

Supplementary Table 1. HAIs Definition Criteria

| HAIs Type | Operational Definition |
|------------------|---|
| VAE | <p>Respiratory infection where a mechanical ventilator was placed and confirmed by laboratory test.</p> <ul style="list-style-type: none">• Mechanical ventilation duration was at least four days or more• Positive sputum culture organism identified. The infection is selected from the first positive culture. The case is not duplicated. The same microorganism and the same specimens are excluded.• Present fever $>38^{\circ}\text{C}$ |
| CLABSI | <p>Central Line-Associated Bloodstream Infection is an infection confirmed by the laboratory where the central vascular line was placed.</p> <p>Type of central line:</p> <ul style="list-style-type: none">• Central Venous Catheter (CVC)• Peripherally Inserted Central Catheter (PICC)• Tunneled dialysis catheter <p>Criteria:</p> <ul style="list-style-type: none">• The central line was placed >2 days• Identified by blood specimen positive culture. The infection is selected from the first positive culture. The same microorganism and the same specimens are excluded.• Present fever $>38^{\circ}\text{C}$ |
| CAUTI | <p>Urinary tract infections with an indwelling urinary catheter used in an inpatient on the date of the event</p> <p>Type of Indwelling catheter:</p> <ul style="list-style-type: none">• Foley catheter <p>Criteria:</p> <ul style="list-style-type: none">• Urinary catheter was placed > 2 days• Positive urine culture result. The infection is selected from the first positive culture. The same microorganism and the same specimens are excluded.• Present fever $>38^{\circ}\text{C}$ |

Supplementary Table 2. Underlying Disease Criteria

| Comorbidity | Definition |
|--|---|
| Cardiovascular diseases | Any health problem specifically related to heart, blood vessels, and beat rhythm (NHS UK, 2022). E.g., Hypertension, coronary artery disease, arrhythmia, etc. |
| Nervous system diseases | Any condition or disorder affecting nervous system function, including the central and peripheral nervous systems (John Hopkins, 2024). E.g., Stroke, meningitis, encephalitis, epilepsy, etc. |
| Diabetes Mellitus | Metabolic disorder due to not enough insulin production or resistance to insulin (DM type 1 and 2). |
| Trauma | Any sudden onset of severe physical injury and life-threatening. E.g., fractures, lacerations, or severe wounds. |
| Obesity | An abnormal condition of excessive fat and impact on health. Obesity is counted from Body Mass Index (BMI) of more than 30, the ratio of weight/height in sq meters (CDC, 2020). |
| Chronic Disease | |
| Asthma | Respiratory inflammation disease that impacted airflow obstruction, shortness of breath, wheezing sound (CDC,2023). |
| Chronic Obstructive Pulmonary Disease (COPD) | A lung disease is characterized by airflow limitation because of lung destruction and irreversible (CDC, 2024). |
| Chronic Kidney Disease (CKD) | Irreversible kidney damage for more than three months and decreased of glomerular filtration rate (GFR) (NHS, 2023). |
| Tuberculosis | A positive lung disease caused by <i>Mycobacterium tuberculosis</i> and still receiving treatment. |
| Immunocompromised condition | |
| HIV/AIDS | Patients with positive Human Immunodeficiency Virus (HIV)/Acquired Immunodeficiency Syndrome (AIDS) regardless of viral load level. |
| Cancer | Patients with malignant cells/tumors regardless of the stages. |

Supplementary Table 3. Bivariate Analysis for Demographic

| Variables | Overall | COVID-19 | Non-COVID-19 | P-value |
|------------------|----------------|-----------------|---------------------|----------------|
| | N=255 (%) | N=159 (%) | N=96 (%) | |
| Age | | | | |
| <60 years | 138 (54.1) | 99 (62.3) | 39 (40.6) | 0.001 |
| ≥60 years | 117 (45.9) | 60 (37.7) | 57 (59.4) | |
| Sex | | | | |
| Male | 129 (50.6) | 84 (52.8) | 45 (46.9) | 0.357 |
| Female | 126 (49.4) | 75 (47.2) | 51 (53.1) | |

Supplementary Table 4. Microorganisms Result

| Microorganism | Overall | COVID-19 | Non- COVID-19 |
|--|-----------|-----------|------------------|
| | N=311 (%) | N=202(%) | N=109 (%) |
| Gram Negative Rods | | | |
| <i>Acinetobacter baumannii</i> | 59 (19.0) | 46 (22.8) | 13 (11.9) |
| <i>Klebsiella pneumoniae</i> | 38 (12.2) | 24 (11.9) | 14 (12.8) |
| <i>Pseudomonas aeruginosa</i> | 23 (7.4) | 2 (1.0) | 21 (19.3) |
| ESBL- producing <i>Klebsiella pneumoniae</i> | 21 (6.8) | 18 (8.9) | 3 (2.8) |
| <i>Escherichia coli</i> | 16 (5.1) | 13 (6.4) | 3 (2.8) |
| <i>Chryseomonas luteola</i> | 12 (3.9) | 8 (4.0) | 4 (3.7) |
| ESBL- producing <i>Escherichia coli</i> | 12 (3.9) | 8 (4.0) | 4 (3.7) |
| <i>Stenotrophomonas maltophilia</i> | 9 (2.9) | 4 (2.0) | 5 (4.6) |
| <i>Klebsiella pneumoniae ss.ozoneae</i> | 8 (2.6) | 6 (3.0) | 2 (1.8) |
| <i>Pseudomonas putida</i> | 5 (1.6) | 2 (1.0) | 3 (2.8) |
| <i>Acinetobacter lwoffii</i> | 5 (1.6) | 4 (2.0) | 1 (0.9) |
| <i>Roultella terrigena</i> | 4 (1.3) | 3 (1.5) | 1 (0.9) |
| <i>Klebsiella oxytoca</i> | 4 (1.3) | 3 (1.5) | 1 (0.9) |
| <i>Enterobacter cloacae</i> | 4 (1.3) | 3 (1.5) | 1 (0.9) |
| <i>Citrobacter freundii</i> | 3 (1.0) | 1 (0.5) | 2 (1.8) |
| <i>Proteus mirabilis</i> | 2 (0.6) | 1 (0.5) | 1 (0.9) |
| <i>Serratia plymuthica</i> | 2 (0.6) | 1 (0.5) | 1 (0.9) |
| ESBL- producing <i>Klebsiella pneumoniae ss. Ozoneae</i> | 2 (0.6) | 2 (1.0) | 0 (0.0) |
| <i>Pseudomonas fluorescens</i> | 2 (0.6) | 1 (0.5) | 1 (0.9) |
| <i>Serratia marcescens</i> | 2 (0.6) | 0 (0.0) | 2 (1.8) |
| <i>Burkholderia cepacia</i> | 1 (0.3) | 0 (0.0) | 1 (0.9) |
| <i>Elizabethkingia meningosepticum</i> | 1 (0.3) | 0 (0.0) | 1 (0.9) |
| ESBL- producing <i>Klebsiella oxytoca</i> | 1 (0.3) | 1 (0.5) | 0 (0.0) |
| <i>Kluyvera cryocrescens</i> | 1 (0.3) | 1 (0.5) | 0 (0.0) |
| <i>Morganella morganii ss morganii</i> | 1 (0.3) | 0 (0.0) | 1 (0.9) |
| <i>Pantoea agglomerans</i> | 1 (0.3) | 0 (0.0) | 1 (0.9) |
| <i>Pasteurella pneumotropica</i> | 1 (0.3) | 0 (0.0) | 1 (0.9) |
| <i>Proteus vulgaris</i> | 1 (0.3) | 0 (0.0) | 1 (0.9) |
| <i>Pseudomonas sp</i> | 1 (0.3) | 1 (0.5) | 0 (0.0) |
| Gram Negative Cocci | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Gram Positive Rods | | | |
| <i>Corynebacterium diphtheroids</i> | 2 (0.6) | 2 (1.0) | 0 (0.0) |
| <i>Corynebacterium sp.</i> | 2 (0.6) | 2 (1.0) | 0 (0.0) |
| <i>Corynebacterium jeikeium</i> | 1 (0.3) | 1 (0.5) | 0 (0.0) |
| Gram Positive Cocci | | | |
| <i>Enterococcus faecalis</i> | 16 (5.1) | 14 (6.9) | 2 (1.8) |
| <i>Staphylococcus haemolyticus</i> | 9 (2.9) | 4 (2.0) | 5 (4.6) |
| <i>Staphylococcus epidermidis</i> | 6 (1.9) | 2 (1.0) | 4 (3.7) |
| <i>Staphylococcus aureus</i> | 6 (1.9) | 4 (2.0) | 2 (1.8) |
| <i>Staphylococcus warneri</i> | 6 (1.9) | 5 (2.5) | 1 (0.9) |

| Microorganism | Overall | COVID-19 | Non- COVID-19 |
|--|-----------|----------|------------------|
| | N=311 (%) | N=202(%) | N=109 (%) |
| <i>Staphylococcus lugdunensis</i> | 6 (1.9) | 4 (2.0) | 2 (1.8) |
| <i>Enterococcus faecium</i> | 5 (1.6) | 4 (2.0) | 1 (0.9) |
| <i>Staphylococcus hominis ss hominis</i> | 2 (0.6) | 2 (1.0) | 0 (0.0) |
| <i>Staphylococcus saprophyticus</i> | 2 (0.6) | 2 (1.0) | 0 (0.0) |
| <i>Streptococcus anginosus</i> | 1 (0.3) | 0 (0.0) | 1 (0.9) |
| <i>Streptococcus mitis</i> | 1 (0.3) | 1 (0.5) | 0 (0.0) |
| <i>Streptococcus salivarius</i> | 1 (0.3) | 1 (0.5) | 0 (0.0) |
| <i>Streptococcus viridans, alpha hemolytics</i> | 1 (0.3) | 0 (0.0) | 1 (0.9) |
| Methicillin-resistant Coagulase-negative <i>Staphylococcus ssp</i> (MRCNS) | 1 (0.3) | 1 (0.5) | 0 (0.0) |
| <i>Micrococcus luteus</i> | 1 (0.3) | 0 (0.0) | 1 (0.9) |

In the multivariate analysis, the association between CLABSI and COVID-19 remained high (aOR=2.28); however, the association with VAE decreased (aOR=0.46). As shown in **Table 3**, VAE showed significantly higher rates of *Acinetobacter baumannii* isolation in patients with COVID-19, but other HAIs pathogens, such as *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*, were more frequently isolated in non-COVID-19 patients. However, in CLABSI and CAUTI, the frequency of isolation of *Acinetobacter baumannii* was higher in non-COVID-19 patients, and particularly the frequency of isolation of *K. pneumoniae*, including ESBL-producing strains, was higher in COVID-19 patients in CLABSI.

The carbapenem resistance rate was 89.8% for *A. baumannii* and 86.9% for *P. aeruginosa*.

Supplementary Table 5. Comorbidity and Ward Location

| Comorbidity | Overall N=255 (%) | ICU N=229 (%) | General Wards N=26 (%) | P-value |
|---|------------------------------|------------------------------|-----------------------------------|----------------|
| Cardiovascular Disease | 190 (74.5) | 169 (73.8) | 21 (80.8) | 0.440 |
| Nervous System Disease | 92 (36.1) | 86 (37.6) | 6 (23.1) | 0.145 |
| Diabetes Mellitus | 131 (51.4) | 120 (52.4) | 11 (42.3) | 0.329 |
| Trauma | 2 (0.8) | 2 (0.9) | 0 (0.0) | 0.632 |
| Obesity | 70 (27.5) | 67 (29.3) | 3 (11.5) | 0.155 |
| Asthma | 2 (0.8) | 2 (0.9) | 0 (0.0) | 0.632 |
| Chronic Obstructive Pulmonary Disease (COPD) | 3 (1.2) | 3 (1.3) | 0 (0.0) | 0.557 |
| Chronic Kidney Disease (CKD) | 28 (9.2) | 21 (9.2) | 7 (26.9) | 0.006 |
| Tuberculosis | 11 (4.3) | 11 (4.8) | 0 (0.0) | 0.253 |
| HIV/AIDS | 4 (1.6) | 4 (1.8) | 0 (0.0) | 0.497 |
| Cancer | 8 (3.1) | 5 (2.2) | 3 (11.5) | 0.01 |

Supplementary Table 6. Steroid use in HAIs patients

| HAIs | Overall N=255 (%) | With Steroid N=190 (%) | Without Steroid N= 65 (%) | P-value |
|-------------|------------------------------|-----------------------------------|--------------------------------------|----------------|
| VAE | 143 (56.1) | 101 (53.2) | 42 (64.6) | 0.108 |
| CLABSI | 135 (52.9) | 113 (59.5) | 22 (33.9) | <0.001 |
| CAUTI | 34 (13.3) | 26 (13.7) | 8 (12.3) | 0.778 |

Supplementary Table 7. Steroid use among CLABSI patients with ESBL-producing *Klebsiella pneumoniae*

| <i>Klebsiella pneumoniae</i> (ESBL) | Overall N=135 (%) | With Steroid N= 113 (%) | Without Steroid N= 22 (%) | P-value |
|--|------------------------------|------------------------------------|--------------------------------------|----------------|
| Yes | 14 (10.4) | 14 (12.4) | 0 (0.0) | 0.081 |