DM</td><td>CKD</td><td>HTN</td><td>TB</td><td>COPD</td><td>HIV/ AIDS</td><td>LIVER TRANSPLANT</td><td>KIDNEY TRANSPLANT</td></tr>
<tr><td colspan="5">IMMUNOSUPRESSION THERAPY</td><td colspan="3">Others (Please specify:</td></tr>
<tr><td colspan="6">Patient admitted to any health care facility in the last 30 days before the current admission</td><td colspan="2">Yes</td><td>No</td></tr>
<tr><td colspan="6">Patient stayed in previous healthcare facility for more than 48 hours in the last 30 days</td><td colspan="2">Yes</td><td>No</td></tr>
<tr><td colspan="3">Patient admitted to this facility from</td><td colspan="3">Home</td><td colspan="3">Other health care facilities: Specify ……</td></tr>
<tr><td colspan="3">Patient currently receiving antimicrobial(s)</td><td colspan="2">Yes</td><td>No</td><td colspan="3">If yes, please specify
1.
2.
3.</td></tr>
<tr><td colspan="9">Risk Factors</td></tr>
<tr><td>Device Present</td><td>Yes</td><td>No</td><td colspan="3">If yes, date of Insertion</td><td colspan="3">Device removal or reinsertion date if any:</td></tr>
<tr><td rowspan="2">Surgery</td><td rowspan="2">Yes</td><td rowspan="2">No</td><td colspan="3">If yes, Date of Surgery: …….</td><td rowspan="2" colspan="2">Type of surgery:</td><td>Emergency</td></tr>
<tr><td colspan="3">Name of Surgery: ……</td><td>Elective</td></tr>
</table>

Annex 2: Trigger Form

Date:		Patient code (IP No/Hospital No.):	
Location or Ward:	☐ Critical Care Unit (ICU, PICU, NICU, SICU, MICU, CCU)	☐ MED (Medicine)	☐ SUR (Surgical ward)
	☐ G/O (Gynecology/Obstetrics)	☐ GER (Geriatrics)	☐ MIX (Mixed cabin)
	☐ High care unit/high dependency unit/ step down	☐ (Other) specify……..	

SN	Statement	Response	
1	**Timing Criteria** a. Has the patient stayed in a healthcare facility for at least 48 hours (for other HAIs), **OR** b. undergone surgery in the facility within the past 30 days (for surgical cases)?	☐ YES (proceed following Questions)	☐ NO (stop)
2	**Signs and symptoms criteria**		
2a	Does the patient have a fever (>38°C) or chills?"	☐ YES	☐ NO
2b	Does the patient have hypotension today (systolic blood pressure of ≤ 90 mmHg)?	☐ YES	☐ NO
2c	Does patient have respiratory symptoms like cough, purulent sputum, tachypnea (respiratory rate > 20 bpm), OR worsening gas exchange (SO2 <94% or decrease from baseline of >3%, new or increased need for supplemental O2) documented auscultation indicative of pneumonia compatible findings such as “crackles” or “bronchial breath sounds”;	☐ YES	☐ NO
2d	Does the patient have any of the following urinary symptoms: urinary urgency, increased urinary frequency, flank pain, dysuria, suprapubic pain, or suprapubic tenderness?	☐ YES	☐ NO
2e	Does the patient have any of the following signs suggestive of a surgical site infection: purulent discharge, abscess, suspicion of infection, wound reopening due to suspected infection, radiological evidence of infection, or a diagnosis made by the surgeon, attending physician, or their designee?	☐ YES	☐ NO
3	**Microbiological Criteria**		
3a	Is there a positive result in the blood culture?	☐ YES	☐ NO
3b	Is there a positive result in the urine culture?	☐ YES	☐ NO
3c	Is there a positive culture result of swab, tissue, or pus taken from incision site?	☐ YES	☐ NO
3d	Is there a positive culture of respiratory sample e.g ET aspirate TT aspirate, sputum?	☐ YES	☐ NO
4	**Device related Criteria**		
	Is any device present at the time of the event? If yes, answer the following. a. central-lines catheter, b. urinary catheters c. Mechanical Ventilation,	☐ YES ☐ YES ☐ YES	☐ NO ☐ NO ☐ NO

Note: Please complete the attached HAI-specific form based on the criteria met in the trigger form

1. *If* **1a** is *YES with* **2a** *or* **2b** *or* **3a** → fill up **BSI** reporting form
2. *If* **1a** is *YES with* **2a** *or* **2d** or ***3b*** → fill up **UTI** reporting form
3. *If* **1b** is *YES* with **2e** *or* **3c** → fill up **SSI** reporting form
4. *If* **1a** *and* is *YES* with **2a** *or* **2c** *or* **3d** → fill up **HAP** reporting form

Annex 3: Denominator Record Form – Adult

		Ward:		Month:	Year:		
Date	Number of new Admitted Patient	Number of patients	Number of patients with 1 or more central lines	Number of patients with urinary catheter	Number of total patients with a ventilator	Total number of surgeries performed	Total number of HAI cases diagnosed
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
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21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
Total							

Annex 4: Bloodstream Infection Reporting Form

<table>
<tr><td colspan="5">Blood Stream Infection</td><td colspan="3">Date of Event (DOE):</td></tr>
<tr><td colspan="8">Criteria 1 (Timing criteria): Patient should have following components/symptoms after <u>at least 48 hours of admission to the healthcare facility or the start of care delivery.</u></td></tr>
<tr><td>Criteria 2</td><td>Symptoms criteria</td><td colspan="2">Patient has <u>at least one</u> of these signs or symptoms</td><td>Temp>38 °C</td><td>Chills</td><td>Hypotension (Systolic pressure ≤ 90 mmHg)</td><td>Yes/No</td></tr>
<tr><td>Criteria 3</td><td colspan="2">Microbiological criteria 3A</td><td></td><td colspan="3">Microbiological criteria 3B</td><td></td></tr>
<tr><td></td><td colspan="2">One positive blood culture for a recognized pathogen. It excludes common skin commensals such as coagulase negative staphylococci, Micrococcus sp., Propionibacterium acnes, Bacillus sp., Corynebacterium sp. (If yes, mention the name of organism)</td><td>Yes/No</td><td colspan="3">Two positive blood cultures for a common skin commensal(s) (from two separate blood samples) within 48 hours. Common skin commensals include coagulase-negative staphylococci, Micrococcus sp., Propionibacterium acnes, Bacillus sp., Corynebacterium sp. (If yes, mention the name of organism)</td><td>Yes/No</td></tr>
<tr><td>Criteria 4</td><td>Device related criteria</td><td colspan="5">a central vascular catheter in place ≤ 2 days prior to first meeting a component of the confirmed BSI definition*.
* (1. Central line catheter was in place when the first BSI criterion was met.
2. Central line catheter had been removed within the previous 2 days before the first BSI criterion was met.)</td><td>Yes/No</td></tr>
<tr><td>Final Diagnosis</td><td colspan="2">Confirmed Bloodstream Infection (Type BSI-A1)</td><td colspan="3">Confirmed Bloodstream Infection (Type BSI-A2)</td><td>Central Line Associated Bloodstream Infection (CLABSI)</td></tr>
<tr><td>Criteria to be meet</td><td colspan="2">(Criteria 1+ 3A)</td><td colspan="3">Criteria 1+ Criteria 2+3B)</td><td>(BSI Type A1 + 4 <u>OR</u> BSI Type A2+4)</td></tr>
</table>

Annex 5: Urinary Tract Infection Reporting Form

<table>
<tr><td colspan="4">Urinary tract infection</td><td colspan="3">Date of Event (DOE):</td></tr>
<tr><td colspan="7"><u>Criteria 1</u> (Timing criteria): Patient should have symptoms after <u>at least 48 hours' of admission to the healthcare facility or the start of care delivery.</u></td></tr>
<tr><td rowspan="8"><u>Criteria 2</u>
Symptom criteria</td><td colspan="2">At Least one of the following
Symptom criteria 2A</td><td>Yes/ No</td><td colspan="2">At Least Two of the following
Symptom criteria 2B</td><td>Yes/ No</td></tr>
<tr><td colspan="2">Temp>38 °C</td><td rowspan="7"></td><td colspan="2">Temp>38 °C</td><td rowspan="7"></td></tr>
<tr><td colspan="2">Urinary Urgency</td><td colspan="2">Urinary Urgency</td></tr>
<tr><td colspan="2">Increased Urinary Frequency</td><td colspan="2">Increased Urinary Frequency</td></tr>
<tr><td colspan="2">Flank Pain</td><td colspan="2">Flank Pain</td></tr>
<tr><td colspan="2">Dysuria</td><td colspan="2">Dysuria</td></tr>
<tr><td colspan="2">Suprapubic pain</td><td colspan="2">Suprapubic pain</td></tr>
<tr><td colspan="2">Suprapubic tenderness</td><td colspan="2">Suprapubic tenderness</td></tr>
<tr><td rowspan="6"><u>Criteria 3</u>
Microbiological Criteria</td><td colspan="2">Microbiological Criteria 3A</td><td>Yes/ No</td><td colspan="2">Microbiological Criteria 3B
at least one of the following findings:</td><td>Yes/ No</td></tr>
<tr><td colspan="2" rowspan="5">Positive Urine Culture (Organism Present >10^5 CFU/ml) no more than two species of microorganism</td><td rowspan="5"></td><td colspan="2">Positive dipstick for leukocyte esterase and/or nitrite</td><td rowspan="5"></td></tr>
<tr><td colspan="2">Pyuria with ≥ 10 WBCs/mL or ≥ 3 WBCs per high-power field of unspun urine</td></tr>
<tr><td colspan="2">microorganisms seen on Gram stain of unspun urine (If yes, mention the name of organisms)</td></tr>
<tr><td colspan="2">at least two urine cultures with repeated isolation of the same uropathogen (Gram-negative bacteria or Staphylococcus saprophyticus) with ≥ 10^2 colonies/mL urine in non-voided specimens; (If yes, mention the name of organisms)</td></tr>
<tr><td colspan="2">≤ 10^5 colonies/mL of a single uropathogen (Gram-negative bacteria or S. saprophyticus) (If yes, mention the name of organisms) in a patient being treated with an effective antimicrobial agent for a UTI.</td></tr>
<tr><td colspan="2"><u>Criteria 4</u> Clinician's diagnosis or therapy Criteria</td><td colspan="3">clinician diagnosed for UTI <u>OR</u>
institutes therapy for a UTI</td><td>Yes/ No</td></tr>
<tr><td><u>Criteria 5-</u>
Urinary Catheter Criteria</td><td colspan="5">an indwelling urinary tract catheter in place ≤ 2 days prior to first meeting a component of the confirmed UTI definition*.
*1.An indwelling urinary catheter was in place when the first UTI criterion was met. 2. An indwelling urinary catheter had been removed within the previous 2 days before the first UTI criterion was met.)</td><td>Yes/ No</td></tr>
<tr><td>Final Diagnosis</td><td>Microbiologically Confirmed Symptomatic Urinary Tract Infection (UTI-A)</td><td>Not microbiologically confirmed symptomatic UTI (UTI-B)</td><td>Not microbiologically confirmed symptomatic (UTI-C)</td><td colspan="3">Catheter-associated UTI</td></tr>
<tr><td>Criteria to be meet</td><td>Timing criteria 1+Symptom Criteria 2A+ Microbiological Criteria 3A</td><td>Timing criteria 1+Symptom criteria 2 +Microbiological Criteria 3B</td><td>Timing criteria 1+ Symptom criteria 2C + criteria 4</td><td colspan="3">UTI A or UTI B or UTI C + Criteria 5</td></tr>
</table>

Annex 6: Surgical Site Infection (SSI) Reporting Form

SSI (Surgical Site Infection)			**Date of Event (DOE):**	
Wound class (tick appropriate):	Clean	Clean contaminated	Contaminated	Dirty or infected wound:
PATOS (present at the time of surgery - visible pus, abscess at operation site; documented in OT note.				Yes/No
Criteria 1	The patient had a history of surgery within the past 30 days.			Yes/No
Criteria 2	Stratify by depth if information available as follows:			Yes/No
	a) superficial: AND infection involves only skin and subcutaneous tissue of the incision, **OR**			
	b) deep incisional: infection involves deep soft tissue (e.g., fascia, muscle) of the incision, **OR**			
	c) organ/space: infection involves any part of the anatomy (e.g., organs and spaces) other than the incision which was opened or manipulated during a surgical procedure.			
Criteria 3	Evidence of surgical site infection based on:			Yes/No
	microbiology (for positive culture) **OR (If Yes, mention the name of organism)**			
	radiology (suggestive of infection) **OR**			
	Histopathologic criteria (for abscess or similar findings).			
Criteria 4	Reopening of the wound for suspected infection **OR**			Yes/No
	Abscess (or similar findings) found during direct examination or during reoperation (for deep and organ-space SSI).			
Criteria 5	Evidence of purulent discharge at the incision or surgical site.			Yes/No
Criteria 6	SSI Diagnosed by surgeon or attending physician or designee			Yes/No

Final Diagnosis:	Surgical Site Infection Type A (SSI-A)	Surgical Site Infection Type B (SSI-B)	Surgical Site Infection Type C (SSI-C)	Surgical Site Infection Type D (SSI-D)
Criteria to be meet	(Criteria 1+2+3)	(Criteria 1+2+4)	(Criteria 1+2+5)	(Criteria 1+6)

Annex 7: Healthcare Acquired Pneumonia Reporting For

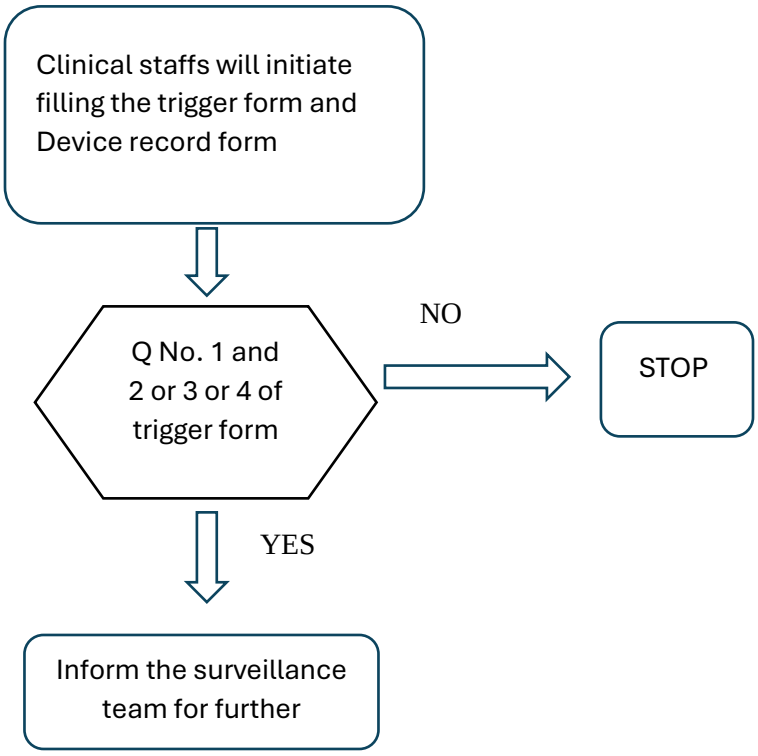
<table>
<tr><td colspan="3">Pneumonia</td><td colspan="3">Date of Event (DOE):</td></tr>
<tr><td colspan="6">Criteria 1 (Timing Criteria): Patient should have following components/symptoms after <u>at least 48 hours of admission to the healthcare facility or the start of care delivery.</u></td></tr>
<tr><td rowspan="8">Criteria 2</td><td rowspan="8">Symptom criteria</td><td>At least TWO of the following <u>Criteria 2A</u></td><td>Yes/No</td><td>At least Three of the following <u>Criteria 2B</u></td><td>Yes/No</td></tr>
<tr><td>Temp>38 °C</td><td rowspan="7"></td><td>Temp>38 °C</td><td rowspan="7"></td></tr>
<tr><td>Cough</td><td>Cough</td></tr>
<tr><td>Purulent sputum</td><td>Purulent sputum</td></tr>
<tr><td>Tachypnea (RR >20bpm)</td><td>Tachypnea (RR >20bpm)</td></tr>
<tr><td>worsening gas exchange (SO_2 <94% or decrease from baseline of >3%, new or increased need for supplemental O_2)</td><td>worsening gas exchange (SO_2 <94% or decrease from baseline of >3%, new or increased need for supplemental O_2)</td></tr>
<tr><td>documented auscultation indicative of pneumonia</td><td>documented auscultation indicative of pneumonia</td></tr>
<tr><td>compatible findings such as “crackles” or “bronchial breath sounds”;</td><td>compatible findings such as “crackles” or “bronchial breath sounds”;</td></tr>
<tr><td>Criteria 3</td><td>Radiological criteria</td><td colspan="3">Chest X-Rays or
CT scan suggestive of pneumonia</td><td>Yes/No</td></tr>
<tr><td rowspan="2">Criteria 4</td><td>Microbiological <u>Criteria 4A</u></td><td colspan="3">Microorganisms isolated from: any positive microbiology from respiratory sample (quantitative or non-quantitative, incl. serology, Antigen in urine, etc.) (If Yes, mention the name of organism)</td><td rowspan="2">Yes/No</td></tr>
<tr><td>Microbiological <u>Criteria 4B</u></td><td colspan="3">AND/OR blood culture (microorganisms isolated from positive microbiology) (If Yes, mention the name of organism)</td></tr>
<tr><td>Criteria 5</td><td>Device related Criteria</td><td colspan="3">Mechanical ventilation/intubation in place ≤ 2 days prior to first meeting a component of the pneumonia definition*.
*(1. A mechanical ventilator was in place, or patient was intubated when the first HAP criterion was met. 2. The mechanical ventilator had been discontinued, or the patient was extubated within the previous 2 days before the first HAP criterion was met.)</td><td>Yes/No</td></tr>
<tr><td>Final Diagnosis</td><td colspan="2">Healthcare Acquired Microbiologically confirmed pneumonia (PNM-A)</td><td>Healthcare Acquired Radiologically confirmed pneumonia (PNM-B)</td><td>Healthcare Acquired Clinical pneumonia (PNM-C)</td><td>Healthcare Acquired Ventilator associated pneumonia (VAP)</td></tr>
<tr><td>Criteria to be meet</td><td colspan="2">Timing Criteria 1+
Symptom criteria 2A+
Radiological criteria 3+
Microbiological criteria 4A +or 4B</td><td>Timing Criteria 1+
Symptom criteria 2A+
Radiological criteria 3</td><td>Timing Criteria 1+
Symptom criteria 2B</td><td>PNM-A + Criteria 5
<u>OR</u>
PNM-B + Criteria 5
<u>OR</u>
PNM-C + Criteria 5</td></tr>
</table>

Annex 8: National Level HAI Reporting form

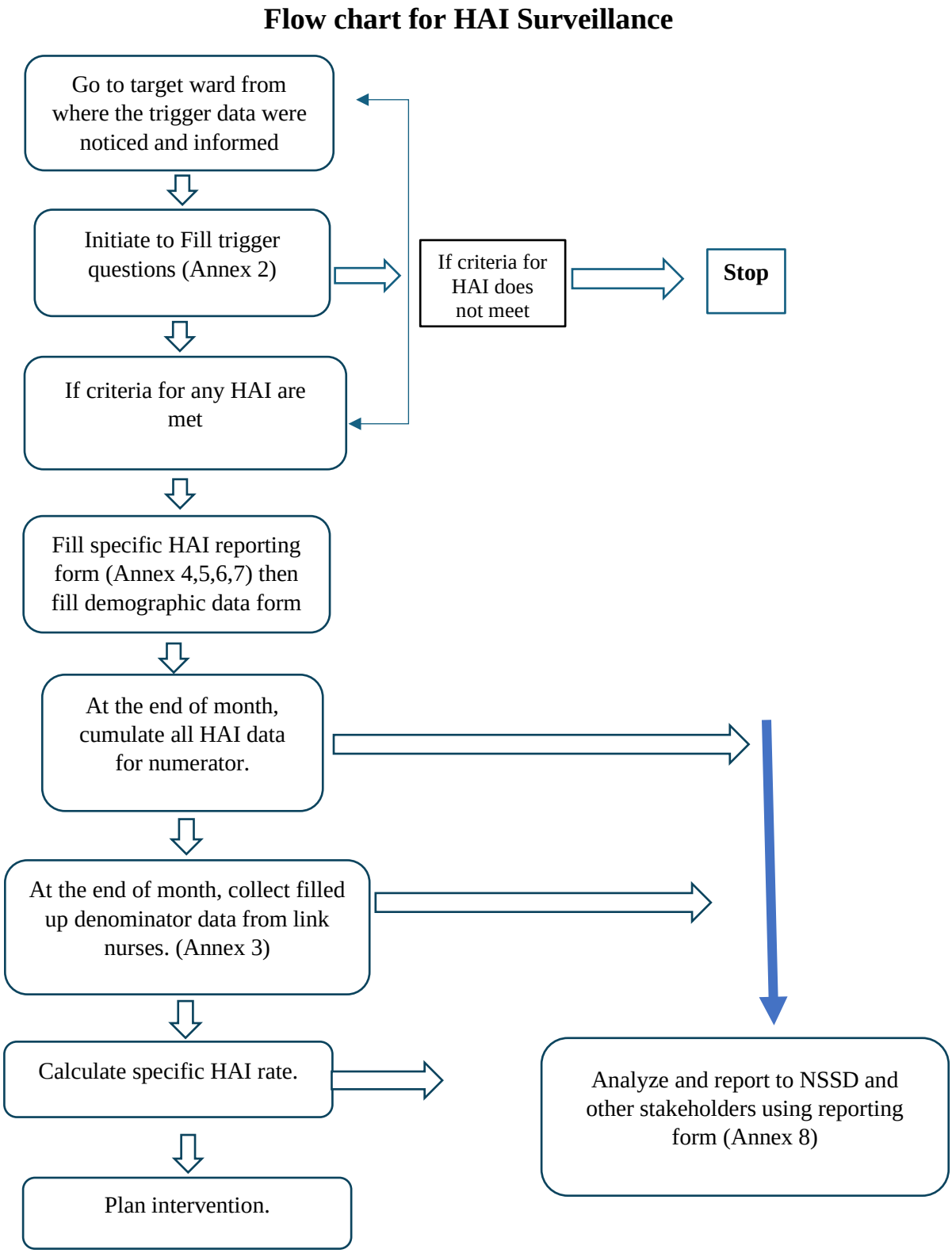
<table>
<tr><td colspan="2">Date:</td><td colspan="5"></td><td colspan="4"></td></tr>
<tr><td colspan="2">Health facility code / Name</td><td colspan="4"></td><td colspan="3">Health care facility size (total number of beds)</td><td></td></tr>
<tr><td colspan="2">Province</td><td>Koshi</td><td>Madhesh</td><td>Bagmati</td><td>Gandaki</td><td>Lumbini</td><td>Karnali</td><td colspan="2">Sudurpaschim</td></tr>
<tr><td colspan="2" rowspan="2">Type of Healthcare facility</td><td colspan="4">Public</td><td colspan="4">Private, nonprofit</td></tr>
<tr><td colspan="4">Private for profit</td><td colspan="4">Other/unknown</td></tr>
<tr><td rowspan="2">Total no of admission</td><td rowspan="2">Total no. of in-patient days</td><td rowspan="2">Total no of Central line days</td><td rowspan="2">Total no of Urinary catheter days</td><td rowspan="2">Total no of Ventilator Days</td><td rowspan="2">Total no of Surgeries performed</td><td colspan="6">HAIs in number:</td></tr>
<tr><td colspan="2">UTI</td><td colspan="2">BSI</td><td colspan="2">HAP</td><td>SSI</td><td>MDROS</td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td>UTI</td><td></td><td>BSI</td><td></td><td>HAP</td><td></td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>CAUTI</td><td></td><td>CLABSI</td><td></td><td>VAP</td><td></td></tr>
<tr><td>HAIs</td><td>UTI</td><td>CAUTI</td><td>BSI</td><td>CLABSI</td><td>HAP</td><td colspan="4">VAP</td><td colspan="2">SSI</td><td colspan="2">MDROS</td></tr>
<tr><td>Incidence density</td><td></td><td></td><td></td><td></td><td></td><td colspan="4"></td><td colspan="2">—</td><td colspan="2">—</td></tr>
<tr><td>Incidence Proportion</td><td></td><td>—</td><td></td><td>—</td><td></td><td colspan="4">—</td><td colspan="2"></td><td colspan="2"></td></tr>
</table>

Annex 9 A: Algorithm for initial assessment of triggering factors for HAI Surveillance

Flow chart for initial assessment of triggering factors for HAI Surveillance



Annex 9 B: Algorithm for HAI Surveillance



Annex 10: MDRO reporting form

Name of the organization: | **Age/ Sex:**

Patient's Name/ ID no: - | **Date of admission**

Ward/ Bed no: -

SP.NO	Culture Sample	Date of collection	Sample ID NO	Sent from	Culture Result (Organism detected)	Antibiotic susceptibility results																																																
						BETALACTAMASE																									TETRACYCLINE				FLUROQUINOLONES					AMINOGLYCOSIDES					GLYCOPEPTIDE			OXAZOLIDINONES	POLY PEPTIDE		OTHERS			
						CARBAPENEM			CEPHALOSPORIN												MONOBACTAM	PENICILLIN																															
						MRM	IMP	ERT	CEFAZ	CEPHA	CEFAD	CEFU	CEFO	CEFEX	CEFTAZ	CEPO	CTR	CEFOT	CEFEP	CEFTAR	AZT	AMOX	PEN G	PEN V	OXA	PIP	AMPI	NAF	CLOX	DICL	DOXY	MINO	TIG	ERAV	CIPRO	NOR	OFLO	LEVO	MOXI	AMK	GEN	KANA	STR	TOB	VAN	FOS	DAP	LIN	CL	PB				
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INDEX : SP. NO: Sample NO; **CARBAPENEM** : MRM-MEROPENEM, IMP-IMIPENEM, ERT-ERTAPENEM; **CEPHALOSPORIN:** CEFAZ- CEFAZOLIN, CEPHA-CEPHALAXIN, CEFAD- CEFADROXIL, CEFU- CEFUROXIME, CEFO-CEFOXITIN, CEFEX-CEFEXINE, CEFTAZ- CEFTAZIDININE, CEPOD-CEPODXIME, CTR- CEFTRIAXONE, CEFOT- CEFOTAXIM, CEFEP-CEFEPIME, CEFTAR-CEFTAROLINE; **MONOBACTAM :** AZT-AZTREONAM; **PENICILLIN:** AMOX-AMOXYCILLIN, PEN G- PENICILLLIN G, PEN V- PENICILLIN V, OXA- OXACILLIN, PIP-PIPERACILLIN, AMPI-AMPICILLIN, NAF-NAFCILLIN, CLOX-CLOXACILLIN, DICL-DICLOXACILLIN; **FLUROQUINOLONES:** CIPRO-CIPROFLOXACILLIN, NOR-NORFLOXACIN, OFLO-OFLOXACIN, LEVO-LEVOFLOXACIN, MOXI-MOXIFLOXACIN; **AMINOGLYCOSIDES:** AMK-AMIKACIN, GEN-GENTAMYCIN, KANA-KANAMYCIN,STR-STREPTOMYCIN,TOB-TOBRAMYCIN; **TETRACYCLINE:** DOXY-DOXYCYCLINE, MINO-MINOCYCLINE, TIG-TIGECYCLINE, ERAV- ERAVACYCLINE, **GLYCOPEPTIDES:** VAN- VANCOMYCIN,FOS- FOSFOMYCIN, DAP-DAPTOMYCIN; **OXAZOLIDIONES:** LIN- LINIZOLID; **POLYPEPTIDES**- CL-COLISTIN (POLYMYXIN E), PB- POLYMYXIN B

Annex 11: List of Bacteria

SN	Gram reaction	Organisms	
1	**Gram Positive Cocci**	1. Staphylococcus aureus (MRSA) 2. Staphylococcus aureus (MSSA) 3. Vancomycin Intermediate Staphylococcus aureus (VISA) 4. Vancomycin Resistant Staphylococcus aureus (VRSA) 5. Staphylococcus saprophyticys 6. Coagulase Negative Staphylococcys (CONS) 7. Streptococcus pyogenes	8. Streptococcus pneumoniae 9. Streptococcus agalactiae 10. Viridans Streptococcus 11. Enterococcus spp. 12. Enterococcus faecalis 13. Enterococcus faecium 14. Vancomycin Resistant Enterococci (VRE)
2	**Gram Negative Cocci**	15. Neisseria meningitidis 16. Neisseria gonorrhoea	17. Moraxella catarrhalis
3	**Gram Positive Bacilli**	18. Corynebacterium diphtheriae 19. Bacillus anthracis	20. Bacillus cereus 21. Listeria monocytogenes
4	**Gram Negative Bacilli**	22. Escherichia coli 23. Shigella spp. 24. Shigella dysenteriae 25. Shigella flexneri 26. Shigella boydii 27. Shigella sonnei 28. Salmonella Typhi 29. Salmonella Paratyphi A 30. Salmonella Paratyphi B 31. Salmonella spp. 32. Citrobacter fruendii 33. Citrobacter koseri 34. Citrobacter spp. 35. Klebsiella pneumoniae 36. Klebsiella oxytoca 37. Klebsiella aerogenes 38. Klebsiella spp. 39. Enterobacter cloacae 40. Enterobacter spp. 41. Serratia marcescens 42. Pantoea agglomerans	43. Proteus vulgaris 44. Proteus mirabilis 45. Proteus spp. 46. Providencia rettgeri 47. Providencia spp. 48. Moganella morganii 49. Yersinia pestis 50. Yersinia enterocolitica 51. Vibrio cholerae 52. Aeromonas hydrophila 53. Pseudomonas aeruginosa 54. Pseudomonas spp. 55. Acinetobacter baumannii 56. Acinetobacter spp. 57. Burkholderia pseudomallei 58. Stenotrophomonas maltophilia 59. Haemophilus influenzae 60. Haemophilus parainfluenzae

Annex 12: List of Commensals

The following organisms normally colonize the skin, gut, or respiratory tract and are considered commensals; not all of them are always pathogenic. They become clinically significant mainly when barriers are breached (e.g., surgery, catheters, ventilation), the host is immuno-compromised, or foreign devices are present.

1. Coagulase-negative Staphylococci (CoNS)
    - *Staphylococcus epidermidis*
    - *Staphylococcus saprophyticus*
2. Corynebacterium species (diphtheroids)
3. Micrococcus species
4. Cutibacterium (Propionibacterium) acnes
5. Bacillus species (non-anthracis)
6. Staphylococcus aureus – normal nasal/skin flora but also an important pathogen
7. Escherichia coli
8. Enterococcus species
9. Staphylococcus saprophyticus
10. Coagulase-negative staphylococci
11. Viridans group Streptococci (alpha-hemolytic streptococci)
12. Non-pathogenic Neisseria species
13. Haemophilus parainfluenzae
14. Anaerobic oral commensals
    - *Prevotella*
    - *Fusobacterium*
    - *Veillonella*
    - *Peptostreptococcus*
15. Bacteroides species
16. Clostridium species

Annex 13: Integrating Gender, Equity and Human Rights (GER) during Healthcare-Associated Infections (HAIs) Surveillance

Gender, equity and human rights matter in health and clinical management including Healthcare-Associated Infection (HAI) Surveillance. The men and women, girls and boys, or any individual of gender, ability and sexual identity experience differences in health status, exposure to risk and vulnerability, access to and use of services, health-seeking behaviour, experiences in health care settings, and health and social outcomes due to their biological and social standing in the society. Health inequities manifest in differential exposure, vulnerability, access, health outcomes and consequences, so it is very important to recognize these aspects and provide health services from gender, equity, and human rights perspectives.

1. Providing respectful care towards all patients

Naturally, we envision a relationship between patients and service providers characterized by caring, empathy, compassion, support, trust, confidence, and empowerment, as well as gentle, respectful, and effective communication to enable informed decision making. When treating patients, **HAI surveillance teams and health workers** need to be aware of the local contexts on diversity, vulnerable groups for providing fair treatment and respecting and protecting the rights of an individual including the disadvantaged or excluded population groups.

HAI surveillance teams/Health workers need to:

- Demonstrate equitable and fair treatment/ behavior irrespective of an individual's age, sex, caste, ethnicity, socioeconomic status, education, sexual orientation, family/ cultural background, disabilities, or any other characteristics.
- Respect the right to information, right to participation with informed consent and refusal; right to confidentiality, privacy, dignity, choices/preferences, equitable care; and self-determination; right to freedom from harm, ill treatment, and discrimination; and right to timely healthcare and to the highest attainable level of health.
- Be aware of and avoid unintended biases towards women, girls, (with or without disabilities) or any clients based on their identity, sexual orientation, and socioeconomic backgrounds.
- Be aware of gender-related biases in access to information, health seeking behaviour, service provision etc. and be non-judgmental.

Gender refers to the socially constructed norms, roles, and relations of and between women, men, boys, and girls. Gender also refers to expressions and identities of women, men, boys, girls, and gender-diverse people. Gender is inextricable from other social and structural determinants shaping health and equity and can vary across time and place.
Sex refers to the biological characteristics that define humans as female or male. While these sets of biological characteristics are not mutually exclusive, as there are individuals who possess both, they tend to differentiate humans as males and females. **Equity** in health means that everyone should have a fair chance to achieve their full health potential and that nobody should be disadvantaged in reaching it. Health inequities are avoidable and unjust differences in exposure and vulnerability to health risk factors, health-care outcomes, and the social and economic consequences of these outcomes.
Human rights approach leads to the enjoyment of the highest attainable standard of health conducive to living a life in dignity. It is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition, including gender, age, disabilities etc.

- Be culturally sensitive and appropriate to age, gender, disabilities, sexual identity and orientation etc.

2. Responding to gender-based violence (GBV) [23]

Available evidence points to significant increase in GBV in any emergency, and it has been exacerbated in the COVID-19 response, which has alarmed all actors working against GBV.

Five Actions for HAI Surveillance Teams / Health Workers to Respond to GBV

- Be aware of the increased risk and health consequences of GBV in the context of emergencies.
- Recognize the signs and know when and how to ask about violence.
- If violence is disclosed, act to provide timely care for physical, sexual, reproductive, and mental health.
- If violence is disclosed, provide First-line support and medical care to survivors.

What is gender - based violence (GBV)?
Gender based violence refers to harmful acts directed at an individual based on their gender. It is rooted in gender inequality, the abuse of power and harmful norms. GBV is a serious violation of human rights and a life-threatening health and protection issue**.** GBV is committed in many forms such as physical, emotional/psychological, sexual, cultural/social, economic or any kind that endangers the safety, health, and well-being of an individual.

Domestic Violence refers to violent or aggressive behavior within home involving intimate partner and immediate family members.

The first-line support is most important, and it involves 5 simple tasks of **LIVES**:

- **LISTEN**: listen closely, with empathy, and without judging.
- **INQUIRE**: assess, identify, and respond to person's various needs and concerns.
- **VALIDATE**: show that you understand survivor's experience, feeling and believe them.
- **ENHANCE SAFETY**: discuss a plan to protect the survivor from further harm if violence occurs again.
- **SUPPORT**: support them by helping him/her connect information, services, and social support.
- Share information about available support, identify referral pathways and refer to other essential services.

Health facilities can identify and provide information about services available locally (e.g. hotlines, one-stop crisis management centers (OCMC), shelters homes, psychosocial counselling) for survivors, including opening hours, contact details, and whether services can be offered remotely, and establish referral linkages. It is important to understand marginalized groups and disabilities are likely to have additional risks and needs. The **National Federation of Disabled Nepal (NFDN)** can be informed, approached, reported for any such issue towards women and girls with disabilities.

Remember*: Safety, respect, confidentiality, privacy, and non-discrimination in relation to GBV survivors and those at risk are always vital considerations.*

Studies [24] show globally that women make up 70 percent of the health workforce, especially as nurses, midwives and community health volunteers, and account for most service staff in health facilities as cleaners, launderers and caterers. However, they are not proportionately represented at senior, managerial, and decision-making levels in health—only 25% hold senior roles [25]. This scenario reflects Nepal as well. Despite the large number, women are often not reflected in decision-making in health emergencies. Further,

[23] There is currently no evidence of increase in VAWG due to monkeypox. However, there is a possible heightened risks of violence against gay or bisexual men or trans people resulting from stigmatization, or of intimate partner violence in these groups.
[24] UN Women | Explainer: How COVID-19 impacts women and girls
[25] DELIVERED BY WOMEN, LED BY MEN: A GENDER AND EQUITY ANALYSIS OF THE GLOBAL HEALTH AND SOCIAL WORKFORCE. Human Resources for Health Observer Series No. 24

women are still paid less than their male counterparts for similar work and hold fewer leadership positions in the health sector and enjoy lower job security and social protection.
Masks and other protective equipment designed and sized for men leave women at greater risk of exposure. The lack of adequate attention to the menstrual hygiene, lactation, and pregnancy needs of women health workers during long shifts is an added workplace-related challenge.
Therefore, managers involved in HAI surveillance need to be aware of the above gender-related issues and ensure that the needs of women health and care workers are prioritized and fulfilled. This means:

- Ensuring that health and care workers have access to women/gender-friendly personal protective equipment (PPE) and menstrual hygiene products. The different sizes and designs of PPE need to be made available and accessible, considering feminine and menstrual hygiene needs.
- Providing flexible working arrangements to balance the burden of care, especially for pregnant and breastfeeding mothers.
- Implementing policies and actions to foster women health workers' increased participation in leadership and decision-making roles.
- Ensuring equal treatment and pay, paid leave (including paid sick leave), and other social protection measures for women health workers in both public and private sectors.

Women subjected to violence require a safe, private, and confidential space to talk freely with health-care providers. Having adequate infrastructure and the necessary medical equipment and supplies helps trained health-care providers to respond appropriately to the needs of women subjected to violence.
(*Source: Strengthening health systems to respond to women subjected to intimate partner violence or sexual violence: a manual for health managers, WHO 2017*)

3. Managing Disaggregated Data (Sex and Age Disaggregation of Data)

Experiences from other outbreaks, epidemics, and pandemics suggest that women and girls (with or without disabilities), and people from marginalized groups, could face specific and often disproportionate economic, health, and social risks due to deeply entrenched inequalities, social norms, and unequal power relations. Therefore, understanding the gender-differentiated impacts of healthcare-associated infections through sex and age, caste/ethnicity, and disability-disaggregated data is fundamental to policy and programme responses that can reduce vulnerable conditions and build the agency of girls, women, and marginalized groups—placing gender, equity, and rights at their center.
To manage disaggregated data, the case reporting forms used in clinical management should include at least sex, age, disabilities, caste/ethnicity, co-morbidities, and this should be reported into regular HAI reporting system. Analysis by these disaggregated variables should be prioritized by health facilities and higher-level authorities to identify gaps and develop targeted interventions. Such analysis can also be used to assess health inequities among different vulnerable groups, inform appropriate actions, and support periodic reporting and review processes.

4. Integrated and Inclusive Services

- Ensure that information, education, and communication (IEC) materials developed for emergencies and HAI surveillance are accessible and inclusive language communication are used:
    - Description of the image for the screen reader user, labelling hyperlink etc.
        - Videos to close captioning, sign-language interpretation etc.
- Ensure barrier free access to services for different vulnerable groups including physical and information access, sensitizing the health care staff on diverse needs and support services etc.

References:

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