HEALTH HOLDING

HAFER ALBATIN HEALTH CLUSTER
MATERNITY AND CHILDREN HOSPITAL

Department:	Infection Prevention and Control Department		
Document:	Multidisciplinary Policy and Procedure (MPP)		
Title:	Healthcare Associated Infections(HAIs) Surveillance		
Applies To:	Health care workers and Technician		
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1. PURPOSE:

1.1 To measure the compliance of the established policies and procedures and utilization of the health care resources.
1.2 To detect, investigate and control hospital clusters or outbreaks of HAI.
1.3 To monitor, evaluate, and implement the necessary preventive measures
1.4 To work on reducing HAI using standard bundles

2. DEFINITONS:

2.1 Health Care Associated Infections (HAIs) are defined as a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s).
2.2 Surveillance is an essential component of an effective infection prevention and control (IPC) program. It is a systematic method of ongoing collecting, consolidating, and analyzing data concerning the distribution and determinates of a given disease or event, followed by the dissemination of that information to those who can improve the outcome.
2.3 Infection definition: The successful transmission of a microorganism to the host with subsequent multiplication, colonization, and invasion. It is usually accompanied by measurable host response(s), either through the appearance of specific antibodies or through cell-mediated reaction(s) (e.g., positive tuberculin test results).
2.4 Colonization definition:
The multiplication of a microorganism at a body site or sites without any overt clinical expression or detected immune reaction in the host at the time that the microorganism is isolated.
2.5 Benchmarking is the process of "comparing oneself to others performing similar activities, so as to continuously improve.

3. POLICY:

3.1 An infection is considered HAI if the date of event of the NHSN site-specific infection criterion occurs on or after the 3rd calendar day of admission to an inpatient location where day of admission is calendar day 1.
3.2 Surveillance data are regularly collected & reported to MOH through national approved electronic surveillance platform
3.3 A written report should be developed to provide a mechanism to interpret and disseminate surveillance data.
3.4 Review the monthly / Quarterly Surveillance statistics and check whether trend is increasing or decreasing and compare to benchmarking (Projected trends of VAE. VAP CLABSI, CAUTI, SSI and MDROs).
3.5 Results of surveillance are regularly reviewed by the IC committee and an action plan is developed based on FOCUS PDCA and followed up accordingly (at least once quarterly).
3.6 Results of surveillance are used to reduce HAIs through well designed quality improvement projects. A performance Improvement project will follow related to Surveillance based on results of HAI statistics.

3.7 Results of surveillance are regularly analyzed, interpreted and communicated to staff and concerned departments.

3.8 Results of surveillance are regularly reviewed by the IC committee, and an action plan is developed and followed up accordingly (at least once quarterly).

3.9 Device Utilization Ratio data validation from staff of critical care units. Device utilization ratio is calculated by dividing the device days by patient days.

$$\text{Device Utilization Ratio (DUR)} = \frac{\text{Device Days (Numerator)}}{\text{Patient Days (Denominator)}}$$

4. PROCEDURE:

4.1 Mode of transmission of infection:
Transmission could be direct or indirect

4.1.1 Direct transmission (person-to-person):

4.1.1.1 Droplet contact: coughing or sneezing (1 meter) .Direct physical contact to infected person secretions, blood, stool/urine (This method includes sexual contact) .Trans-placental infection

4.1.2 Indirect transmission (person-environment-person):

4.1.2.1 Airborne transmission - if the microorganism can remain in the air for long periods (TB, varicella, measles). Indirect contact - usually by touching soil contamination or a contaminated surface. Fecal-oral transmission - usually from contaminated food or water sources.Vector borne transmission - carried by insects or other animals. Inoculation (devices)

4.2 Types of surveillance:

4.2.1 Device-associated infections:

4.2.1.1 Central line associated blood stream infection (CLABSI)

4.2.1.2 Catheter associated urinary tract infection (CAUTI)

4.2.1.3 Ventilator associated events (VAE)

4.2.1.4 Dialysis events (DE)

4.2.2 Procedure-associated:

4.2.2.1 Surgical Site Infection (SSI)

4.2.3 Others:

4.2.3.1 Multidrug-Resistant Organism and Clostridium difficile infections (MDRO/CDI)

4.3 Infection Pathogens

4.3.1 HAIs are caused by bacterial, fungal, and viral pathogens. The focus here will be on bacterial and fungal pathogens Difference between Gram-Positive and Gram-Negative Bacteria. See attachment 7.1.

4.4 Surveillance of Device-Associated HAI

4.4.1 Device-associated infections is an infection in a patient with a device (e.g., ventilator, central line or indwelling urinary catheter) that was in place for more than 2 calendar days before onset of infection.

4.5 Identifying Healthcare-associated Infections (HAI) :

4.5.1 Infection Window Period for HAI

4.5.1.1 It is the 7-days during which all site-specific infection criteria must be met. It includes the day the first positive diagnostic test that is an element of the site-specific infection criterion, was obtained, the 3 calendar days before and the 3 calendar days after.

4.5.2 Date of HAI event

4.5.2.1 It is the date the first element used to meet an NHSN site-specific infection criterion occurs for the first time within the seven-day infection window period.

4.5.3 Present on admission (POA)

4.5.3.1 An infection is considered POA if the date of event of the NHSN site-specific infection criterion occur on or 02 calendar days before day of admission i.e - First day of

admission (day 1) - Day after admission (day 2) Exceptions: SSI, MDRO, CDI, and MRSA bacteremia may occur after patient's discharge from facility and be present upon readmission

4.5.4 Repeat Infection Time Frame (RIT)

4.5.4.1 Repeat Infection Timeframe (RIT): It is a 14-day timeframe during which no new infections of the same type are reported.

4.5.5 Secondary BSI Attribution Period

4.5.5.1 It is the period in which a positive blood culture must be collected to be considered as a secondary bloodstream infection to a primary site infection. This period includes the Infection Window Period combined with RIT

4.5.6 Device removal and reinsertion

4.5.6.1 If central line or urinary catheter were removed and reinserted before a full calendar day without a device (central line or urinary catheter), then continue the day count . Therefore, if the patient is without a device (central line or urinary catheter) for at least one full calendar day (NOT to be read as 24 hours), then start a new day count.

4.5.7 Transfer Rule

4.5.8 If all elements of an HAI were present within 2 calendar days of transfer from one inpatient location to another in the same facility (i.e., on the day of transfer or the next day), the HAI is attributed to the transferring location.

4.5.8 Multiple Transfer

4.5.8.1 If the patient has been transferred to more than one location on the date of an infection, or the day before, attribute the infection to the first location in which the patient was housed the day before the infection's date of event.

4.5.9 Pathogen Assignment Guidance:

Additional pathogens recovered during the RIT from the same type of infection or during the secondary BSI attribution period are added to the event .Exception: Pathogens excluded from specific infection definitions (e.g., yeast in UTI, Enterococcus spp. in PNEU) are also excluded as pathogens for BSIs secondary to that type of infection.

4.5.10 Microbiologic testing:

4.5.10.1 Organisms identified from a specimen by a culture or non-culture based microbiologic testing method is acceptable to meet the HAI definition

4.5.11 Non-accepted organisms:

4.5.11.1 Specific fungal pathogens typically causing community-associated infections cannot be used to meet any HAI definition such as, Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, Cryptococcus,Pneumocystis.

4.6 Surveillance data collection categorized into two groups; numerator or denominator data.

4.6.1 Numerator data

4.6.1.1 Numerator is the upper portion of a fraction used to calculate a rate or ratio. In surveillance, it is usually the number of cases of a disease or event being studied.

4.6.1.2 Types of numerator data to collect

4.6.1.2.1 Demographic data: name, date of birth, gender, hospital identification number, admission date

4.6.1.2.2 Infection: onset date, site of infection, patient care location of HAI onset

4.6.1.2.3 Risk factors: devices, procedures, other factors associated with HAI

4.6.1.2.4 Laboratory: pathogens, antibiogram, serology, pathology

4.6.1.2.5 Radiology/imaging: X-ray, CT scan, MRI, etc.

4.6.1.3 Sources of numerator data

4.6.1.3.1 Admission/discharge/transfer records, microbiology laboratory records

4.6.1.3.2 Visits to patient wards for observation and discussion with caregivers

4.6.1.3.3 Patient charts (paper or computerized) for case confirmation

4.6.1.4 For post-discharge detected SSI, sources include records from surgery clinics, physician's offices, emergency departments

4.6.2 Denominator data

4.6.2.1 Denominator is the lower portion of a fraction used to calculate a rate or ratio. The purpose of denominator is to adjust the HAI events and other related numerator data to the counts of the cohorts of patients at risk of acquiring HAI to make fair comparisons

4.6.2.2 Types of denominator data collection

Surveillance	Types of denominator data
CLABSI	Patient-days and central line-days
CAUTI	Patient-days and urinary catheter-days
VAE	Patient-days, ventilator-days, ventilator episodes
SSI	Number of operative procedures of the same type
MDRO	Patient-days, number of admissions, number of encounters

4.7 Infection control indicators

4.7.1 Infection control indicators have been used to assess the overall activity and efficiency of infection control program.

Domain	Items	Metric expression
Infection prevention	Hand hygiene compliance	100 opportunities
Device-associated HAI	CLABSI rate	1000 central line days
	CAUTI rate	1000 urinary catheter days
	VAE rate	1000 ventilator days
Procedure-associated HAI	SSI: C-section rate	100 C-section procedures done
Antimicrobial resistance	MRSA rate	10,000 patient days
	Clostridium difficile rate	10,000 patient days

4.8 Calculating Infection Rates and Ratios

4.8.1 CLABSI:

4.8.1.1 The CLABSI rate per 1000 central line-days is calculated by dividing the number of CLABSI by the number of central line-days and multiplying the result by 1000.

4.8.1.2 The Central Line Utilization Ratio is calculated by dividing the number of central linedays by the number of patient-days.

4.8.1.3 These calculations will be performed separately for different types of ICUs, specialty care areas, and other locations in the institution.

4.8.1.4 Separate rates and ratios will also be calculated for different types of catheters and birthweight categories in NICUs.

4.8.2 CAUTI:

4.8.2.1 The CAUTI rate per 1000 urinary catheter-days is calculated by dividing the number of CAUTIs by the number of catheter-days and multiplying the result by 1000.

4.8.2.2 The Urinary Catheter Utilization Ratio is calculated by dividing the number of urinary catheter-days by the number of patient-days.

4.8.2.3 These calculations will be performed separately for the different types of ICUs, specialty care areas, and other locations in the institution.

4.8.3 VAE:

4.8.3.1 The VAE rate per 1000 ventilator-days is calculated by dividing the number of VAEs by the number of ventilator-days and multiplying the result by 1000.

4.8.3.2 The VAE rate per 100 episodes of mechanical ventilation is calculated by dividing the number of VAEs by the number of episodes of mechanical ventilation and multiplying the result by 100 (episodes of mechanical ventilation).

4.8.3.3 The Ventilator Utilization Ratio is calculated by dividing the number of ventilator-days by the number of patient-days. These calculations will be performed separately for the different types of ICUs,
specialty care areas, and other adult locations in the institution

4.8.4 SSI:

4.8.4.1 The SSI rates per 100 operative procedures are calculated by dividing the number of SSIs by the number of specific operative procedures and multiplying the results by 100.

4.8.4.2 These calculations will be performed separately for the different types of operative procedures and stratified by risk index.

4.8.4.3 Standardized infection ratios are also calculated using indirect standardization or multivariate models.

4.8.5 MDRO-Infection Surveillance:

4.8.5.1 MDRO infection incidence rate is calculated by dividing the number of infections of a certain MDRO type by the number of patient days and multiplying the results by 10,000.

4.8.5.2 Rate is then stratified by time (e.g., month, quarter, etc.) and patient care location.

4.8.6 MDRO-Laboratory-Identified (LabID) Event: Numerator data are the Laboratory-identified MDRO Events while denominator data are the number of patient days, admissions, and encounters (for ER and outpatient locations).

4.9 Calculating SIR

4.9.1 The standardized infection ratio (SIR): SIR is a summary measure used to track HAIs at a national, state, or local level over time. SIR provides improved risk adjustment and can replace risk-stratified HAI rates.

Calculation of SIR:

$$\frac{\text{Observed HAI events}}{\text{Expected HAI events}}$$

4.9.1.1 The observed HAI events: It is the HAI events you detect during surveillance

4.9.1.2 The expected HAI events: It can be calculated from the published benchmarking reports of NHSN, INICC, GCC, or Saudi MOH

4.9.1.3 To allow for more precise comparisons, SIRs are calculated only if the number of expected HAIs is ≥1 .When the expected HAI

4.9.2 Interpretation of SIR: SIR1 means that after adjusting for differences, more HAIs were observed than predicted .SIR=1 means that after adjusting for differences, Same HAIs were observed as predicted

4.10 Results of surveillance are used to reduce HAIs through well designed quality improvement projects.

4.10.1 A Performance Improvement Project (PIP) is a quality tool with concentrated effort on a particular problem in one or more areas of the facility. It involves gathering information systematically to clarify issues or problems and intervening for improvements.

4.10.2 The Steps Defined by FOCUS PDCA. The FOCUS PDCA acronym describes the basic components of the improvement process.

F - FIND A PROCESS / OPPORTUNITY FOR IMPROVEMENT
O - ORGANIZE A TEAM
C - CLARIFY THE CURRENT UNDERSTANDING OF THE PROCESS
U - UNDERSTAND VARIATION IN THE PROCESS
S - SELECT A STRATEGY FOR IMPROVEMENT
P - PLAN
D - DO
C - CHECK
A – ACT

5. MATERIALS AND EQUIPMENT:

5.1 **Forms and Records:**

5.1.1 N/A

5.2 **Materials and Equipment**

5.2.1 N/A

6. RESPONSIBILITIES:

6.1 Infection Prevention and Control Staff

7. APPENDICES:

7.1 Difference between Gram-Positive and Gram-Negative Bacteria

8. REFERENCES:

8.1 MOH Surveillance Manual Second Edition. Healthcare Associated Infections (HAIs) Surveillance Manual. Last updated: November 2023

9. APPROVALS:

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7.1 Difference between Gram-Positive and Gram-Negative Bacteria

	Gram-positive bacteria	Gram-negative bacteria
Gram stain	Appear as purple-colored when examined under the microscope	Appear as pink-colored when examined under the microscope
Cell wall	Composed of thick layers peptidoglycan	Composed of thin layers of peptidoglycan
Toxins	Produce exotoxins	Produce endotoxins
Examples pathogenic	Pathogenic: • Staphylococcus aureus • Methicillin Sensitive Staphylococcus aureus • Enterococcus spp. • Clostridium • Streptococcus pneumoniae • Streptococcus spp. Commensals: • Coagulase negative Staphylococci • Streptococcus viridans • Diphtheroids • Corynebacterium spp. • Bacillus spp. • Propionibacterium spp. • Aerococcus spp. • Micrococcus spp. • Rhodococcus	• Acinetobacter spp. • Bacteroides spp. • Citrobacter spp. • Enterobacter spp. • Escherichia coli • Fusobacterium spp. • Haemophilus spp. • Klebsiella spp. • Legionella spp. • Peptostreptococcus spp. • Prevotella spp. • Proteus spp. • Providencia • Pseudomonas aeruginosa • Serratia spp. • Stenotrophomonas maltophilia • Veillonella spp.

Most frequent bacterial pathogens causing HAIs
The pathogens causing HAIs (device-associated and SSI) were sorted in descending order according to frequency (Saudi Arabia 2015-2022)

1 Klebsiella spp. 17.2% 2 Pseudomonas spp. 14.4% 3 Staphylococcus aureus 10.6%
4 Escherichia coli 8.0% 5 Enterococcus spp. 7.6% 6 Candida 7.0%
7 Enterobacter spp. 7.0% 8 MRSA 4.7% 9 Acinetobacter spp. 3.9%
10 Stenotrophomonas maltophilia 3.3% 11 Streptococcus spp. 2.5%
12 Coagulase negative staphylococci 2.0% 13 Serratia spp. 1.8% 14 Proteus 1.1%
15 Citrobacter spp. 0.9% 16 Other commensals 0.7% 17 Other intestinal organisms 0.4%
18 Others 7.0%