الإدارة العامة لمكافحة عدوى المنشآت الصحية
General Directorate of Infection Prevention and Control in Healthcare Facilities

وزارة الصحة
Ministry of Health

2023 ANNUAL REPORT

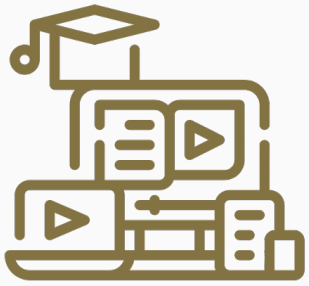
General Directorate of Infection Prevention & Control (GDIPC)

وزارة الصحة
Ministry of Health

وزارة الصحة
Ministry of Health

TABLE of CONTENTS

1. GDIPC in Numbers



3 Educational Platforms

1,981 Licensed Trainers & 137,000 Licensed BICSL Trainees

2 Published Articles

5 Comprehensive IPC Programs & 277 Graduates

CAUTI0N
CAUTI out of Nation

Reduction in CAUTI was 35% during last year with applying CAUTI0N Strategy

Go.green

Reduction in CLABSI since the start of CRRS strategy up to 32.8%

2. Infection Prevention & Control (IPC) Programs

2.1 IPC Auditing Unit

The aim of the program is to monitor the compliance and implementation of the infection prevention & control standards of all the GDIPC – accredited programs in the healthcare facilities.

ICA auditing unit uses approved evaluation forms based on the national and international references. The program maintains a rigorous approach to prevent the healthcare – acquired infections (HAIs) by achieving the determined and scheduled evaluation's visits, filling the scientifically – rooted evaluation forms and improving the quality of the whole process.

One of the objectives of the program is to verify the quality, assess the process of the evaluation and collaborate with the regional health directorates and coordinators to achieve the highest rate of IPC compliance to these standards. In addition to that, the IPC auditing program is continuously implementing training programs to increase the awareness level of the auditors.

There are two types of the ICA evaluation:

A. Supervisory Auditing Programs:

These are conducted by the GDIPC-certified evaluators for the following:

- Infection control auditing (ICA)
- Central sterilization service department (CSSD) auditing
- Dental infection control auditing (DICA)
- Hemodialysis centers infection control auditing (HD ICA)
- Comprehensive rehabilitation centers (Rehab ICA).

B. Self-Auditing Programs:

They are conducted by the auditors of the healthcare facilities, themselves and include the following:

- Infection Prevention & Control Core Components (IPCCC)
- Primary Health Care Center Infection Control Audit (PHC ICA)
- Respiratory Protection Program (RPP)
- Hand hygiene, and self- assessment of hand hygiene.

The mechanism of performance of the supervisory auditing programs:

1. Supervising the evaluation visits to the healthcare facilities and following up the process of reports receiving.
2. Reviewing all the auditing visits reports that are submitted by the auditors to ensure the quality of the auditing activities.
3. Communicating with the coordinators and providing advisory support regarding the quality of the submitted reports.
4. Ensuring the adherence to the evaluation visits protocol for all the regions.
5. Creating reports of the compliance for all the healthcare facilities regarding all auditing programs through data analysis and exploring all visits results.

The mechanism of performance of the self-auditing programs:

1. Communicating with the program coordinators and providing technical support.
2. Following up ~~on~~ the data that was entered and related to the self-auditing programs of all the healthcare facilities.
3. Monitoring the healthcare facilities preparedness to confine emerging or re-emerging infectious diseases threats.
4. Comparing the results of the self-assessment reports with the supervisory evaluation visits reports to ensure validity and quality.

The mechanism of performance of the hand hygiene program:

1. Following up data entry and reports to verify the compliance rate of all the healthcare facilities.
2. Monitoring the quality of the submitted reports received from all the regions.
3. Following up the implementation of the verification visits.

Analyzing the results of the verification visits according to the approved standards.

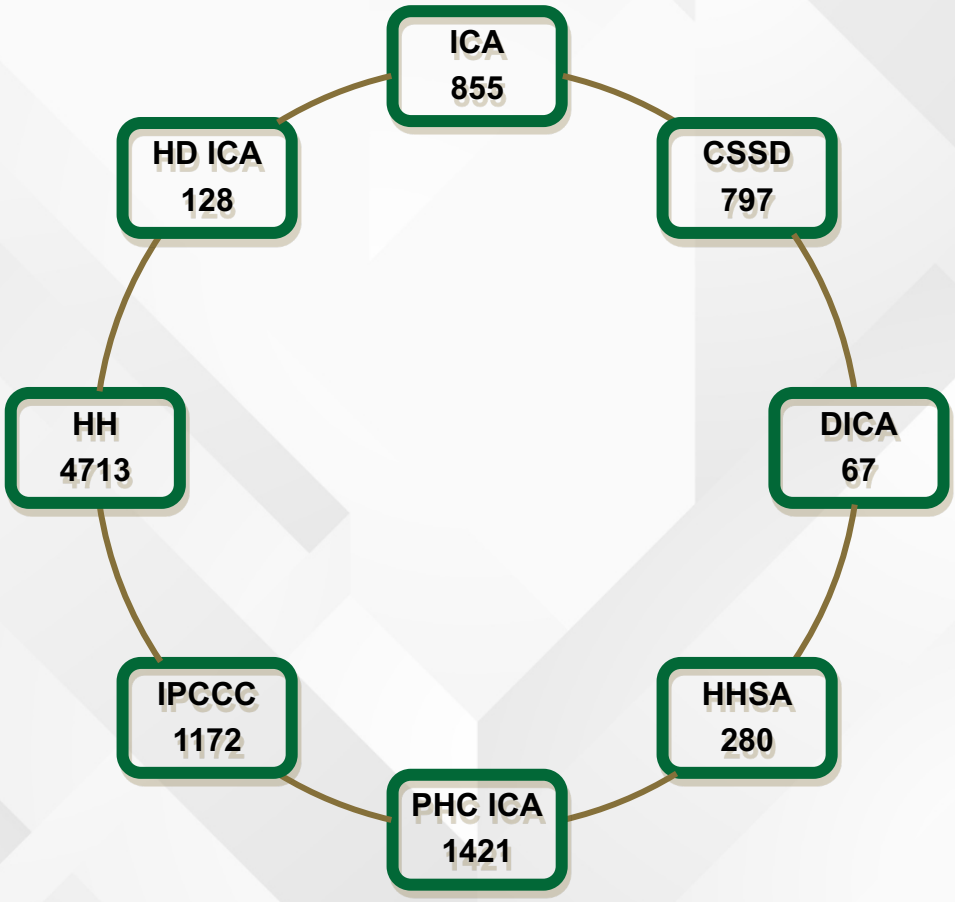


Figure 1. Number of Auditing Programs Reports, 2023

Infection Control Audit (ICA)

Overall Compliance Rate (CR): 84.49%.

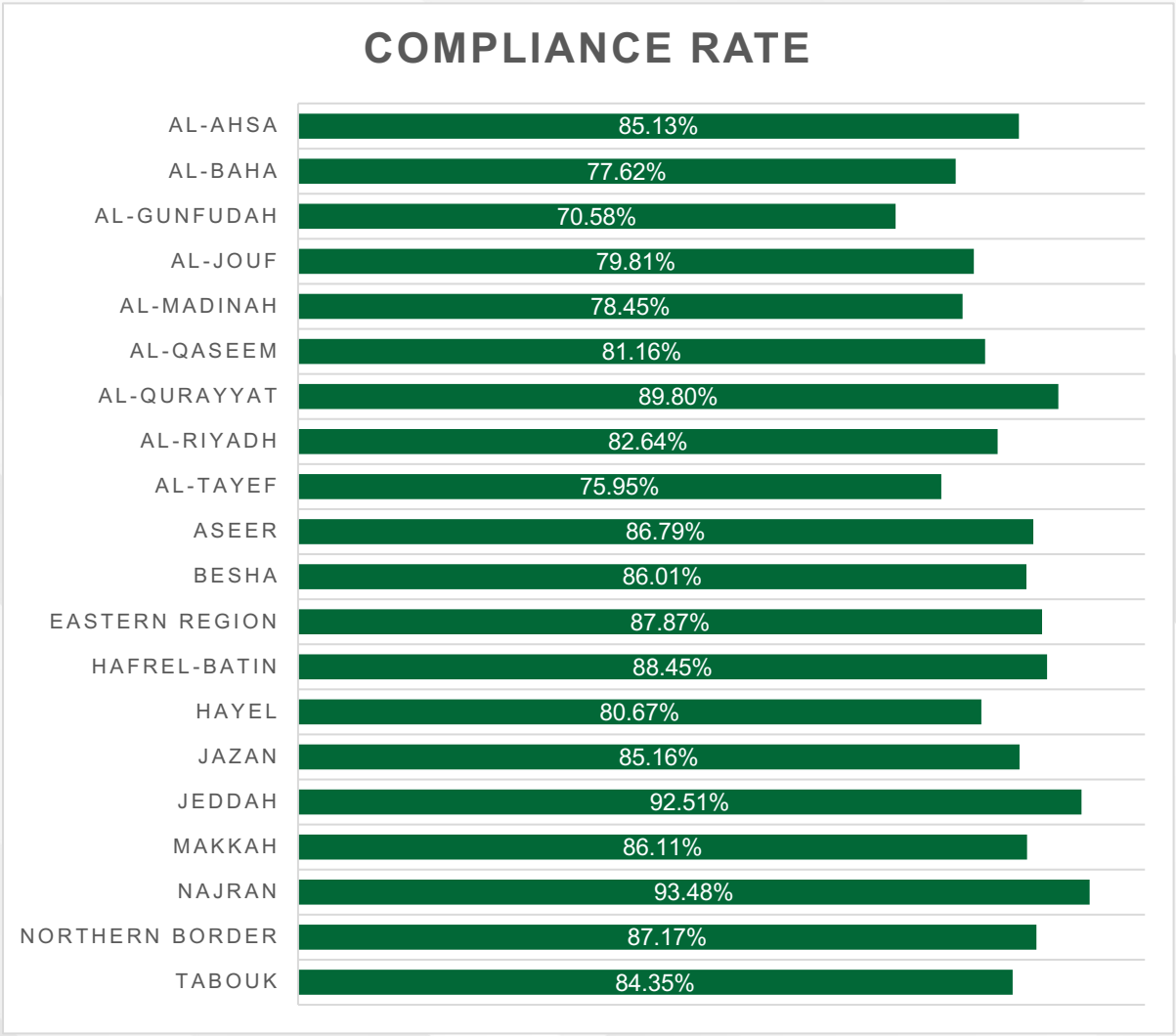


Figure 2: ICA Overall Compliance Rate per Region,2023

The comprehensive findings revealed that the overall compliance rate of the infection prevention & control standards at KSA is 84.49 %.

It is obvious that Najran region gained the highest compliance rate in the ICA program, which was 93.48%, while the lowest compliance rate 70.58% was attributed to Al-Gunfudah region.

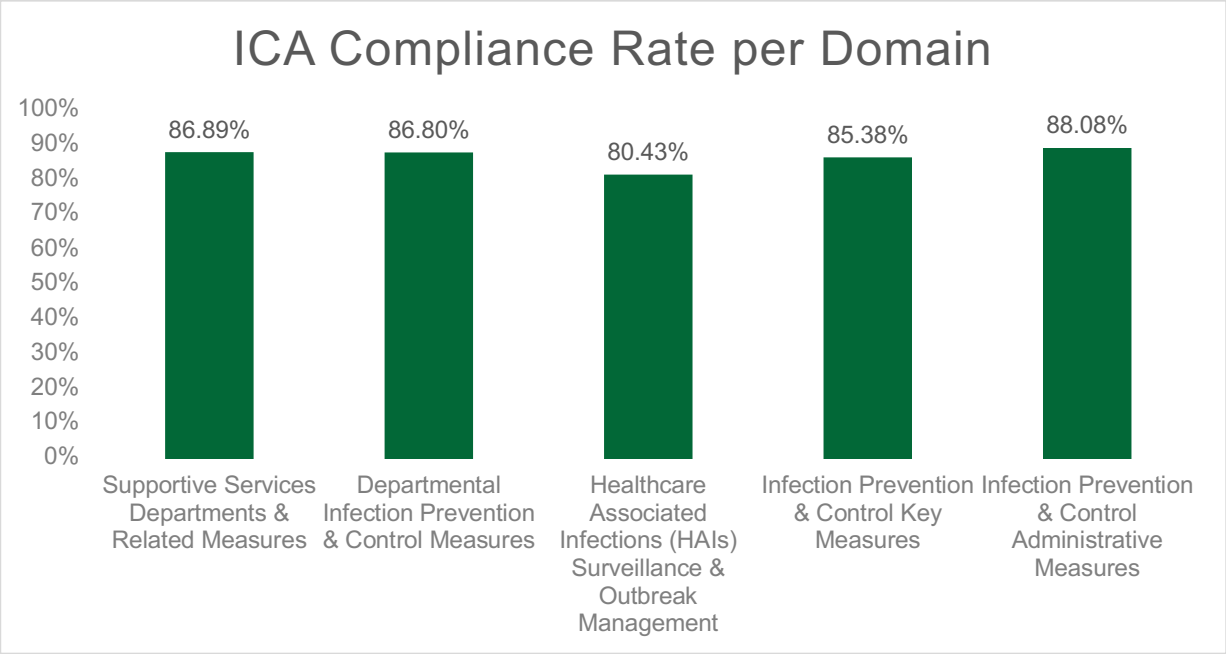


Figure 3: ICA Compliance Rate per Domain, 2023.

The chart depicts the overall compliance rate of infection prevention & control in five certain domains. It illustrates the highest compliance rate of the administrative measures, which was (88%). The lowest compliance rate was (80%) linked with the Healthcare associated infections (HAIs) surveillance & outbreak management.

Central Sterilization Service Department (CSSD) Auditing

Overall Compliance Rate: 83.60%

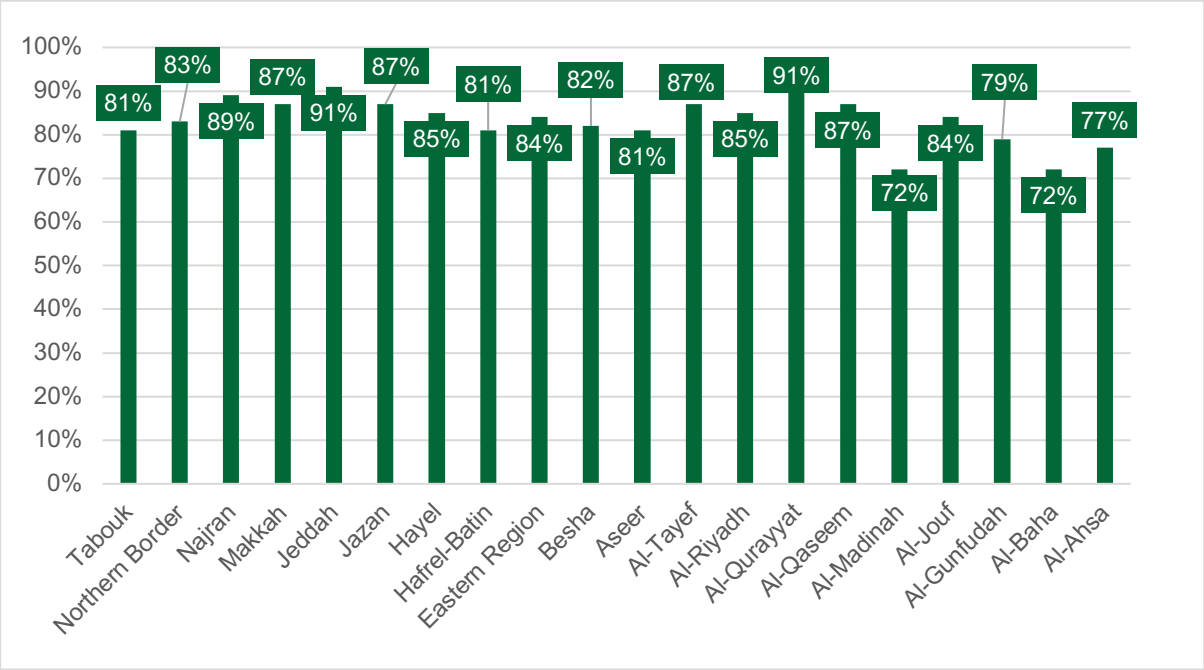


Figure 3: CSSD Overall Compliance Rate per Region, 2023

The comprehensive findings revealed a general compliance rate of 83.60%. The highest compliance rate of the Al-Qurayyat & Jeddah regions was 91%, while the lowest rate 72% was of Al-Madinah & Al-Baha regions.

Dental Infection Control Audit (DICA)

Overall Compliance Rate: 87.98%.

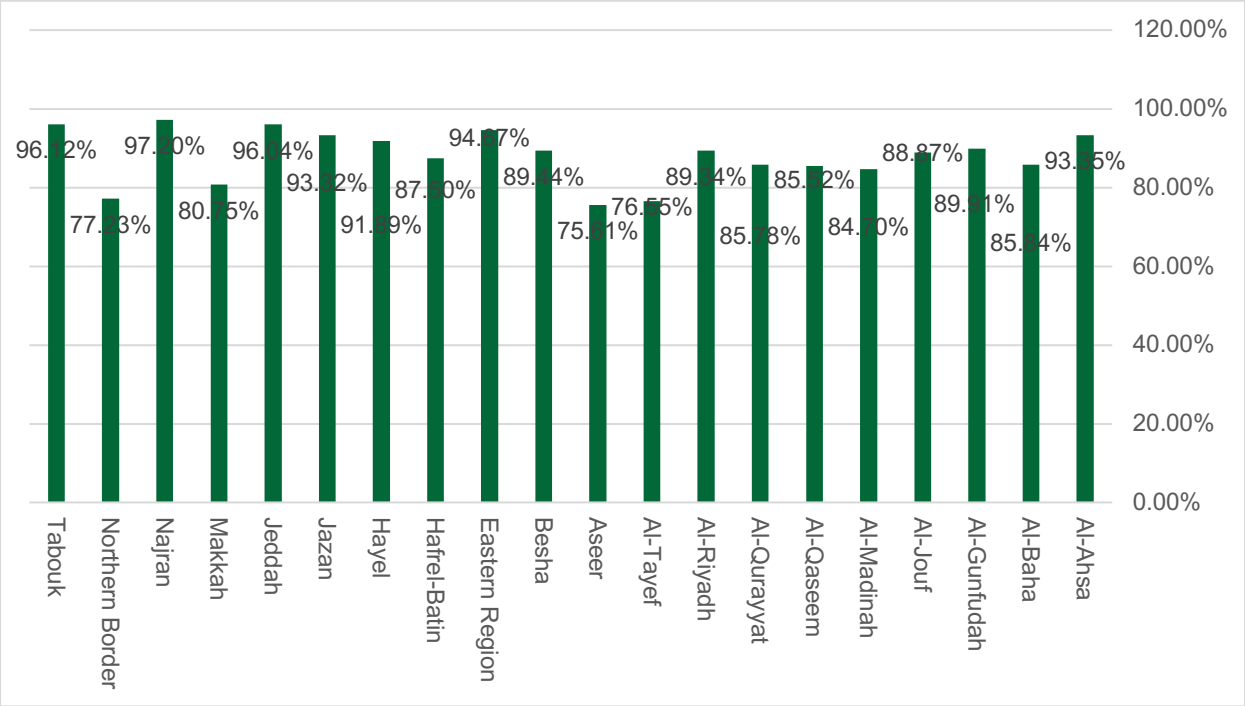


Figure 4: DICA Overall Compliance Rate per Region, 2023

The graph illustrates that the compliance rate of the dental centers is 87.98%.

The highest total compliance rate was recorded in Najran region, while the lowest rate of 75.61% was recorded in Aseer region.

Hemodialysis Centers Infection Control Audit Program (HD ICA):

Compliance rate: 89.29%.

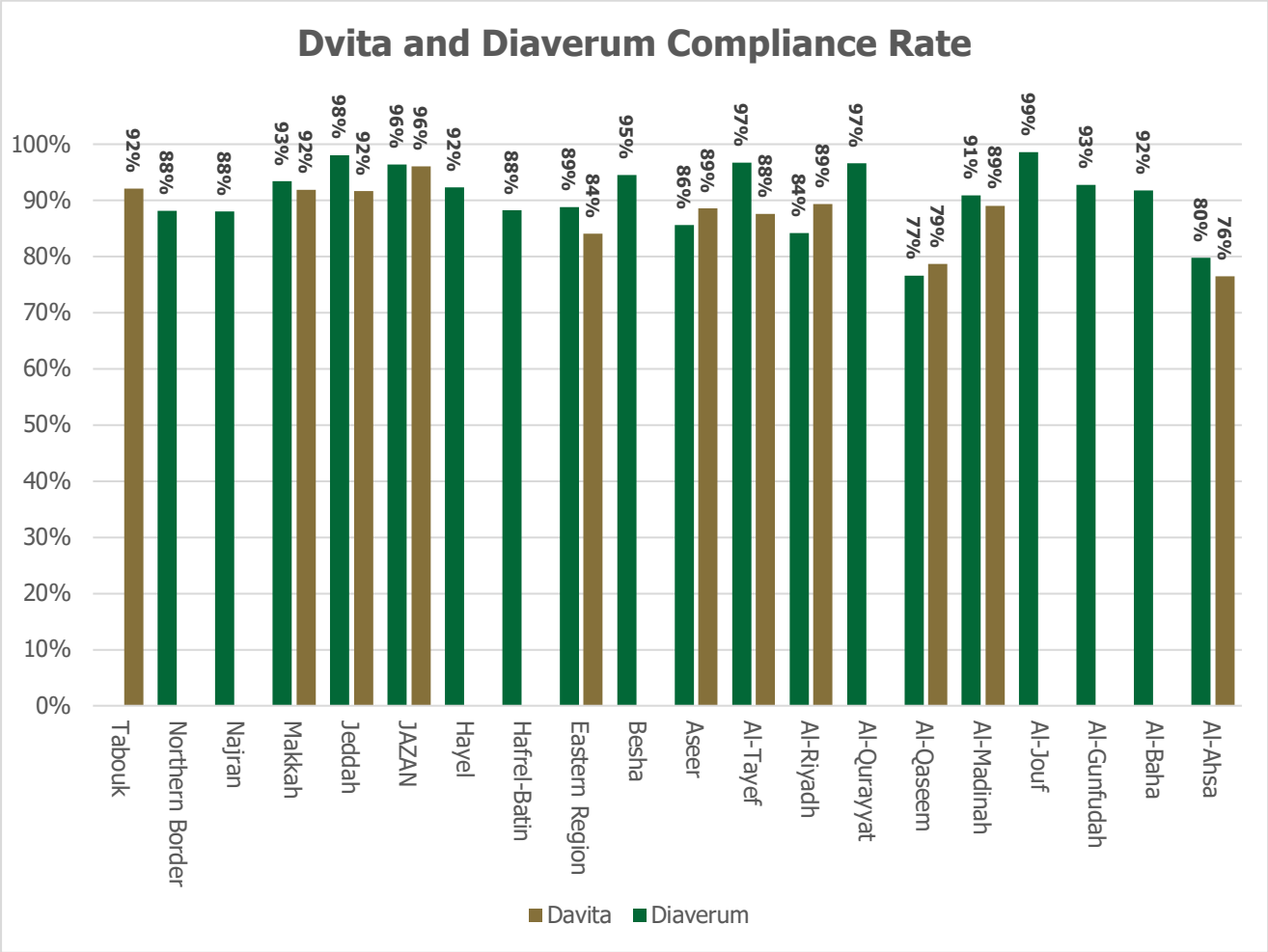


Figure 5: Davita and Diaverum Compliance Rate per Region,2023

There are two designated hemodialysis centers at KSA, namely DaVita & Diaverum. Some regions have both DaVita & Diaverum centers while others have only one of them. It is obvious from the graph that the overall compliance rate among the DaVita and Diaverum hemodialysis centers across the various regions of KSA is 89.29%.

Among DaVita centers, Jazan achieved the highest compliance rate of 96%, while Al-Ahsa reported the lowest one 76%. In the case of Diaverum centers, Al-Jouf exhibited the highest compliance rate at 99%, whereas Al-Qaseem showed the lowest 77%.

Hand Hygiene Program (HH)

Overall Compliance Rate: 75.26%.

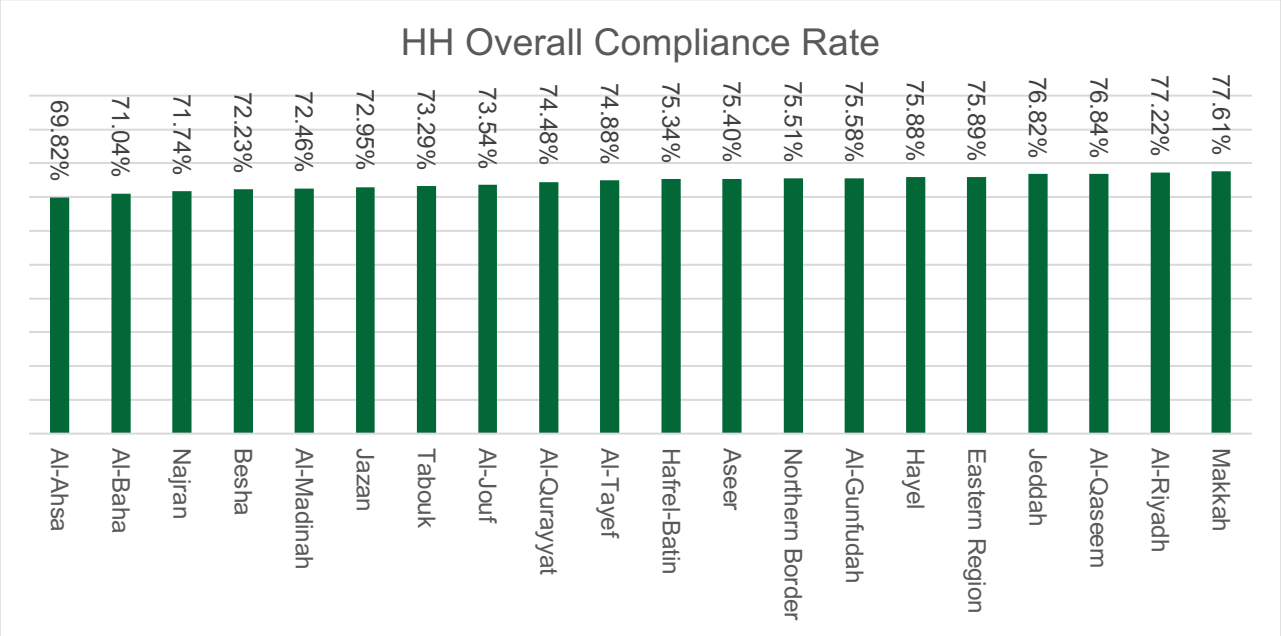


Figure 6: HH Overall Compliance Rate Per Region, 2023.

The graph illustrates that the regional overall compliance rate in 2023 of the hand hygiene was 75.26%. Makkah region exhibited the highest compliance rate 77.61%, while Al-Ahsa reported the lowest rate 69.82%.

Hemodialysis	Intensive care	Emergency	Other
81%	78%	77%	77%

Table 1: Hand Hygiene Compliance Rate per Department, 2023.

Nurse/midwife	Doctors	Other health care worker
80%	78%	70%

Table 2: Hand Hygiene Compliance Rates per staff category, 2023.

Morning	Afternoon	Night
78%	77%	75%

Table 3: Hand Hygiene Compliance Rate per Shift, 2023.

Before touching a Patient	Before clean/aseptic procedure	After touching patient surroundings	After touching a patient	After body fluid exposure risk
71%	85%	69%	80%	91%

Table 4. Hand Hygiene Compliance Rate per (5 moments), 2023.

The tables (1-4) provide insights into hand hygiene compliance among healthcare workers based on department, staff category, shift, and indication (5 moments). Notably, the Hemodialysis Department exhibited the highest overall compliance at the national level, with nurses being the most compliant compared to the other categories. Morning shifts and situations involving after-body fluid exposure risk showed the highest compliance rates among healthcare workers.

Respiratory Protection Program (RPP)

Overall Compliance Rate: 93.70%

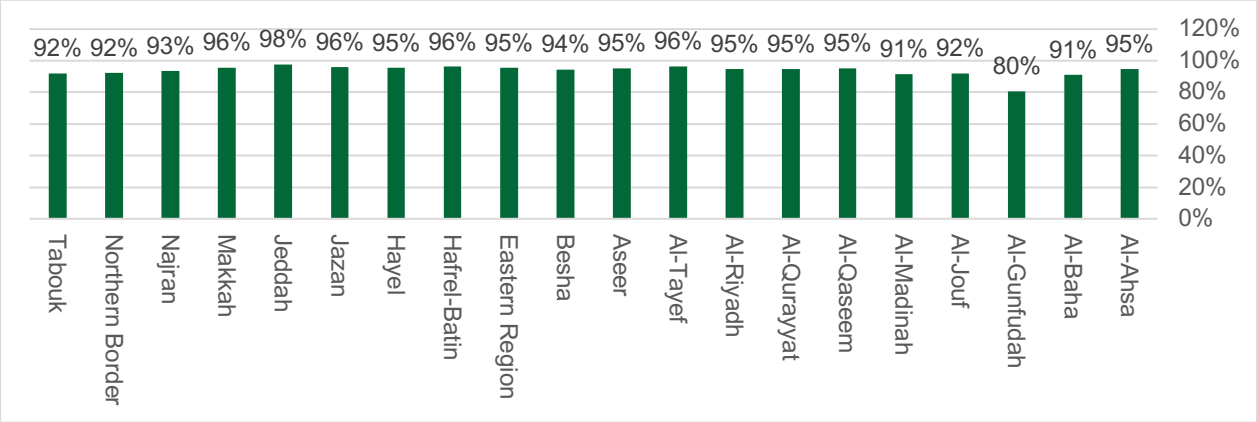


Figure 7: RPP Overall Compliance Rate Per region, 2023

The above chart provides insights into the adherence levels to the Respiratory Protection Program in 2023. Notably, Jeddah exhibited the highest compliance rate 98%, whereas Al-Gunfudah showed the least adherence with a rate of 80%.

Technical Unit:

The technical unit specialized in establishing and preparing scientific guidelines, protocols, and documents related to the IPC best practices & measures. Additionally, educational materials and technical recommendations regarding IPC best practices are also provided through this unit.

A. Published Guidelines:

In 2023, several guidelines for various topics and practices in infection prevention & control were released, including the following:

- National Guide for Auditors in Infection Control Auditing Strategies for Healthcare Facilities. Version (4), 2023.
- Prediction Guide for the Required Number of Airborne Infection Isolation Room (AIIR). Version (1), 2023.
- Frequently Asked Questions of Airborne Infection Isolation Room (AIIR). Version (1), 2023.
- Respiratory Protection Program (RPP). Version (3) 2023.
- Manual of Infection Prevention and Control in Dental Setting. Version (3), 2023.
- Infection Prevention & Control Committee Terms of Reference. Version (2), 2023.
- Infection Prevention & Control Guideline in the Compounded Sterile Preparations (CSPs). Version (1) 2023.
- Infection Prevention & Control Core Components (IPCCC). Version (2), 2023.
- The executive regulations for the Private Health Institutions System -Infection Prevention & Control Standards, 2023.
- The Document of Conditions & Specifications (Competition to Secure, Prepare, and Operate Cleaning Services for Ministry of Health Facilities), 2023.
- Guide to Regulatory Standards for Healthcare Facilities, Infection Prevention & Control Standards, 2023.

Projects:

1. Improving Infection Prevention & Control Measures in Sterilization Service Units (SSU) at Private Dental Centers

In 2023, a national project was launched aimed at improving infection prevention & control measures within the Sterilization Services Units (SSUs). It targeted (150) private dental centers in Riyadh, (22) in Hail, and (13) in Bisha. At this project, scheduled visits were conducted by the licensed and approved Infection control auditors of the above-mentioned regions to their targeted centers in their specific locations.

These visits involved evaluating the centers using specialized auditing tool and providing them with the technical supporting feedback.

Additionally, some centers need improvement projects, and they were directed to develop corrective plans tailored to their units' needs, with the necessary support offered. Training workshops, both onsite and virtual, were conducted in these regions to explore crucial IPC standards for implementation within (SSUs). Participants in the training courses received certificates via the GDIPC electronic website, certifying a total of 300 SSU staff members across the three mentioned regions.

One of the most important outputs are:

1. Increasing awareness of the importance of correct practices for the sterilization process within sterilization units in private dental centers
2. 300 Workers in sterilization units was obtain basic training certificates for sterilization through the GDIPC website (Sterilization Basic Course)
3. Creating a special auditing tool to measure the application of infection control standards in sterilization units in private dental centers.

2. National IPC Standards of Airborne Infection Isolation Rooms (AIIRs)

The national IPC standards of AIIRs mandate the presence of specific value of AIIRs or negative pressure isolation rooms in each inpatient, critical, and emergence departments among healthcare facilities. Accordingly, the IPC programs department team revised these standards against international references, best evidence, and the current situation and overview of the previous standards and its impact on the quality and safety of the care that provided among healthcare facilities to our clients & patients. Consequently, the IPC programs team construct a specific " *Prediction Guide for the Required Number of Airborne Infection Isolation Room (AIIR)"* that emphasis on the importance of risk assessment and a specific calculation that support healthcare facilities to predict their required AIIRs based on specific indicators. The indicators as the follow; the average number of suspected or confirmed airborne infectious cases, average length of stay of the suspected or confirmed airborne infectious cases, and the total number of days per year. This calculation is designed to provide an accurate measure of required negative pressure isolation rooms in the healthcare facilities.

Product Evaluation:

The products evaluation process involves a specialized committee within IPC programs department dedicated to thoroughly studying infection prevention & control products and its related supplies that required for the effective implementation of the IPC program among healthcare facilities.

This committee meticulously examines the technical aspects, including adherence to specifications, desired efficacy, cost effectiveness, and the overall quality of the products. Additionally, the assessment extends to understanding the proper utilization methods of the products.

The committee employs a specific mechanism for evaluation, ensuring a systematic and comprehensive approach to assess each product. This thorough evaluation is crucial in determining the suitability and effectiveness of infection prevention & control products, contributing to informed decision-making and the maintenance of high standards in healthcare practices and to prevent healthcare acquired infections. Over 800 infection control products were studied across various internal and external committees such as (IPC programs committee in GDIPC, national unified procurement company, Gulf health council).

Activities & Contributions:

ICA Society:

The ICA Society is instituted with the primary objective of optimizing the synergies among national-level ICA auditors, fostering collaboration on shared expertise, skills, and challenges encountered in the ICA journey.

Membership in the society is reserved for approved and certified ICA auditors. Regular meetings of society members will be convened every three months to facilitate knowledge exchange and professional development within the ICA community.

Primary Healthcare Centers (PHCs) Infection Prevention & Control Standards

The IPC Programs Department have been collaborated with the General Directorate of Primary Healthcare Centers Affairs to review policies and procedures as well as the approved IPC national standards among primary healthcare centers, incorporating numerous changes aligned with the IPC best practices with the core objective of enhancing infection control measures.

Environment of the Healthcare Facilities

The IPC Programs Department have been collaborated with the General Administration of Health Facilities Environment to review and construct handbook pertaining to the best practices, protocols, and measures required to promote the environmental health and its related activities among healthcare facilities, with modifications based on the technical perspective for the proper implementation of infection prevention & control standards which includes the correct selection of environmentally cleaning products.

Ticketing system:

The IPC Programs Department have been collaborated with the National health command center (NHCC) for a particular branch of the medical supplies operations to ensure the availability and accessibility of the medical supplies that are critical for the appropriate implementation of the IPC program among healthcare facilities and in preventing healthcare acquired infections and outbreaks. This collaborative approach encompasses building an electronic dashboard and establishing access account for all assigned coordinators among

critical care units all over regional governmental MOH hospitals, to request tickets if they faced any critical IPC supplies shortage. The same collaboration includes comprehensive training sessions that have been provided to the assigned regional coordinators.

Water, Sanitation, Hygiene (WASH):

GDIPC responds to the WASH program in the kingdom of the Saudi Arabia's hospitals and submits its findings to the WASH, the concerned body in WHO. This paramount WASH report will be arranged and facilitated by the General Directorate of the Environmental Health as a focal point for the WASH. The total number of the recent functioning - hospitals of the kingdom under the WASH program is (417), either governmental or private. Fortunately, all these hospitals are under the direct supervision of GDIPC for the various and comprehensive components of the infection prevention and control (IPC).

Objectives of the WASH report

1. To fill the form of the core questions of the WASH by answering all the questions for each one of the five WASH components.
2. To analyze the results of the core questions in the specified WASH excel sheet.
3. To release a descriptive and clearly explainable report to the concerned WASH bodies and parties.

To summarize, the hospitals of the kingdom of the Saudi Arabia acquire and attain (100%) proportion for the basic level of the WASH components (water, hygiene, sanitation, waste management & environmental cleaning) related to infection control. This fact is not drawing attention, instead it goes beyond doubts, since the kingdom's hospitals are well – established and modernly – equipped. Moreover, all the WASH requirements are responded to, completely; and even further developments in IPC are achieved and visualized in the standard medical services and practices.

3.Training and Continuous Education

3.1 Introduction

The training and continuous education aims primarily to raise the level of knowledge and skills in the infection control field among healthcare workers and infection control practitioners. The department is divided into two units: Training Unit & Basic Infection Control Skills License (BICSL) Unit and The Training and Intensive Programs Unit (TIPU). TIPU is composed of two programs: Short course and Comprehensive Training Programs. Additionally, the BICSL unit aims to provide HCWs with basic essential skills needed in infection prevention and control.

The educational materials are based on the latest scientific studies and guidelines related to the field of infection prevention and control. The scientific material should be approved by General Directorate of Infection Prevention and Control at Ministry of Health (GDIPC-MOH) and aligned with World Health Organization (WHO) and Centers for Disease Control and prevention (CDC) updates.

1- Training and intensive Programs Unit

The training programs are planned based on GDIPC objectives, either annual or based on needs assessment as in case of the pandemic situation. The basic and advanced education programs were built to improve the skills and knowledge of healthcare workers in the field of infection control and strengthen their weaknesses based on strategic goals.

1.1 Comprehensive Programs

The GDIPC training department has created and implemented four programs: Comprehensive Infection Control Program (CICP), Comprehensive Sterilization Program (CSP), Healthcare-Associate Infections Outbreak and Surveillance (HAIOS) and Infection Control Orientation program (ICOP).

1.1 Comprehensive Infection Control Program (CICP) is a training program specialized in the infection control field. Target groups of the training program are infection control practitioners. The aim is to provide them with basic principles, applied practices and standards for infection control in healthcare facilities. The training is based on the latest local and international standards for managing and operating all infection control program activities. The comprehensive program is achieved by completing a period of three months in which lectures and clinical training were provided. The clinical training was conducted under supervision of the experts who are the coordinators of the IPC- accredited training centers.

1.2 The program addresses and provides strong knowledge related to understanding of the Healthcare Associated Infections Outbreak and Surveillance (HAIOS). The principles of infection control are applied to different hospital departments, outbreak investigations, and surveillance methodologies. This aim is achieved through an comprehensive training plan for the period of three months that include lectures and clinical training under the supervision of expert's infection control coordinators in accredited training centers.

1.3 The Comprehensive Sterilization Program (CSP) is specialized in the infection prevention & control field and especially in the Sterilization Services. The program is an advanced program continuing for two months. The practical sessions focus on all the principles and best practices of the sterilization processes. The program is designed to be 1 month as a basic program for new/unexperienced ICPs to provide them with the IC basic principles and applied practices.

1.4 Preparation program for certification board of infection control and epidemiology. One of the objectives of this program is to enhance the most updated infection prevention & control knowledge & skills among the program candidates. Also, explore the CBIC exam requirements and its related strategies and review the CBIC modules and practice on the CBIC mock exams.

Comprehensive programs in Numbers

Figure1 Programs, and graduates of the comprehensive programs in 2023.

The comprehensive programs (HAIOS, CICP, and CSP) were approved by GDIPC in 2023, and implemented once in the three regions (Riyadh, Jeddah, and Dammam), while the ICOP program was executed in three batches across 10 different regions.

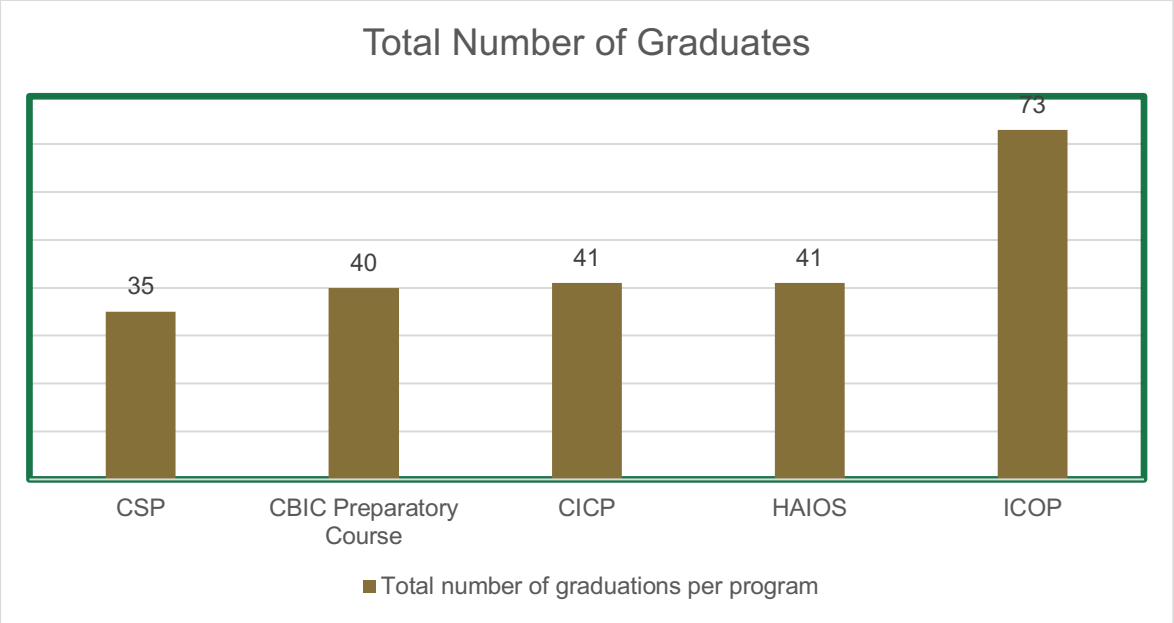


Figure 2 Total Participants and graduates per Program, 2023.

The graph demonstrates the total number of the comprehensive program participants and graduates in 2023. The highest number of participants was 73 in ICOP as it was executed in three batches in 2023.

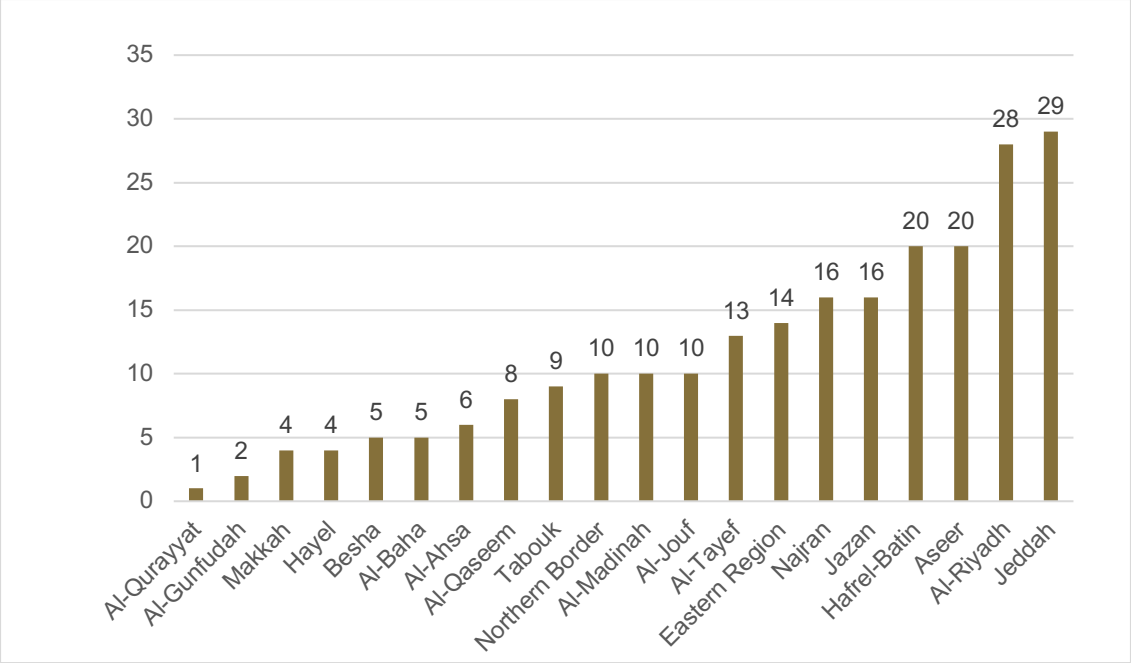


Figure 3 Total graduates of Comprehensive courses per regions in, 2023

Figure 3 shows the total number of participants and graduates of the comprehensive programs in 2023 in each region. The highest number of the participants and graduates was 29 and 28 in Jeddah and Riyadh, respectively.

1.2 Short Courses

The training department of GDIPC implemented twelve short training programs based on the needs assessment and indicators of GDIPC. The online short programs have the potential to reach a wide and diverse audience globally. In addition to the short training programs online educational platforms were created to support and enhance the knowledge of infection prevention and control.

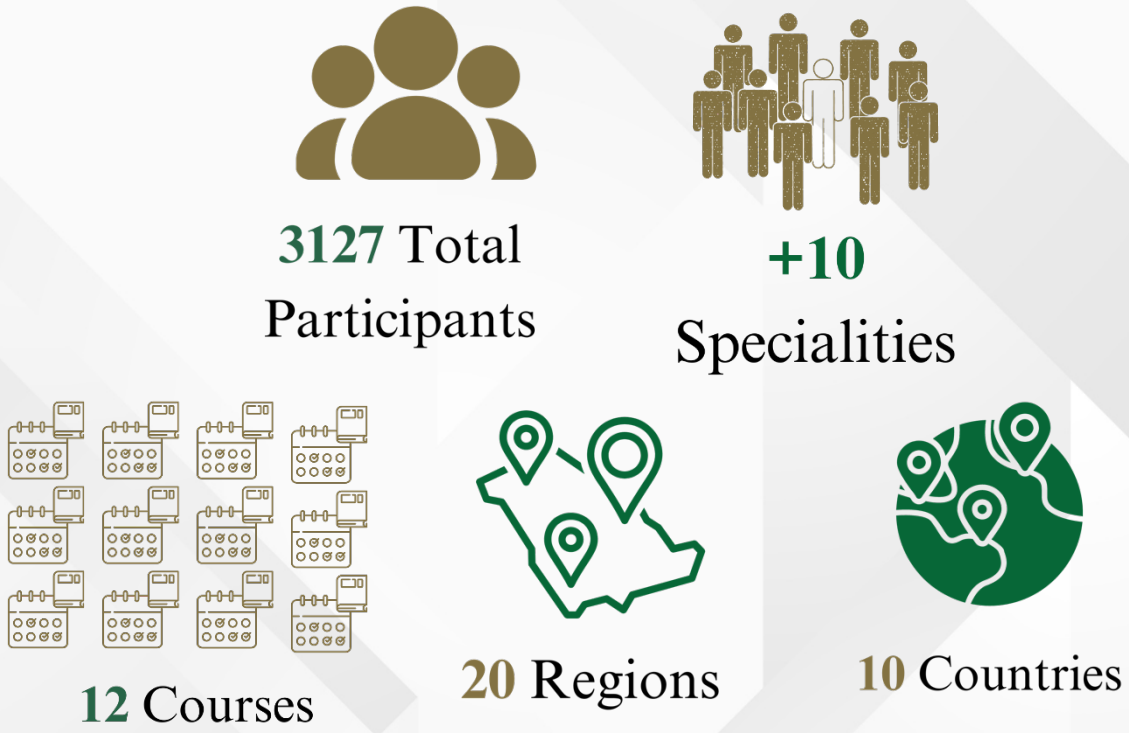


Figure 4 Participants, Regions and Countries participated in short courses 2023.

The 12 in-person and short online programs provide a quick and efficient way in training to cover all healthcare facilities in 20 regions to disseminate timely information and enhance health practitioners' capabilities on the latest health practices about infection control to be aligned with the health transformation project and ministry of health strategic plan.

Programs name	Programs method	Number of Participants
The 1st Capacity Building Course 2023	In-person	37
The 2nd Capacity Building Course 2023	In-person	39
The 3rd Capacity Building Course 2023	In-person	38
The 4th Capacity Building Course 2023	In-person	42
The 1st IPC Rapid Response Team (RRT) workshop	In-person	36
The 2nd IPC Rapid Response Team (RRT) workshop	In-person	35
The 3rd IPC Rapid Response Team (RRT) workshop	In-person	25
HAIs Surveillance Course	Online	1313
CL Insertion and Maintenance Best Practices	Online	626
Basic Principle of Infection Control in the Dental Centers	Online	561
Principles of Disease Prevention in Primary Health Care Centers (PHCs)	Online	287
Applying the Surveillance Management in the Hemodialysis Centers	Online	88

Table 1. Number of participants throughout short programs 2023.

Table 1 reviews the names and types (In-person or online) of short training programs that were implemented through the GDIPC and covered 3127 participants.

2- BICSL Program

The training and continuous education department arranges the process to obtain the Basic Infection Control Skill License (BICSL) certification after reviewing the recently updated BICSL program guidelines. The main goal of BICSL is to provide a safe environment for HCWs and patients, reduce and prevent transmission of infections in HCFs. The BICSL program is mandatory for HCWs, based on the GDIPC regulations.

However, the quality of the BICSL training program is continuously monitored. The monitoring process of the BICSL program covers all the BICSL trainers in regions, clusters, and both governmental and private healthcare facilities.

Type of Healthcare Facility	Target No.	Actual No.	Achievement rate
Governmental HCFs	835	717	86%
Private HCFs	416	367	88%

Table 2: The total number of targeted, actual and achievement rate of BICSL trainer in 2023.

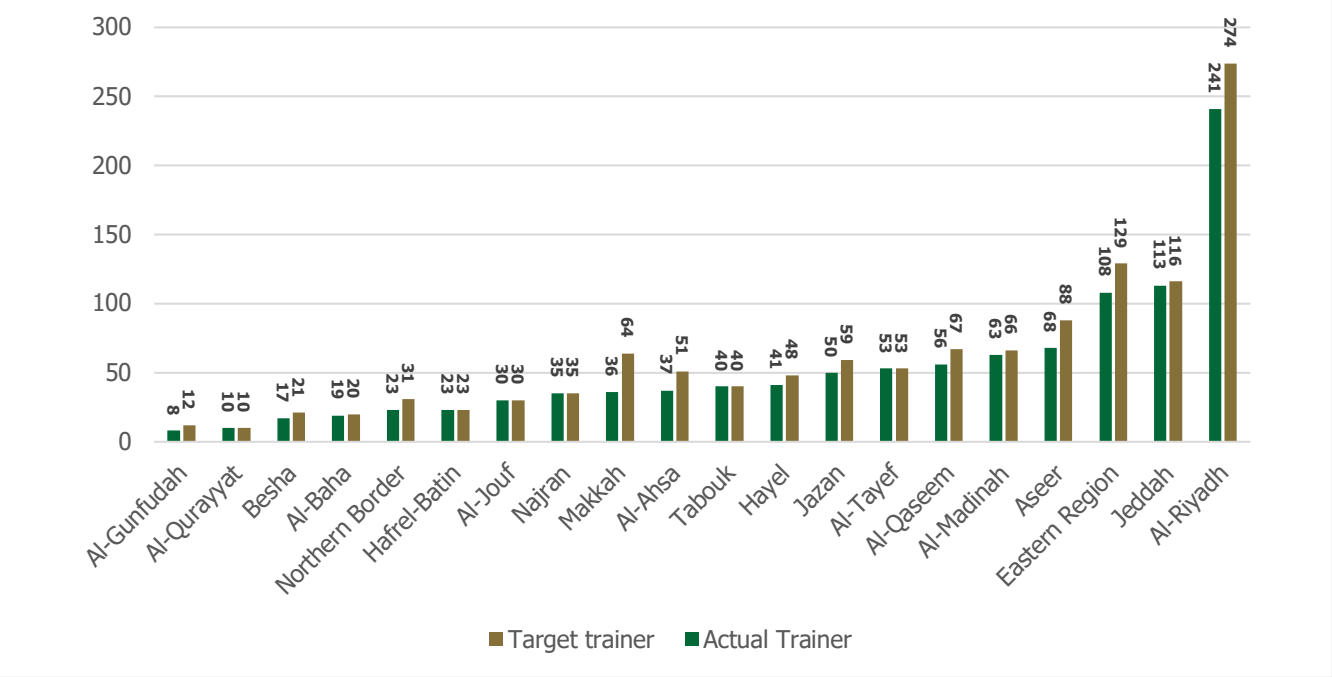


Figure 6 Distribution of BICSL trainers by region in 2023.

In 2023, BICSL program aims to accrediting trainers and trainees for all the governmental

and private health care facilities in all regions based on GDIPC regulations. The number of the targeted trainers in the governmental HCFs for whole regions was 835, while the total actual number of the BICSL trainers in the governmental HCFs was 717. Therefore, the achievement rate was 86%. On the other hand, the targeted number of the private HCFs in 20 region was 416 trainers, while the total actual number of the BICSL trainers of the private was 367, therefore the achievement rate was 88%. Therefore, the whole licensed BICSL trainers was distributed in 20 regions.

BICSL Program in Numbers

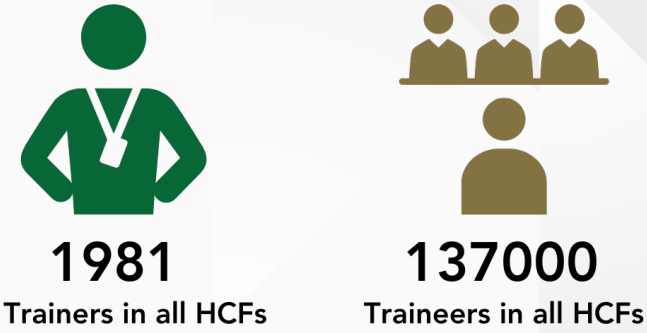


Figure 8. Total number of active BICSL trainers and trainees till 2023.

Based on the working plan of the GDIPC BICSL team to train all healthcare workers in Saudi Arabia, 1,981 trainers for the BICSL program were trained and licensed as BICSL trainers, and 137,000 practitioners were trained and licensed as BICSL trainers in all health facilities.

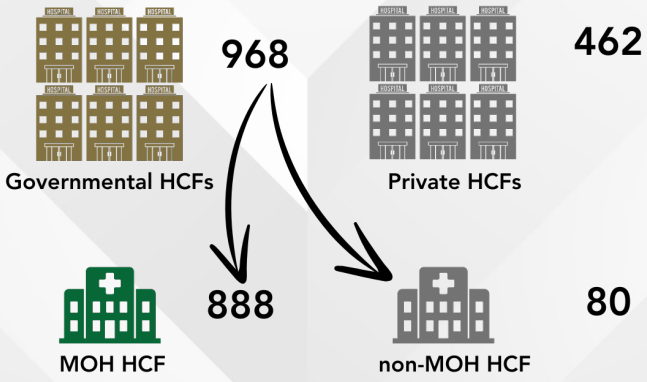


Figure 9: Total number of licensed BICSL trainers in 2023 both the governmental (MOH, non-MOH) and private HCFs.

Regions	Total Number attend the written BICSL exam	Total Number pass the written BICSL Exam	The percentage rate (%)
Riyadh	465	334	72%
Eastern Province	239	178	74%
Jeddah	176	149	85%
Qaseem	113	84	74%
Hail	111	65	59%
Aseer	107	76	71%
Madinah Manwarah	97	67	69%
Tabouk	86	61	71%
Taif	80	70	88%
Makkah Makrama	75	51	68%
Jazan	63	61	97%
Al Hassa	58	54	93%
Jouf	47	26	55%
Hafer AlBatin	47	28	60%
Najran	40	30	75%
Northern Boarders	40	30	75%
Qurayyat	26	19	73%
Bisha	25	21	84%
Baha	24	18	75%
Qunfudhah	9	8	89%
Total Number	**1928**	**1430**	**74%**

Table 3: The distribution of licensed BICSL trainers per region and the achievement rate.

BICSL exam conducted in 20 regions of Saudi Arabia, the total number of HCWs who took the exam was 1928 during the year 2023, and the total participants who passed the written exam about 1430 which will represent 74%.

4. HAIs Surveillance Program

Welcome to our annual Healthcare Acquired Infection (HAI) Prevention and Control Report. This document represents our sustained efforts towards bolstering health standards and minimizing the risk of infection within healthcare environments. Covered within are details of Surveillance, outbreaks Management, and Infection Control Audits Programs. But our approach goes beyond reactive methods – training and continued education remain at the core of our preventative strategies, empowering our dedicated healthcare professionals to excel in the provision of safe, high-quality care. As you delve into the report, you'll witness the impact of our ongoing commitment t– risk mitigation and our proactive steps towards a safer, healthier future in healthcare.

4.1 Introduction

Healthcare Associated Infection (HAI) is an infection that occurs in a patient while on the process of care in a healthcare facility, which was not incubating at the time of admission. It can affect patients in any healthcare setting causing high morbidity, mortality, prolonged hospital stays and extra costs.

Surveillance serves as a method to measure and understand the need to prevent and control HAIs through ongoing collection, consolidation, analysis, and interpretation of data concerning the distribution and determinates of a given disease or event, then dissemination of this information to regional directorates to improve the outcome.

The General Directorate of Infection Prevention and Control Surveillance team in coordination with the HESN Plus team have worked together to establish Surveillance Program for HAIs with specified criteria for healthcare facility to be eligible to share surveillance data. Accordingly, the compliance to data entry was measured to assure reliability and improve data collection process. Analysis and evaluation of surveillance data were done monthly, quarterly, semiannually, and annually.

The program aims to utilize the national Health Electronic Surveillance System (HESN Plus) for healthcare-associated infections (device-associated infections), infections associated with surgical procedures, and with outpatient hemodialysis treatment according to national and international protocols.

General supervision on the implementation of the surveillance system for healthcare-associated infections through linking the healthcare facilities by the national health electronic surveillance network and measuring their rates, compliance to the infection prevention bundles to minimize occurrence of HAIs. In addition, the program regularly updates the guidelines and protocols for the surveillance process and releases reports to allow the regions and hospitals to improve the quality of work and decrease the infection rates. Validation visits were also conducted in multiple regions. The program includes the necessary research and studies based on the available surveillance data and supervises the participating hospitals' training and education activities. This report aims to provide a national overview and presentation of 2023 surveillance data, measuring trends of HAIs for the last 5 years and allow internal and external benchmarks.

4.2 Numbers and Types of participated hospitals

Hospital Type	Bed capacity		Number	Percentage
	<200	>200		
General/ Central Hospitals	52	41	93	79.48%
Maternal and Children Hospitals	8	9	17	14.52%
Cardiac Centers	6	0	6	5.12%
Pediatric Hospital	1	0	1	0.85%
Total	67	50	117	100%

Table 1: MOH hospitals' data per type and bed capacity, 2023.

Table 1 shows that there were 67 hospitals with less than 200 beds, while there are 50 hospitals with more than 200 beds. In total, there were 117 hospitals across all types. General/Central hospitals accounted for the largest number of beds, at approximately 79.48%, while Pediatric hospitals had the lowest number of beds, at approximately 0.85%.

Type of ICU	ICUs		ICU beds	
	N	%	N	%
Medical Surgical	106	40.3%	1431	37.8%
Neonatal	63	24.0%	1304	34.4%
Pediatric Medical Surgical	28	10.6%	291	7.7%
Medical	20	7.6%	288	7.6%
Medical Cardiac	14	5.3%	162	4.3%
Pediatric Medical	8	3.0%	90	2.4%
Burn	7	2.7%	69	1.8%
Surgical Cardiothoracic	5	1.9%	25	0.7%
Respiratory	4	1.5%	59	1.6%
Pediatric Surgical	2	0.8%	14	0.4%
Prenatal	2	0.8%	11	0.3%
Trauma	2	0.8%	28	0.7%
Pediatric Cardiothoracic	1	0.4%	3	0.1%
Surgical	1	0.4%	11	0.3%
Total	263	100.0%	3786	100.0%

Table 2: Types of Intensive Care Units per bed capacity, 2023.

Table 2 shows that the total number of ICU beds was 3786 beds. The most frequent types of ICUs were Medical-Surgical, Neonatal, Pediatric Medical-Surgical, Medical, Medical Cardiac, and Pediatric Medical ICUs. They represented 90% of all ICU types and 94% of all ICU bed capacity.

4.3 DEVICE- ASSOCIATED INFECTIONS (INPATIENTS)

UNIT	Patients Days	CL Days	CLABSI Event	CLABSI Rate*	DUR
Burn	1329	255	3	11.76	0.19
Medical Cardiac	38620	9675	35	3.61	0.25
Neonatal Intensive Care	375795	81910	289	3.53	0.22
Pediatric Medical Surgical	66649	23822	71	2.98	0.35
Pediatric Medical	38308	6479	16	2.47	0.16
Medical	23199	8970	18	2	0.38
Medical/Surgical	396909	174881	294	1.68	0.44
Surgical Cardiothoracic	6868	6033	5	0.82	0.87

Table 3: Central Line-Associated Bloodstream Infection Rates and Ratios per type of ICU, 2023. **Rate per 1000 device days.*

Table 3 shows CLABSI rates and Central Line Utilization Ratios per type of ICU. The ICUs with higher CLABSI rates were Burn (11.76), followed by Medical Cardiac (3.61) and Neonatal Intensive Care (3.53).

Unit/Region	Patient Days	CL Days	CLABSI Event	CLABSI Rate*	DUR
Northern Border	9488	2748	10	3.64	0.29
Tabouk	16531	5066	18	3.55	0.31
Jeddah	31760	20029	54	2.70	0.63
Al-Ahsa	21139	7524	20	2.66	0.36
Eastern Region	21830	8507	22	2.59	0.39
Aseer	25028	12535	31	2.47	0.5
Hafrel-Batin	11327	5008	10	2.00	0.44
Makkah	41933	17680	33	1.87	0.42
Al-Gunfudah	6089	2263	4	1.77	0.37
Al-Tayef	13177	8517	13	1.53	0.65
Al-Madinah	29879	10959	16	1.46	0.37
Al-Riyadh	53871	23558	27	1.15	0.44
Al-Baha	10818	4536	5	1.10	0.42
Jazan	19638	9406	10	1.06	0.48
Al-Jouf	8627	3019	3	0.99	0.35
Al-Qurayyat	2695	1025	1	0.97	0.38
Hayel	13135	4825	4	0.83	0.37
Al-Qaseem	32345	15033	9	0.60	0.46
Najran	22457	9358	3	0.32	0.42
Besha	5142	3285	1	0.30	0.64
Total (national data)	396909	174881	294	1.68	0.44

Table 4: Central Line-Associated Bloodstream Infection Rates and Ratios in Adult Medical Surgical ICUs per region, 2023. **Rate per 1000 device days.*

Table 4 shows the overall CLABSI rate and Central Line Utilization Ratio in the Medical-Surgical ICUs in the Kingdom. The national CLABSI rate was 1.68 per 1000 central line days and the Central Line Utilization Ratio was 0.44. The CLABSI rates were highest in the Northern Border (3.64), Tabouk (3.55), and Jeddah (2.70) while lowest in Najran (0.32) and Besha regions (0.30).

There was a 7% decrease in CLABSI rate during the year 2023 compared to 2022 which may be due to the CRRS project which was started in 2021 with the implementation of prevention strategies.

Unit/Region	Patient Days	CL Days	CLABSI Event	CLABSI Rate*	DUR
Aseer	6916	3108	27	8.69	0.44
Al-Ahsa	3646	959	5	5.21	0.25
Al-Madinah	10053	6514	20	3.07	0.64
Al-Qaseem	5484	1636	4	2.44	0.29
Besha	1744	444	1	2.25	0.25
Eastern Region	7935	3138	7	2.23	0.39
Jazan	4921	2011	4	1.99	0.4
Makkah	3904	1026	1	0.97	0.26
Al-Riyadh	12328	4048	2	0.49	0.32
Al-Baha	1485	403	0	0	0.27
Al-Qurayyat	2444	85	0	0	0.03
Hafrel-Batin	938	247	0	0	0.26
Hayel	1708	130	0	0	0.07
Najran	725	41	0	0	0.05
Tabouk	2418	32	0	0	0.01
Total (national data)	66649	23822	71	2.98	0.36

Table 5: Central Line-Associated Bloodstream Infection Rates and Ratios in Pediatric ICUs per region, 2023. *Rate per 1000 device days

Table 5 shows the national CLABSI rate in Pediatric Medical-Surgical ICUs and the Central Line Utilization ratio. The national rate was 2.98 per 1000 central line days, and the Central Line Utilization Ratio was 0.36. The rate of CLABSI in Pediatric Medical-Surgical ICU was highest in Aseer Region (8.68), Al-Ahsa (5.21) and found to be zero in Al-Baha, Al-Qurayyat, Hayel, Hafer al-Batin, Najran and Tabouk regions.

Unit/Region	Patient Days	CL Days	CLABSI Event	CLABSI Rate*	DUR
Aseer	25933	5339	65	12.17	0.2
Al-Gunfudah	2313	170	2	11.76	0.04
Al-Madinah	43230	5359	44	8.21	0.16
Tabouk	13782	2057	13	6.32	0.1
Al-Ahsa	12136	2736	17	6.21	0.22
Northern Border	10050	1666	8	4.8	0.16
Makkah	27436	6339	20	3.16	0.23
Jazan	17824	6057	18	2.97	0.31
Hayel	21657	2657	7	2.63	0.12
Al-Tayef	30703	7728	20	2.59	0.23
Jeddah	18379	4641	12	2.59	0.25
Besha	7113	1198	3	2.5	0.16
Al-Riyadh	47303	9352	22	2.35	0.16
Hafrel-Batin	11349	2242	5	2.23	0.19
Najran	9571	1356	3	2.21	0.14
Eastern Region	18308	9076	16	1.76	0.53
Al-Qaseem	29743	6733	11	1.63	0.22
Al-Baha	8821	3063	2	0.65	0.34
Al-Jouf	10100	2710	1	0.36	0.26
Al-Qurayyat	10044	1431	0	0	0.14
Total (national data)	375795	81910	289	3.53	0.22

Table 6: Central Line-Associated Bloodstream Infection Rates and Ratios in Neonatal ICUs per region, 2023. **Rate per 1000 device days.*

Table 6 shows the national rate of CLABSI in Neonatal ICU and the Central Line Utilization Ratio. The national rate of CLABSI was 3.53 per 1000 central line days and the Central Line Utilization Ratio was 0.22. The CLABSI rate was highest in Aseer region (12.17) and Al-Gunfudah (11.76), and lowest in Al-Jouf (0.36) and Al-Qurayyat (0) regions.

Unit	Patients Days	UC Days	CAUTI Event	CAUTI Rate*	DUR
Burn	1329	1021	4	3.91	0.76
Pediatric Medical	38308	6942	9	1.29	0.18
Pediatric Medical Surgical	66700	19844	18	0.9	0.29
Medical	23199	16982	15	0.88	0.73
Medical/Surgical	396909	307811	209	0.68	0.78
Medical Cardiac	38620	17114	9	0.52	0.44
Surgical Cardiothoracic	6868	6163	3	0.48	0.89

Table 7: Catheter-associated Urinary Tract Infection Rates and Ratios per type of ICU, 2023. **Rate per 1000 device days.*

Table 7 shows CAUTI rates and urinary Catheter Utilization Ratios per type of ICU. CAUTI Rate was highest in the Burn unit with 3.91 per 1000 Urinary catheter days could be due to a lower number of device days presented while the rate is lowest in the Surgical Cardiothoracic unit with 0.48 per 1000 Urinary catheter days. The device utilization ratio was highest in Surgical Cardiothoracic with 0.89.

Unit/Region	Patient Days	FC Days	CAUTI Event	CAUTI Rate*	DUR
Al-Qurayyat	2695	2068	3	1.8	0.77
Hafrel-Batin	11327	8187	12	1.44	0.72
Al-Baha	10818	9343	13	1.36	0.86
Eastern Region	21830	17877	22	1.18	0.82
Al-Gunfudah	6089	3486	4	1.08	0.57
Al-Madinah	29879	24174	22	0.91	0.81
Al-Ahsa	21139	12158	8	0.84	0.58
Jeddah	31760	28933	23	0.79	0.91
Northern Border	9488	6439	5	0.78	0.68
Al-Riyadh	53871	42083	25	0.74	0.78
Tabouk	16531	9060	5	0.64	0.55
Aseer	25028	19273	12	0.63	0.77
Makkah	41933	35564	22	0.62	0.85
Najran	22457	12451	6	0.62	0.55
Al-Jouf	8627	6550	3	0.46	0.76
Hayel	13135	11030	6	0.4	0.84
Al-Qaseem	32345	25759	8	0.31	0.80
Jazan	19638	17797	6	0.31	0.91
Al-Tayef	13177	11205	3	0.27	0.85
Besha	5142	4374	1	0.23	0.85
Total (national data)	396909	307811	209	0.68	0.78

Table 8: Catheter-associated Urinary Tract Infection Rates and Ratios in Adult ICUs per region, 2023.
**Rate per 1000 device days.*

Table 8 shows the national rate of CAUTI in Adult Medical Surgical ICU and Urinary Catheter Utilization Ratio in all regions. The national rate of CAUTI is 0.68 per 1000 urinary catheter days and the Urinary catheter Utilization Ratio was 0.78. The highest rate of CAUTI is in Al-Qurayyat region at 1.80 and Hafer al-Batin at 1.44 and the lowest in Besha at 0.23.

Unit/Region	Patients Days	FC Days	CAUTI Event	CAUTI Rate*	DUR
Aseer	6916	2495	8	3.25	0.35
Tabouk	2418	518	1	1.9	0.21
Eastern Region	7935	2185	2	0.91	0.27
Al-Riyadh	12328	2867	2	0.69	0.23
Al-Qaseem	5485	1606	1	0.62	0.29
Al-Madinah	10053	4906	3	0.61	0.48
Jazan	4921	2001	1	0.49	0.4
Al-Ahsa	3696	784	0	0	0.21
Al-Baha	1485	130	0	0	0.08
Al-Qurayyat	2444	146	0	0	0.05
Hafrel-Batin	938	116	0	0	0.12
Hayel	1708	411	0	0	0.24
Makkah	3904	1323	0	0	0.33
Najran	725	93	0	0	0.12
Besha	1744	263	0	0	0.15
Total (national data)	66700	19844	18	0.90	0.29

Table 9: Catheter-associated urinary Tract Infection Rates and Ratios in Pediatric ICUs per region, 2023. **Rate per 1000 device days.*

Table 9 shows the national rate of CAUTI and Urinary Catheter Utilization Ratio in Pediatric Medical-Surgical ICUs. The national rate is 0.90 per 1000 Urinary catheter days and the Urinary catheter Utilization Ratio was 0.29. CAUTI Rate was highest in Aseer region (3.25) and zero in Al-Baha, Al-Ahsa, Al-Qurayyat, Makkah, Najran, Hayel, Hafer al-Batin, and Besha regions.

UNIT	Patients Days	Vent Days	VAE	VAE Rate*	DUR
Burn	1329	184	2	10.86	0.13
Medical/Surgical	396909	205390	958	4.66	0.51
Medical	23199	9696	41	4.22	0.41
Medical Cardiac	38620	6883	29	4.21	0.17
Surgical Cardiothoracic	6868	6033	5	0.82	0.87

Table 10: Ventilator-Associated Event Rate and Device Utilization Ratio per type of Adult ICUs, 2023.
**Rate per 1000 device days.*

Table 10 shows VAE rates and Ventilator Utilization Ratios per type of ICU. VAE rates were highest in the Burn unit with 10.86 per 1000 ventilator days indicating a higher risk of ventilator-associated complications compared to other ICUs, and lowest in the Surgical Cardiothoracic unit with 0.82 per 1000 ventilator days.

Unit/Region	Patients Days	Vent. Days	VAE	VAE Rate*	DUR
Al-Tayef	13177	7432	73	9.82	0.56
Eastern Region	21830	12581	99	7.87	0.58
Aseer	25028	12076	93	7.7	0.48
Makkah	41933	24473	156	6.37	0.58
Besha	5142	2248	14	6.23	0.44
Al-Riyadh	53871	30916	167	5.4	0.57
Jeddah	31760	21013	108	5.14	0.66
Northern Border	9488	3378	17	5.03	0.36
Najran	22457	8147	39	4.79	0.36
Al-Baha	10818	5314	24	4.52	0.49
Tabouk	16531	6967	22	3.16	0.42
Al-Ahsa	21139	9088	25	2.75	0.43
Jazan	19638	13174	32	2.43	0.67
Al-Gunfudah	6089	2103	5	2.38	0.35
Al-Jouf	8627	3659	8	2.19	0.42
Al-Qaseem	32345	15569	34	2.18	0.48
Hafrel-Batin	11327	6854	11	1.6	0.61
Al-Madinah	29879	14019	22	1.57	0.47
Hayel	13135	4895	7	1.43	0.37
Al-Qurayyat	2695	1484	2	1.35	0.55
Total (national data)	396909	205390	958	4.66	0.52

Table 11: Ventilator-Associated Event Rate and Device Utilization Ratio in Adult ICUs per region, 2023. **Rate per 1000 device days.*

Table 11 shows the VAE rate and Ventilator Utilization Ratio in Adult Medical-Surgical ICUs in the Kingdom. The national VAE rate was 4.66 per 1000 ventilator days and the Device Utilization Ratio was 0.52. The VAE rate was highest in Al-Tayef region with 9.82 per 1000 ventilator days potentially due to improper implementation of the VAE Prevention Bundle as one factor. Meanwhile, Al-Qurayyat and Hayel have low VAE rates, at 1.35 and 1.43 per 1000 ventilator days respectively. One reason might be a lack of knowledge in identifying VAE correctly or could also be the effective application of preventive bundles helped in the decrease of VAE rates.

UNIT	Patients Days	Vent Days	VAE	VAE Rate*	DUR
Neonatal Intensive Care	379797	68888	104	1.50	0.18
Pediatric Medical	38308	16254	21	1.29	0.42
Pediatric Medical Surgical	66429	23198	53	2.28	0.34

Table 12: Pediatric Ventilator-Associated Event Rates and Ratios per type of ICU, 2023. **Rate per 1000 device days.*

Table 12 shows Pediatric VAE rates and Ventilator Utilization Ratios per type of ICU. The VAE rate was highest in Pediatric Medical Surgical with 2.28 per 1000 ventilator days, and lowest in Pediatric Medical with 1.29 per 1000 ventilator days. The Ventilator Utilization ratio was highest in Pediatric Medical with 0.42, while the lowest was in Neonatal Intensive Care with 0.18.

Unit/Region	Patients Days	Vent. Days	VAE	VAE Rate*	DUR
Aseer	6916	2354	15	6.37	0.34
Al-Madinah	10053	4072	19	4.71	0.4
Al-Qaseem	5484	1437	5	3.47	0.26
Makkah	3904	1723	4	2.32	0.44
Eastern Region	7935	3069	6	1.95	0.38
Al-Ahsa	3696	1255	2	1.59	0.33
Al-Riyadh	12328	2406	2	0.83	0.19
Al-Baha	1485	719	0	0	0.48
Al-Qurayyat	2444	879	0	0	0.35
Hafrel-Batin	938	240	0	0	0.25
Hayel	1708	248	0	0	0.14
Jazan	4921	2569	0	0	0.52
Najran	725	217	0	0	0.29
Besha	1744	587	0	0	0.33
Tabouk	2148	1423	0	0	0.66
Total (national data)	66429	23198	53	2.28	0.34

Table 13: Pediatric Ventilator-Associated Event Infection Rates and Ratios in Pediatric ICUs per region, 2023. **Rate per 1000 device days*

Table 13 shows the Pediatric VAE rate and Ventilator Utilization Ratio in Pediatric Medical-Surgical ICUs in all regions. The national rate of Pediatric VAE was 2.28 per 1000 ventilator days and the Ventilator Utilization Ratio was 0.34. The VAE rate was highest in Aseer region with a rate of 6.37 per 1000 ventilator days and Zero VAE in Al-Baha, Al-Qurayyat, Hafer al-Batin, Hayel, Jazan, Najran, Besha and Tabouk regions. Approximately 53% among regions have no reported Pediatric VAE cases in their Pediatric Medical-Surgical ICUs. This could be due to the need for more training to better understand the Pediatric VAE Surveillance.

Unit/Region	Patients Days	Vent. Days	VAE	VAE Rate*	DUR
Al-Baha	8821	1843	15	8.13	0.20
Aseer	25933	4475	16	3.57	0.17
Najran	9571	1482	5	3.37	0.15
Hafrel-Batin	11249	2984	8	2.68	0.26
Eastern Region	17026	5866	13	2.21	0.34
Al-Jouf	10082	1431	3	2.09	0.14
Al-Qurayyat	10044	1042	2	1.91	0.10
Al-Riyadh	57365	7433	13	1.74	0.12
Hayel	21657	1751	3	1.71	0.08
Makkah	27436	5479	8	1.46	0.19
Al-Tayef	33036	3737	5	1.33	0.11
Al-Madinah	32199	7027	6	0.85	0.21
Al-Qaseem	29743	4139	3	0.72	0.13
Jeddah	18379	3183	2	0.62	0.17
Tabouk	13783	3526	2	0.56	0.25
Al-Ahsa	12136	2989	0	0	0.24
Jazan	19538	7079	0	0	0.36
Besha	7113	1810	0	0	0.25
Al-Gunfudah	3985	367	0	0	0.09
Northern Border	10701	1245	0	0	0.11
Total (national data)	379797	68888	104	1.50	0.18

Table 14: Pediatric Ventilator-Associated Event Rates and Ratios in Neonatal ICUs per region, 2023. **Rate per 1000 device days*

Table 14 shows the VAE rate and Ventilator Utilization Ratio in Neonatal ICUs in all regions of the Kingdom. The national rate of VAE was 1.50 per 1000 ventilator days and the Ventilator Utilization Ratio was 0.18. The highest rate of VAE was in Al-Baha with 8.13 per 1000 ventilator days and 0 in Al-Ahsa, Besha, Al-Gunfudah, Jazan and Northern border. This means that approximately 25% of regions have no reported VAE cases in their Neonatal Intensive Care ICUs and could also be due to the need for more training in proper identification of Neonatal VAEs.

	NHSN	**GCC**	**INICC**	**MOH**
CLABSI				
Adult Medical Surgical	0.8	2.6	4.93	1.68
Pediatric Medical Surgical	1.2	3.1	6.07	2.98
Neonatal ICU	1.12	5	5.17	3.53
CAUTI				
Adult Medical Surgical	1.71	3.3	5.34	0.68
Pediatric Medical Surgical	2.5	N/A	5.6	0.90
VAE				
Adult Medical Surgical ICU	7.76	-	-	4.66
Pediatric Medical Surgical	-	-	-	2.28
Neonatal ICU	-	-	-	1.50

NHSN: National Health Safety Network **(2013-2014).**
GCC: Gulf Cooperation Council **(2008-2013).**
INICC: International Nosocomial Infection Control Consortium **(2007-2012).**
MOH: Current Ministry of Health.

Table 15. National and International Benchmarks (NHSN, GCC, INICC & MOH), 2023.

Table 15 shows the benchmarking of device-associated HAIs of MOH hospitals in 2023 with international benchmarks. The CLABSI rates were higher than NHSN, and lower than INICC, and GCC rates. CAUTI rates were lower than all benchmarking rates. VAE rates were lower than NHSN rates, which is the only available benchmark.

4.4 DEVICE- ASSOCIATED INFECTIONS (OUTPATIENTS)

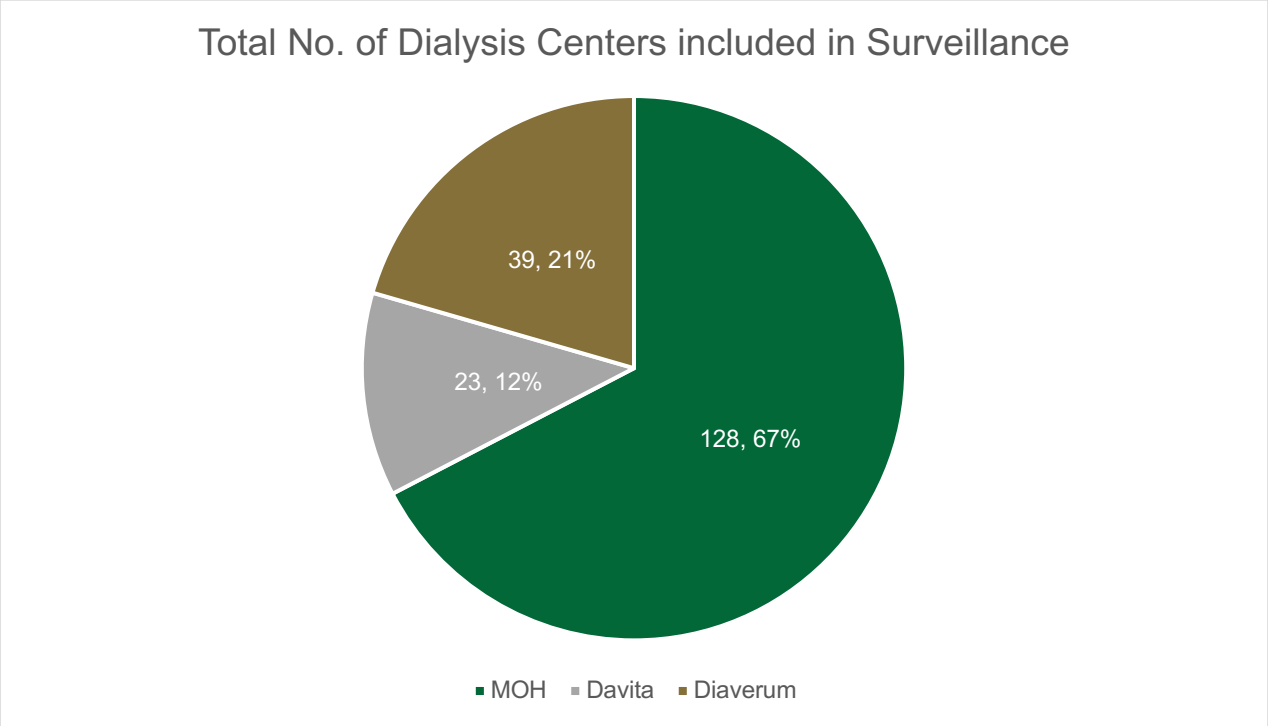


Figure 16. Data of Dialysis Centers (No.; %), 2023.

Figure 16 shows that there was a total of 190 Dialysis centers active in surveillance in the year 2023. Out of 190, MOH have 128 total number of dialysis centers while Private sector, Davita and Diaverum, have 23, and 39 respectively.

Region	Number of patient months	Number of events	Dialysis event rate*
Al-Qurayyat	755	35	4.63
Al-Riyadh	24975	1079	4.32
Eastern Region	4835	176	3.64
Al-Ahsa	3107	103	3.31
Al-Qaseem	2960	85	2.87
Northern Border	1548	44	2.84
Al-Baha	2319	59	2.54
Hafrel-Batin	1596	32	2.00
Aseer	2208	39	1.76
Al-Madinah	5662	99	1.74
Najran	2540	41	1.61
Jazan	5566	75	1.34
Tabouk	2748	35	1.27
Al-Tayef	1756	18	1.02
Al-Jouf	1850	18	0.97
Jeddah	1454	14	0.96
Besha	1744	15	0.86
Makkah	5617	40	0.71
Hayel	5302	20	0.37
Davita	36390	318	0.87
Diaverum	45107	315	0.69
Total	160039	2660	1.66

Table 17. Rates of Dialysis Events per Regions, Davita, and Diaverum, 2023. **Rate per 100 patient months*

Table 17 shows the national rate of dialysis events in all the regions of the Kingdom. The national rate of dialysis event is 1.66 per 100 patient months. The dialysis event rate was highest in Al-Qurayyat (4.63) and lowest in Hayel, Makkah and Besha regions, at (0.37) and (0.86) respectively.

As per private dialysis centers, Davita dialysis centers has higher dialysis event rate of 0.87 compared to Diaverums' rate of 0.69 per 100 patient months.

Names of Operative Procedures	Total no. of Procedures	SSI Events	SSI Rate*	NHSN
Coronary artery bypass grafting (CBGC/CBGB)	1506	36	2.39	2.94
Cardiac Surgery (CARD)	389	8	2.06	1.84
Caesarian Section (CSEC)	57731	522	0.9	3.82
Fixation (FX)	3674	24	0.65	3.36
Appendectomy (APPY)	5421	25	0.46	3.47
Cholecystectomy (CHOL)	5519	8	0.14	1.72

Table 18: Total numbers and rates of Surgical Site Infections per procedure, 2023. **Rate per 100 procedures*

Table 18 shows SSI rates in MOH hospitals for selected surgeries in 2023 with NHSN benchmark. A total of 623 SSI events was detected during surveillance of 6 surgeries. The highest SSI rate was associated with Coronary Artery Bypass Grafting (2.39) and lowest was associated with cholecystectomy (0.14). All SSI rates were found to be lower than the NHSN benchmarks.

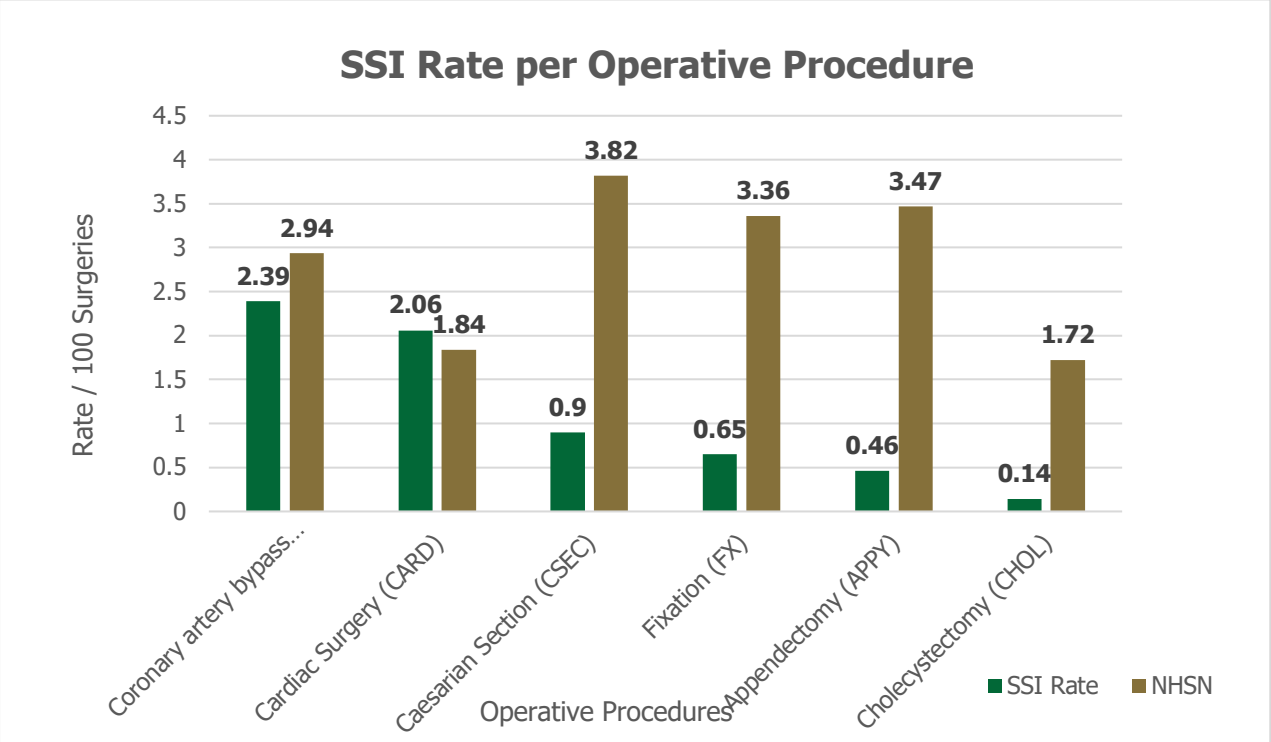


Figure 18: SSI rates in MOH 2023 and NHSN (2006-2008)

4.5 TREND OF HEALTHCARE-ASSOCIATED INFECTIONS, 2023.

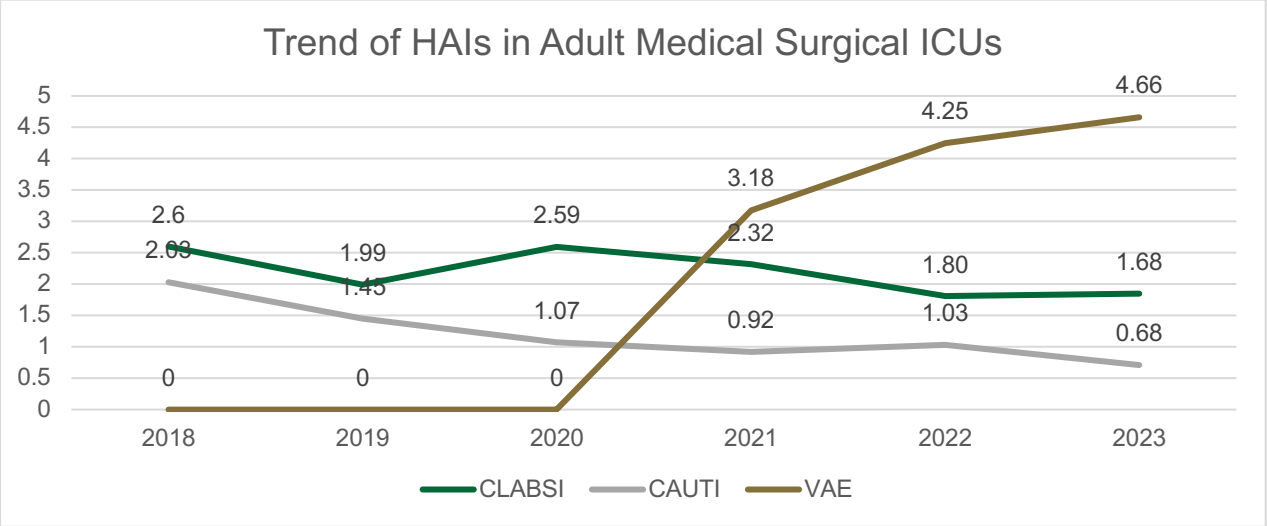


Figure 19: Trend of Healthcare-Associated Infections (Rates) in Adult Medical Surgical ICU, 2018-2023.

Figure 19 shows device-associated HAI rate trends in adult medical surgical ICUs in MOH hospitals from 2018 to 2023. CLABSI decreased by 7% in 2023 vs 2022, while CAUTI decreased by 33% which could be due to the implementation of Preventive Strategies CLABSI Rate Reduction Strategy (CRRS) and CAUTI Out of Nation (CAUTION), while VAE increased by 9% potentially due to a better understanding of VAE Surveillance definition that could lead to increased reporting of events.

Year	CLABSI	CAUTI	VAE
2018	2.58	1.04	-
2019	2.23	0.48	-
2020	1.45	0.2	-
2021	3.72	0.67	-
2022	3.83	1.45	-
2023	2.98	0.90	2.28

Table 20: Table of Healthcare-Associated Infections (Rates) in Pediatric Medical Surgical ICU, 2018- 2023.

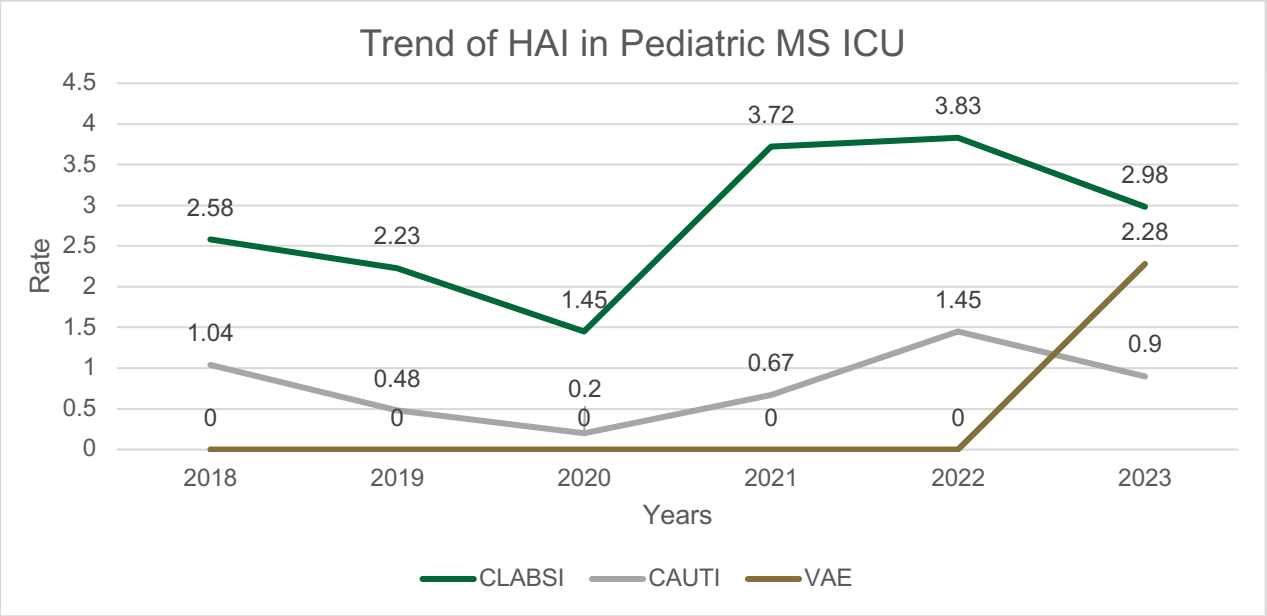


Figure 20: Trend of Healthcare-Associated Infections (Rates) in Pediatric Medical Surgical ICUs, 2018-2023.

Figure 20 shows the trend of healthcare-associated infections in the pediatric medical-surgical ICU. The CLABSI rate decreased by 22% during the year 2023 compared to 2022 and the CAUTI rate decreased by 38%. Better Compliance with preventive tools could be a factor. VAE module is recently implemented in Pediatric ICUs.

Year	CLABSI	VAE
2018	6.61	-
2019	4.52	-
2020	2.9	-
2021	3.87	-
2022	3.74	-
2023	3.53	1.50

Table 21. Table of Healthcare-Associated Infections (Rates) in Neonatal ICU, 2018- 2023.

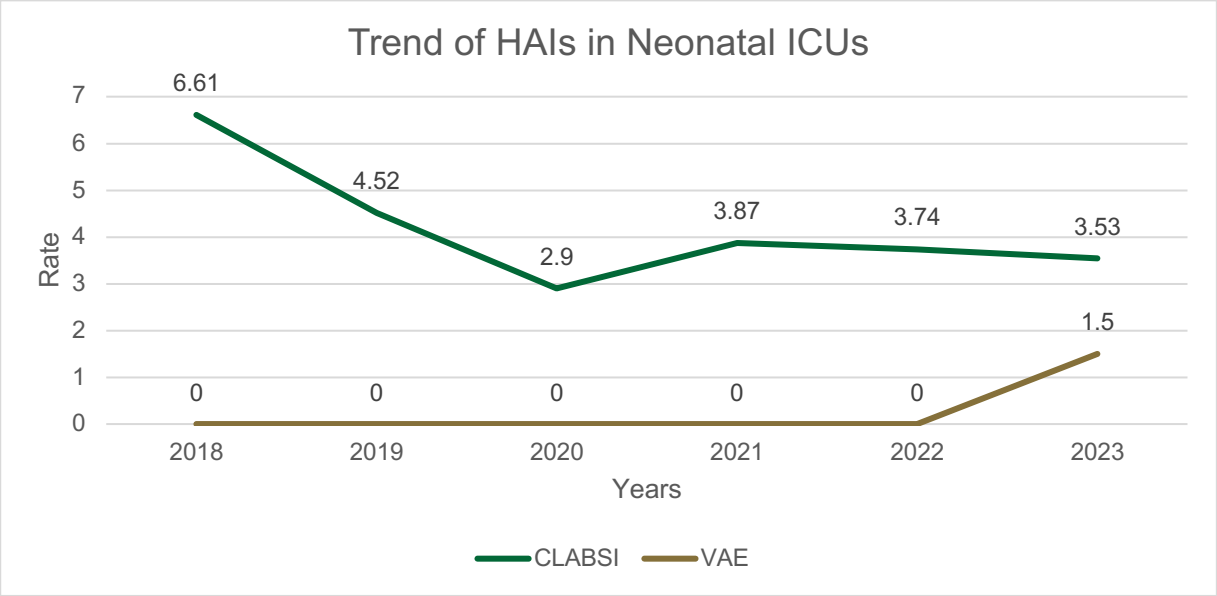


Figure 21: Trend of Healthcare-Associated Infections (Rates) in Neonatal ICU, 2018- 2023.

Figure 21 shows the trend of healthcare-associated infections in neonatal ICU. The CLABSI rate decreased by 5% during 2023 as compared to 2022. It could be due to increased awareness after the implementation of Prevention Tools and strategy in adult critical care units but with some considered variations. VAE module is recently implemented in NICUs.

Name of MDROs	Number (n)	Rank
CRE – Carbapenem Resistant Enterobacteriaceae	1004	1
MRSA – Methicillin-Resistant Staphylococcus aureus	966	2
MDR Klebsiella	773	3
MDR Acinetobacter	758	4
MDR Pseudomonas	309	5
Candida auris	282	6
VRE – Vancomycin Resistant Enterococcus	89	7
CephR –Cephalosporin Resistant Klebsiella	67	8

Table 22: MDRO Data in MOH Hospitals, 2023.

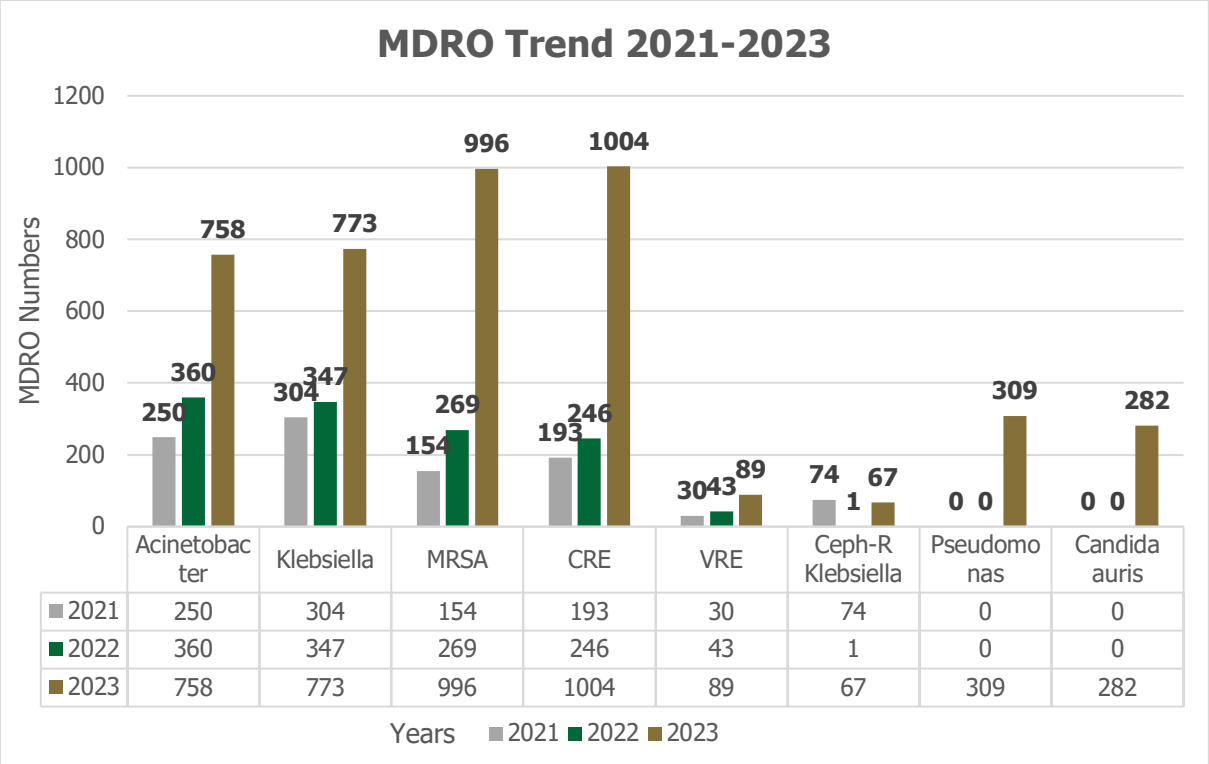


Figure 22 A: Trend of Multidrug-Resistant Organisms, 2021- 2023.

Figure 22 A shows the trend of MDRO Incidence from 2021 to 2023. There is a huge difference in the number of total incidences of MDRO between 2022 and 2023. The number of MDROs identified in the year 2023 was two times more than the previous year 2022. This possibly could be due to the increased knowledge on proper identification of MDRO in the hospital with constant follow-up for any incidence of outbreak related MDRO from the Outbreak team. Several courses and trainings were given to raise awareness of MDRO Prevention which could be also an added reason.

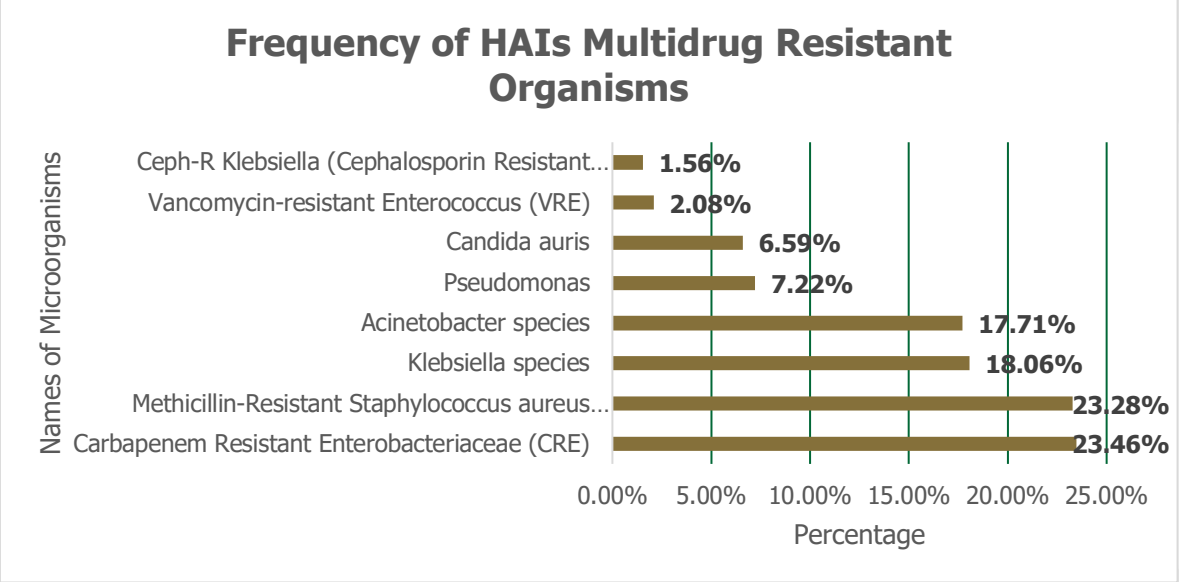


Figure 22 B: Frequency of Multidrug-Resistant Organisms.

Figure 22 B shows the Frequency of Multidrug – Multidrug-resistant organisms with Carbapenem Resistant Enterobacteriaceae (CRE) as the most frequent organism reported with 23.46%, followed by MRSA. The least frequent reported organism is Cephalosporin Resistant Klebsiella (Ceph-R Klebsiella) with 1.56%.

UNIT	Patients Days	CL Days	CLABSI Event	CLABSI Rate*	DUR
Medical	295122	80258	60	0.75	0.27
Medical Cardiac	52966	6250	4	0.64	0.12
Medical/Surgical	194941	54059	40	0.74	0.28
Neonatal Intensive Care	128568	27778	27	0.97	0.22
Pediatric Medical Surgical	124032	12850	9	0.70	0.10
Surgical Cardiothoracic	6863	1589	0	0	0.23

Table 23: Central Line-Associated Bloodstream Infection Rates and Ratios per type of ICU in Private Hospitals, 2023. **Rate per 1000 device days*

Table 23 shows CLABSI rates and Central Line Utilization Ratios per type of ICU in Private Hospitals of the Kingdom. The CLABSI rate was per 1000 central line days highest in NICU at 0.97 per 1000 central line days and lowest with a Zero rate in Surgi Cardiothoracic. Central Line Utilization Ratio was highest in Medical with 0.27 which could be due to the most common available units in private hospitals.

UNIT	Patients Days	FC Days	CAUTI Event	CAUTI Rate*	DUR
Medical Cardiac	52966	16766	17	1.01	0.32
Medical	295122	175853	63	0.36	0.60
Medical/Surgical	194941	103165	30	0.29	0.53
Pediatric Medical Surgical	124032	5029	1	0.20	0.04
Surgical Cardiothoracic	6863	1879	0	0	0.27

Table 24: Catheter-associated urinary tract Infection Rates and Ratios per type of ICU in Private Hospitals, 2023. **Rate per 1000 device days.*

Table 24 shows CAUTI rates and urinary catheter utilization ratios by type of ICU in Private Hospitals of the Kingdom. The CAUTI rate was highest in Medical Cardiac at 1.01, and lowest at 0 in Surgical Cardiothoracic.

UNIT	Patients Days	Vent Days	VAE	VAE Rate*	DUR
Medical/Surgical	194941	65111	49	0.75	0.33
Medical	295122	118418	75	0.63	0.40
Medical Cardiac	52966	6510	3	0.46	0.12
Pediatric Medical Surgical	124032	48734	20	0.41	0.39
Neonatal Intensive Care	128568	24313	5	0.21	0.19
Surgical Cardiothoracic	6863	454	0	0	0.07

Table 25: Ventilator-associated events Rates and Ratios per type of ICU in Private Hospitals, 2023. **Rate per 1000 device days.*

Table 25 shows VAE rates and ventilator utilization ratios by type of ICU in Private Hospitals of the Kingdom. The above three tables show the data of Private hospitals, which includes data from the 1st of July 2023.

5. Healthcare-Associated Outbreak & Rapid Response Team (RRT)

5.1. Introduction

The health-Associated Outbreak & Rapid Response Team in the General Directorate of Infection Prevention and Control (GDIPC) monitors and follows up on outbreaks that appear in the healthcare facilities in all the regions of the Kingdom. The program aims to investigate all Healthcare-Associated Outbreaks and any case of Emerging & Re-emerging disease. The department is working to identify, track, and respond to Healthcare-Associated cases in healthcare facilities, using approved GDIPC forms, manual and scientific methods to facilitate documentation of outbreak notification, investigation, and responses.
All the activities were covered 24/7 even during official holidays. (46) Notifications of outbreaks, (36) Notification of Emerging & Re-emerging diseases were received and (6) Supporting visits were conducted during the holidays.

This report summarizes the information related to Healthcare-Associated Outbreaks and cases of Emerging & Re-emerging diseases for the year 2023 and provides national-level Health-Associated Outbreaks and Emerging & Re-emerging diseases data with all challenges during 2023. The report is designed to be accessible to healthcare providers and health organizations. The GDIPC hopes this annual report will help in controlling Health-Associated Outbreaks and preventing them in healthcare facilities.

5.2. Highlights

5.2.1 In 2023, a total of 1938 notifications with cases (3514) were reported to the GDIPC national platform from healthcare facilities as follows:

- **Healthcare-Associated Outbreaks:** 1240 with 2767 cases.
- **Covid-19 outbreaks:** 18 with 67 cases.
- **MERS-CoV:** 5 sporadic cases.
- **Mpox:** 675 sporadic cases.

5.2.2 The GDIPC national platform received a total of (1240) Healthcare-Associated Outbreak notifications in 2023 which increased by 144% compared to 2022 (508 Outbreaks), according to the classification matrix which classify the outbreaks according to the reported number of cases into class A, B, and C.

- **Class A:** 15 outbreaks (1%).
- **Class B:** 57 outbreaks (5%).
- **Class C:** 1168 outbreaks (94%).

5.2.3 Activation of GDIPC and regional health directorates outbreak management team using the official corrective action plans in the national platform according to the class of the outbreaks.

5.2.4 GDIPC support visits:

- 3 outbreaks class B.
- 11 outbreaks class A.
- Outbreak assessment (discover 28 unreported healthcare-associated outbreaks).

5.2.5 The department received notifications of outbreaks from all regions, 117 from MOH healthcare facilities, 52 from private healthcare facilities, and 2 from governmental non-MOH healthcare facilities.

5.2.6 67% of the Healthcare-Associated Outbreaks occurred in adult ICUs.

5.2.7 The most reported microorganisms causing outbreaks in 2023 were:

- **Candida auris:** 551 out of the 1240 notifications (44%)
- **Klebsiella pneumoniae (CRE, ESBLS):** 224 out of the 1240 notifications (18%).
- **Acinetobacter Baumannii**: 176 out of the 1240 notifications (14%).
- **Clostridium difficile:** Among the 1240 healthcare-associated outbreaks, 38 notifications (3%) were recorded in 2023, emphasizing the significance of closely monitoring these germs.
- **Viral infections:**
  - **Measles:** 2 notifications with 9 cases.
  - **Chickenpox:** 4 notifications with 14 cases.
  - **Rotavirus:** 1 notification with 3 cases.
- **Other Organisms:** 244 out of the 1240 notifications (20%).

5.2.8 The overall percentage of death that associated with outbreaks was 34%, however association does not mean causation.

5.2.9 Among 675 cases of Mpox there are No reported case associated with death, and 5 cases of MERS-CoV reported cases associated with only 1 reported death.

5.2.10 The notification of zero reporting healthcare facilities was Improved during 2023 as 44 healthcare facilities were targeted last year. 79% of the targeted healthcare facilities were improved in the reporting process. That leads to receiving notifications of outbreaks from all regions.

5.2.11 Al-Riyadh region had the highest number of Healthcare-Associated Outbreaks and cases (344 outbreaks and 601 cases), followed by Jeddah (182 outbreaks and 412 cases).

5.2.12 In 2023, there were 551 Candida auris outbreaks with 820 cases (notification process of outbreak applied from the first case), while in 2022, there were 146 outbreaks with 345 cases, indicating a noticeable increase.

5.2.13 Regions reported 551 Candida auris notifications out of 1240 (44.4%), Candida auris cases reported cases represents (30%) with 820 cases.

5.2.14 Al-Riyadh region reported the highest number of Candida auris notifications, 276 out of 551 which represent 50%, with 435 cases which represent 53% of the total reported Candida auris 820 cases.

5.2.15 Total received notifications of Candida. auris from healthcare facilities in different sectors:

- **MOH:** 65
- **Private:** 23
- **Governmental non-MOH:** 1

5.3. Implemented improvement activities:

1. Training

1.1. 4 workshops (*Basic Principles of Infection Prevention and Control in Emergency Events Workshop*) for 131 Rapid Response Team members in all regions. The workshop aims to enable the infection control staff to refresh and update their knowledge with up-to-date information about the dealing with Infection Control Emergency Events and methods to be implemented in the Healthcare system. With clear objective which is:

- To promote the scientific and practical level of participants to face Emerging & Remerging disease.
- To enhance the readiness of Infection Control Rapid Response teams.
- To Share the updated international guidelines and national experiences to deal with Emerging & Remerging disease.
- To mount optimal IPC outbreak management using the strategies and actions through a significant approach of Preparedness, readiness, and response.

a. Continuous virtual training for outbreak coordinators (9 courses).

b. Continuous virtual training for IPCs in private healthcare facilities: (5 training courses).

c. Establishment of E-learning modules of healthcare-associated outbreak management through the national GDIPC platform.

2. Conferences

2.1. MOH Mass Gathering, Al-Riyadh.
2.2. 3rd International Infection Prevention and Control IPC 2023, Al-Riyadh.
2.3. 2nd International Antimicrobial Resistance and Infection Control conference, Taif.
2.4. Unleashing value-Centric Quality: Advances in Quality and Infection Control, Riyadh.

3. National outbreaks notification platform

3.1. Enhancement of the national platform in different phases (1st, 2nd, 3rd, and 4th) during 2023.
3.2. Establishment of new user accounts for the private sector in all regions.
3.3. Tracking all healthcare facilities to ensure the activations of the national platform in different level (central, regional and cluster).

4. Projects

4.1. Candida auris Prevention Strategy (CAPS).

5. Guidelines, Policies& Documents

5.1. Health-Associated Outbreaks 2023.
5.2. Candida auris infection control management 2023.
5.3. Candida auris screening policy.
5.4. Candida auris fact sheets.
5.5. Candida auris in the Kingdom of Saudi Arabia (KSA) current situation.
5.6. Most frequently asked questions about Candida auris.
5.7. National plan of Established Candida auris Prevention Strategy.

6. Tools and forms to support the management of Health-Associated Outbreaks

6.1. Outbreaks validation, clarification, and clearance.
6.2. Outbreak class A and B management plan.
6.3. Procedure for collection of patient swaps for Candida auris.
6.4. Candida auris facility assessment.
6.5. Candida auris care elements.
6.6. Candida auris infection prevention and control checklist.
6.7. Corrective action plan for outbreaks class A and B on the national platform
6.8. Healthcare facility assessment for outbreaks class A and B on the national platform.
6.9. Outbreak management action plan (OMAP) for outbreak class C on the national platform.

7. Collaborations

7.1. Emergency Operating Center (EOC) to control and manage epidemiological situations.
7.2. General Directorate for Hospital Affairs to implement improvement projects of outbreaks management.

5.4 Findings

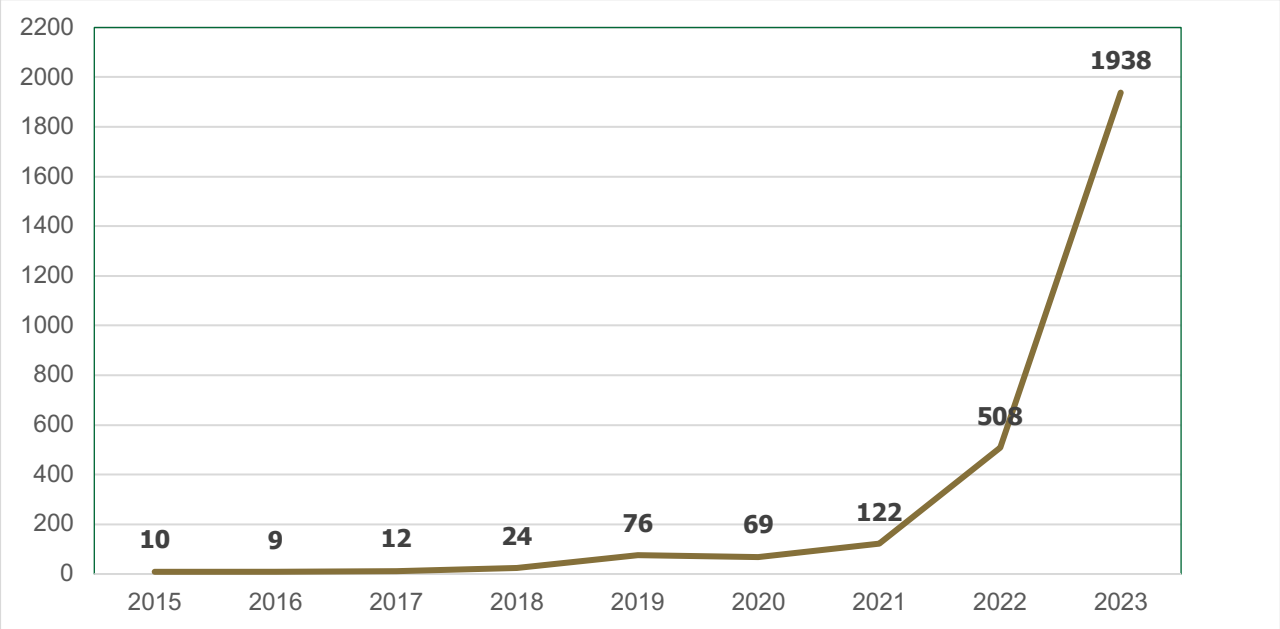


Figure 1: Trend of notifications through the national platform over the years (2015 – 2023).

Figure 1 shows the total number of reported Health-Associated Outbreaks and emerging & re-emerging disease notifications during the years (2015 – 2023).
There was an increase in the number of notifications over the last 8 years. The highest number of notifications was recorded in 2023.

The reported notifications increased from 2022 to 2023 by 144% **due to:**

1. Improvement in the process of training and receiving notifications after updating the policies and guidelines in 2023.
2. Establishment of the GDIPC outbreak national platform.
3. Recording the notifications of Mpox cases on the national platform (675 notifications).
4. Establishment of Candida Auris Prevention Strategy (CAPS).
5. Establishment validation process from both teams in GDIPC and Regional Health Directorate.
6. Improving diagnostic measures used in healthcare facilities' microbiology laboratories.

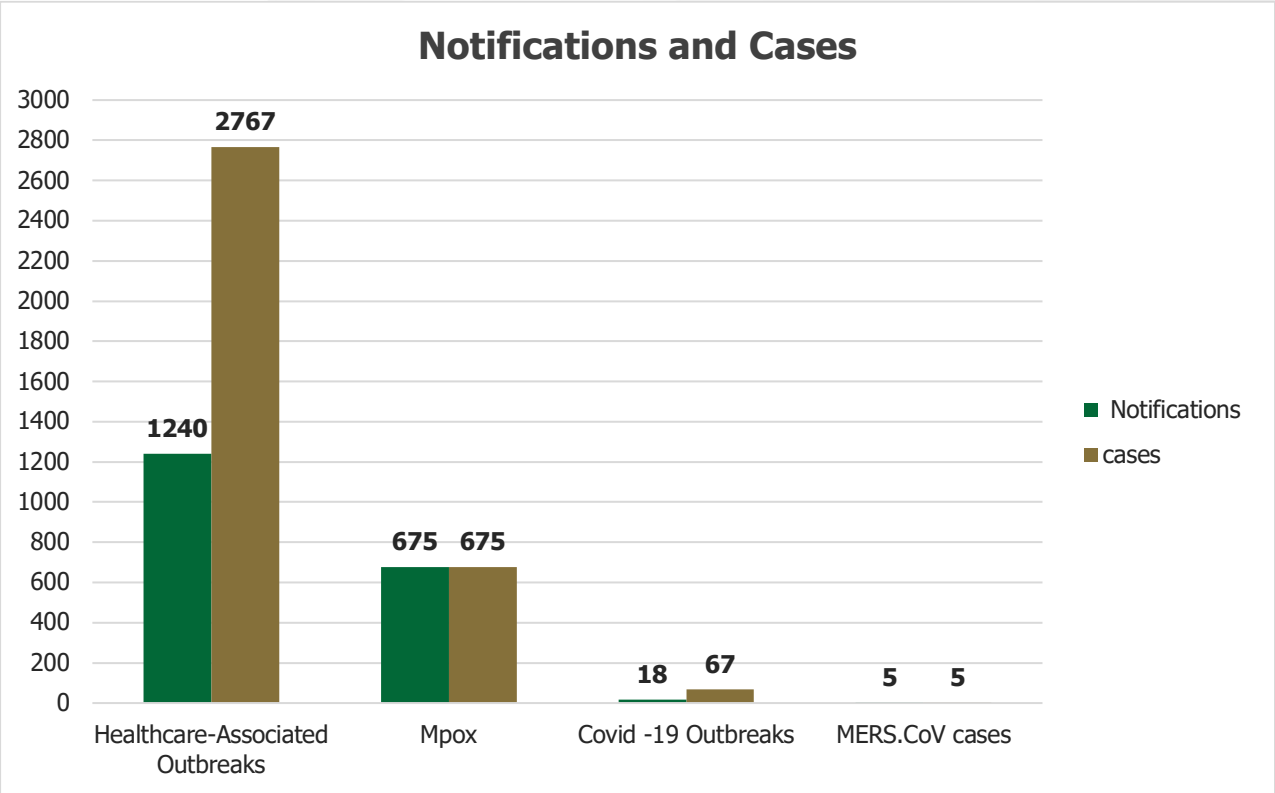


Figure 2: Total Number of notifications and cases (% of total notifications), 2023.

Figure 2 shows a total of 1938 Notifications with 3514 cases were reported to the national platform from healthcare facilities, as follows:

- Health-Associated Outbreaks: 1240 notifications with 2767 cases.
- Covid-19 outbreaks: 18 notifications with 67 cases.
- MERS-CoV: 5 cases & notifications.
- Mpox: 675 cases & notifications.

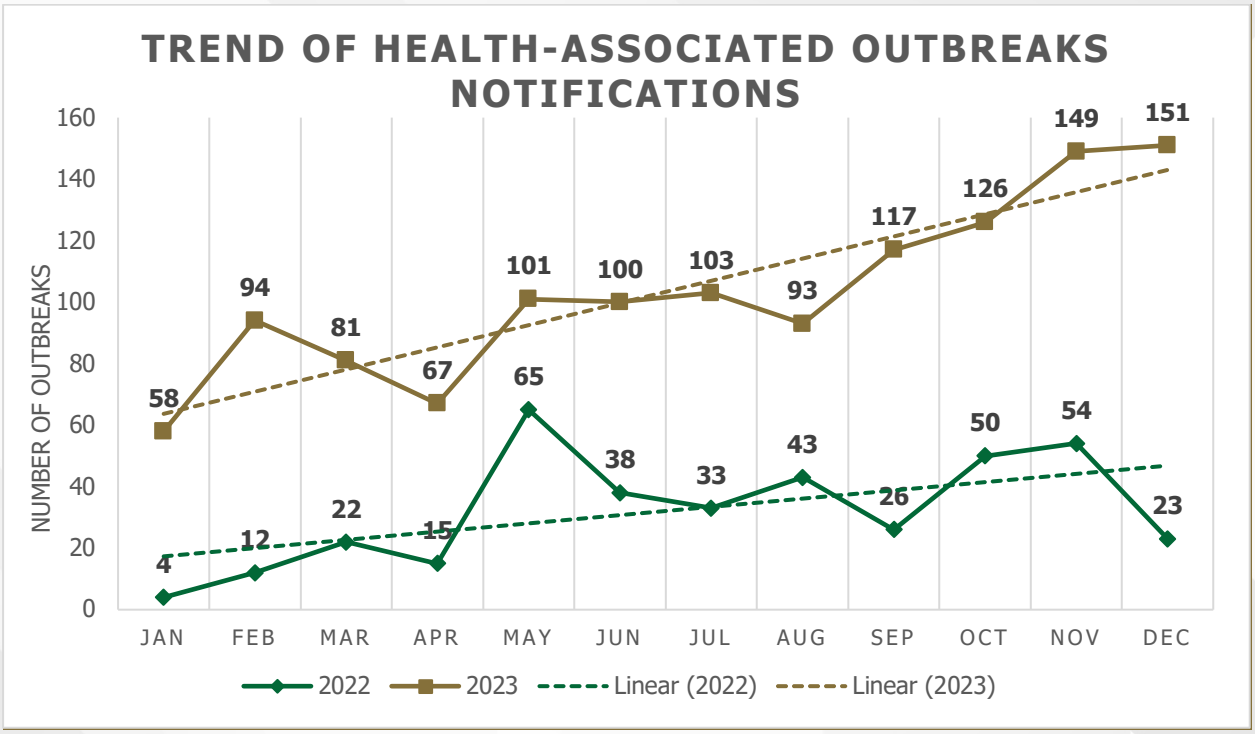


Figure 3: Trend of Health-Associated Outbreaks Notifications per Month, 2022 – 2023.

Figure 3 shows the total number of notifications per month between 2022 and 2023. In 2023, the highest number was recorded in December (151 notifications), and the lowest was recorded in January (58 notifications). There was a notable increase in notifications in most of the months of 2023 compared to 2022. The higher number of notifications in 2023 could be due to the systemic methods used in 2023 to register all notifications on the national platform.

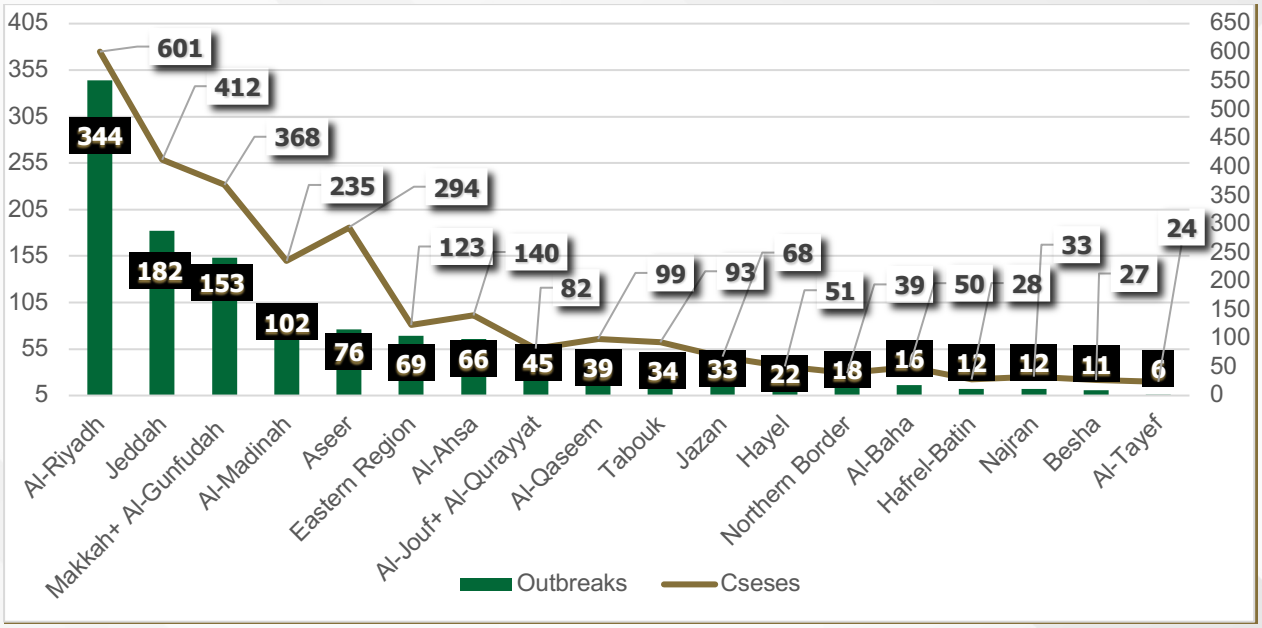


Figure 4: Total Reported Health-Associated Outbreaks and Cases per Region in 2023.

Figure 4 shows that during 2023, All the regions have reported outbreaks to the GDIPC. The highest number of outbreaks and cases was recorded in Al-Riyadh (344 confirmed outbreaks and 601 cases), followed by Jeddah (182 confirmed outbreaks and 412 cases). That might be related to the high number of healthcare facilities in both regions.

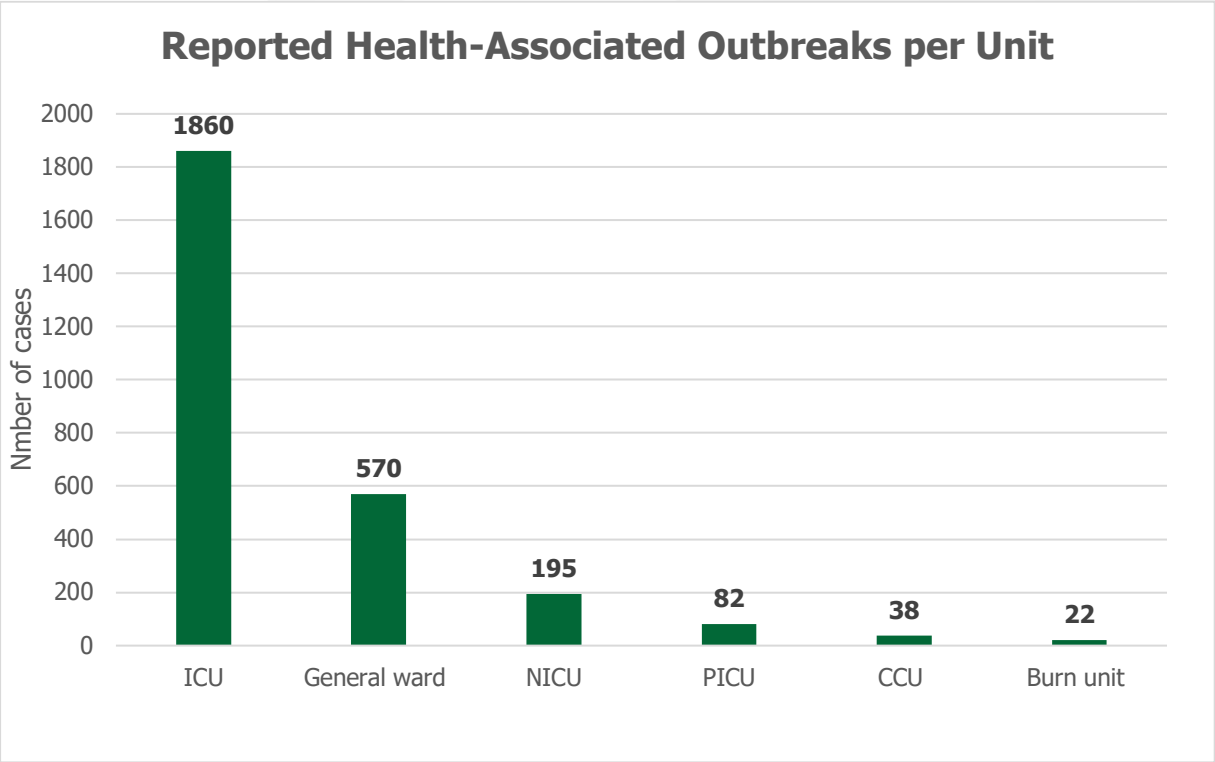


Figure 5: Distribution of Reported Health-Associated Outbreaks per Unit, 2023.

ICU: Intensive Care Unit.
CCU: Coronary Care Unit.
NICU: Neonatal Intensive Care Unit.
PICU: Pediatric Intensive Care Unit.
General ward: (FMW: Female Medical Ward, MSW: Male Surgical Ward...etc.).

In 2023, adult ICU recorded the highest number of cases (67% of all cases), followed by General wards (46% of cases) as showed in figure 5. Critical situation and increase the need of invasive devices for patients in ICUs could explain the high number of received notifications.

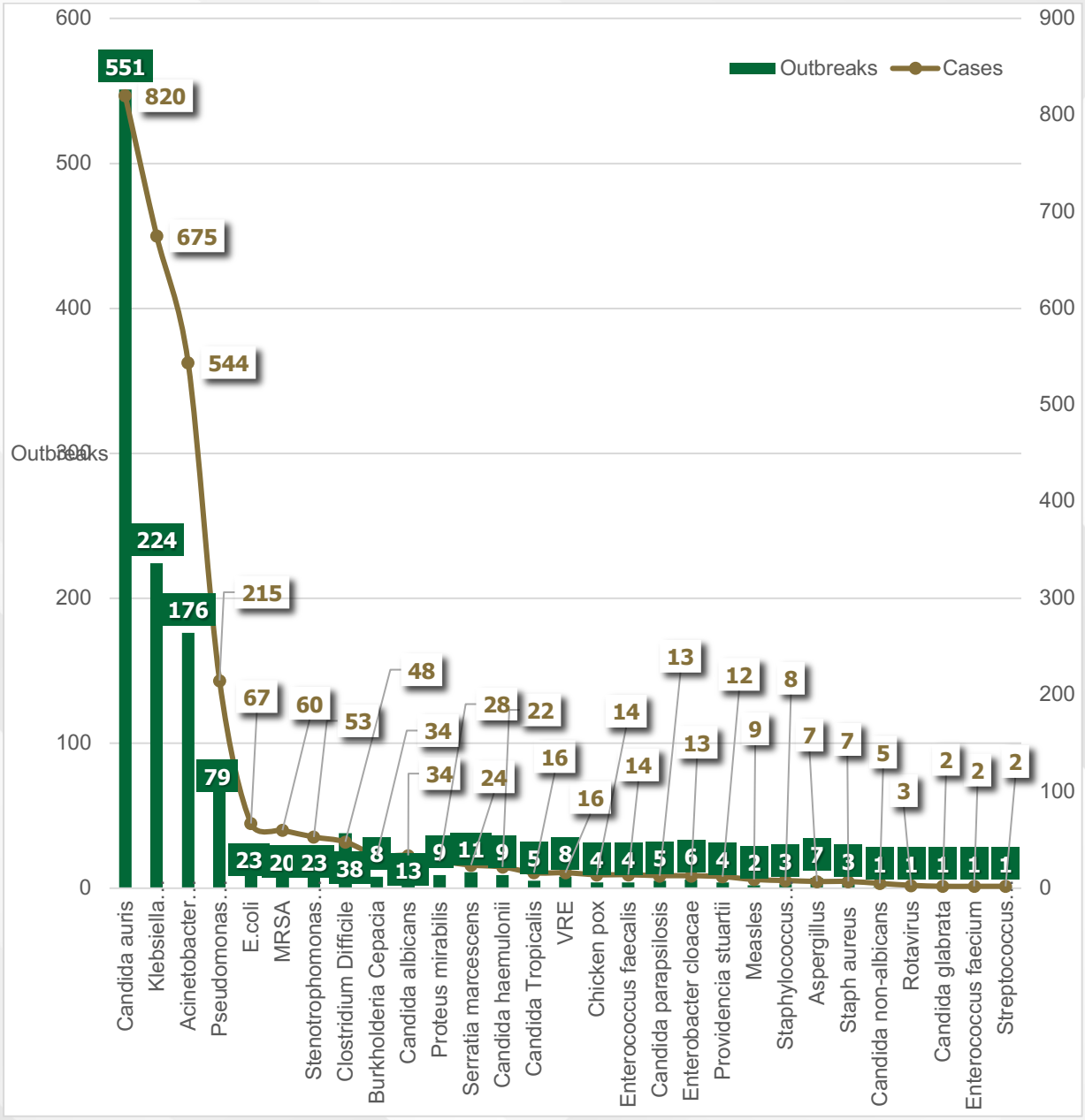


Figure 6: Total Health-Associated Outbreaks and cases per Isolated microorganisms, 2023.

A total of 29 different microorganisms were identified during 2023 notifications (Figure 6). The most reported microorganisms related to outbreaks in healthcare facilities were Candida auris (551, 44.4%), Klebsiella pneumoniae (224, 18%), and Acinetobacter baumannii (176, 14.1%), while other microorganisms accounted for (289, 23%) of total reported outbreaks.

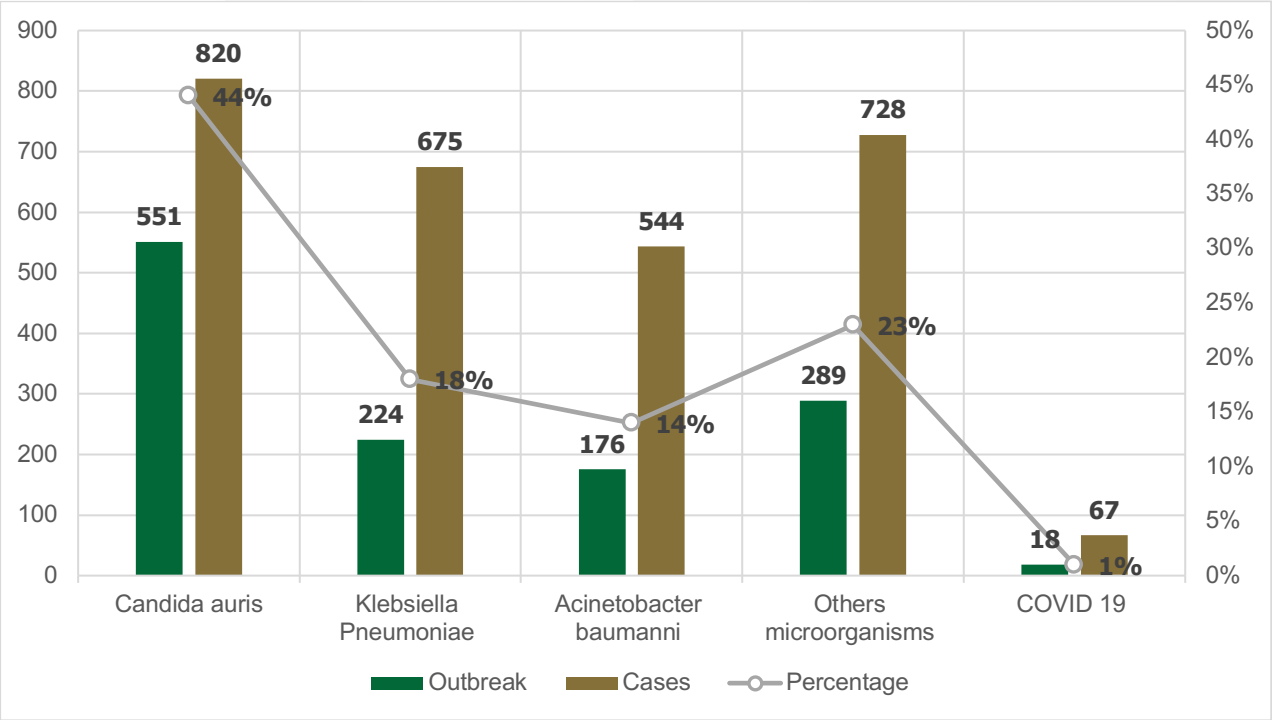


Figure 7: The Highest Recorded Microorganisms in Outbreaks, 2023.

Figure 7 shows Out of the 1258 reported notifications of Health-Associated Outbreaks and Covid-19 outbreaks, 44% (551) were caused by Candida auris, Klebsiella pneumoniae (CRE, ESBLS) represents 18% (224). Acinetobacter Baumannii with (176) notifications represents14%. Other organisms were responsible for 23% (298 notifications). There were also 18 outbreaks of Covid-19, with a total of 67 cases.

Microorganisms	Number of Outbreaks 2022	Number of Cases 2022	Number of Outbreaks 2023	Number of Cases 2023
Candida auris	146	345	551	820
Klebsiella Pneumoniae (CRE & ESBLs)	105	358	224	675
Acinetobacter bumannii	75	256	176	544
Other microorganisms	59	153	289	728
Total	385	1112	1240	2767

Table 1: Total Reported Health-Associated Outbreaks by Most Common Pathogens 2022-2023.

In 2023, the most reported microorganism associated with outbreaks was Candida auris, with a more than twofold increase in notifications in comparison to 2022. The increase in notifications and cases is attributed to several factors, including better resource availability, updated guidelines and policies, implementation of the national strategies, and enhanced diagnostic measures in laboratories.

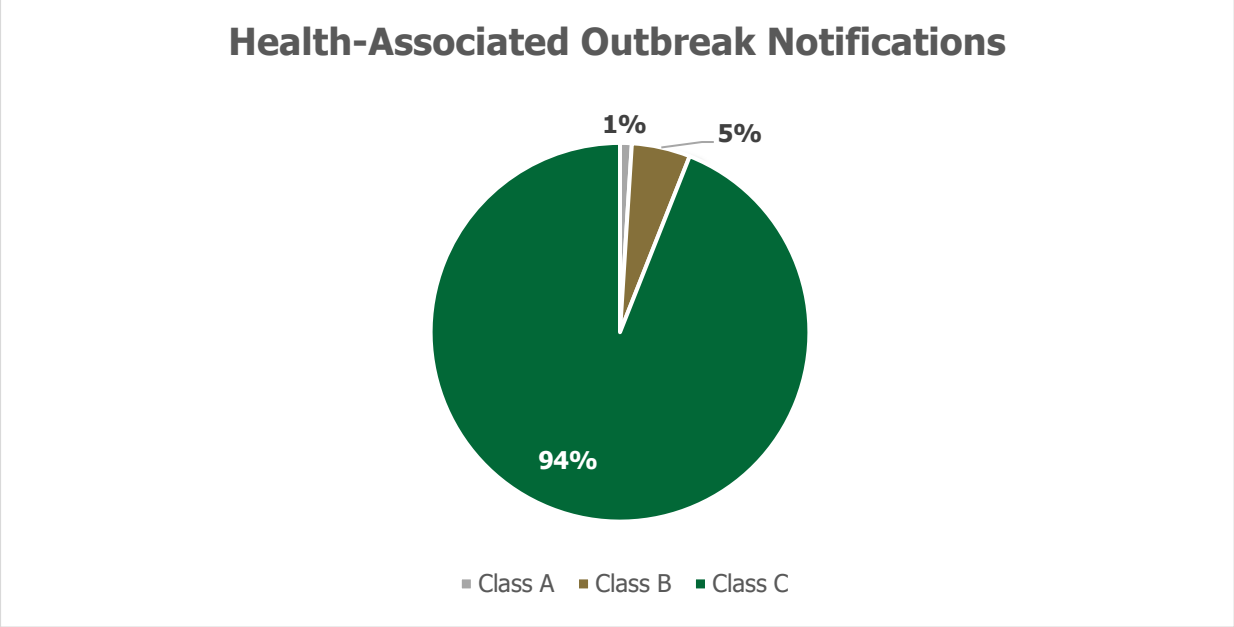


Figure 8: Percentage of Health-Associated Outbreak notifications per classification matrix, 2023.

In 2023, GDIPC received a total of 1240 notifications for Healthcare-Associated outbreaks. These notifications were classified into three classes of infection control interventions and management (A, B, and C) based on the Healthcare-Associated Outbreaks Guideline 2023. The overall notifications of different class divided as the following:

- Class A: 15 notifications, 1% of the total.
- Class B: 57 notifications, 5% of the total.
- Class C: 1168 notifications, 94% of the total. Which indicates an early detection and notification of outbreaks from healthcare facilities.

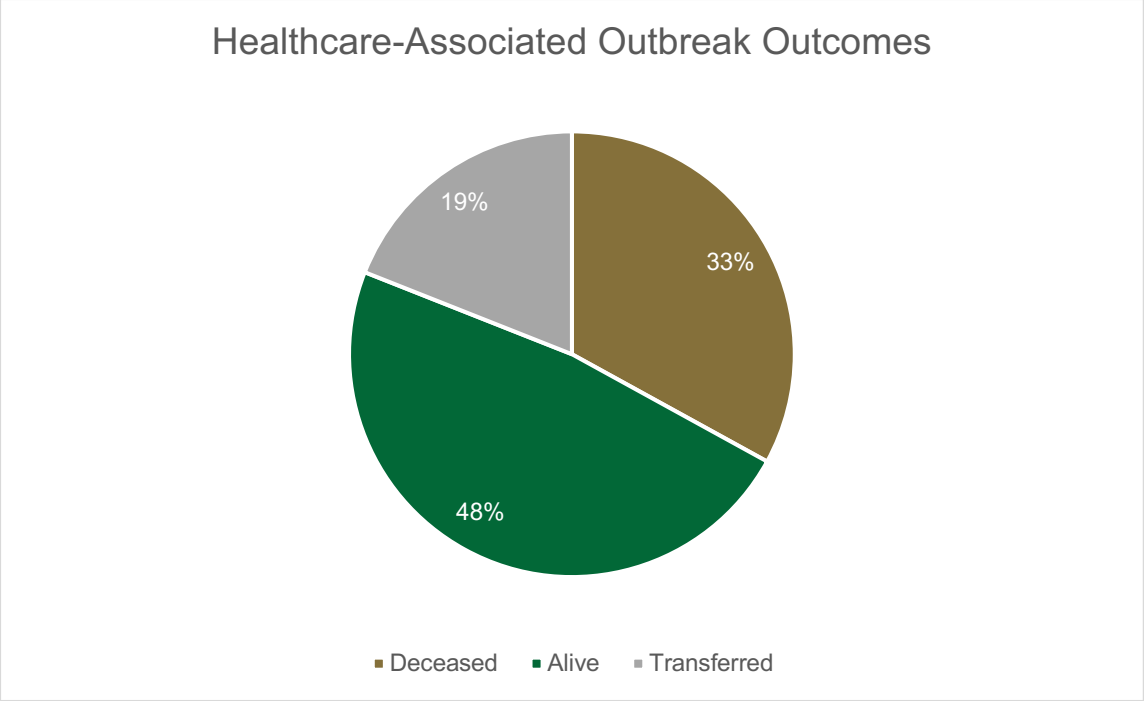


Figure 9: Distribution of Healthcare-Associated Outbreak Outcomes, 2023

Figure 9 shows that 33% of patients involved in Healthcare-Associated Outbreaks died, 48% survived, and 19% were transferred to another healthcare facility or different ward. That's discovered association does not mean causation.

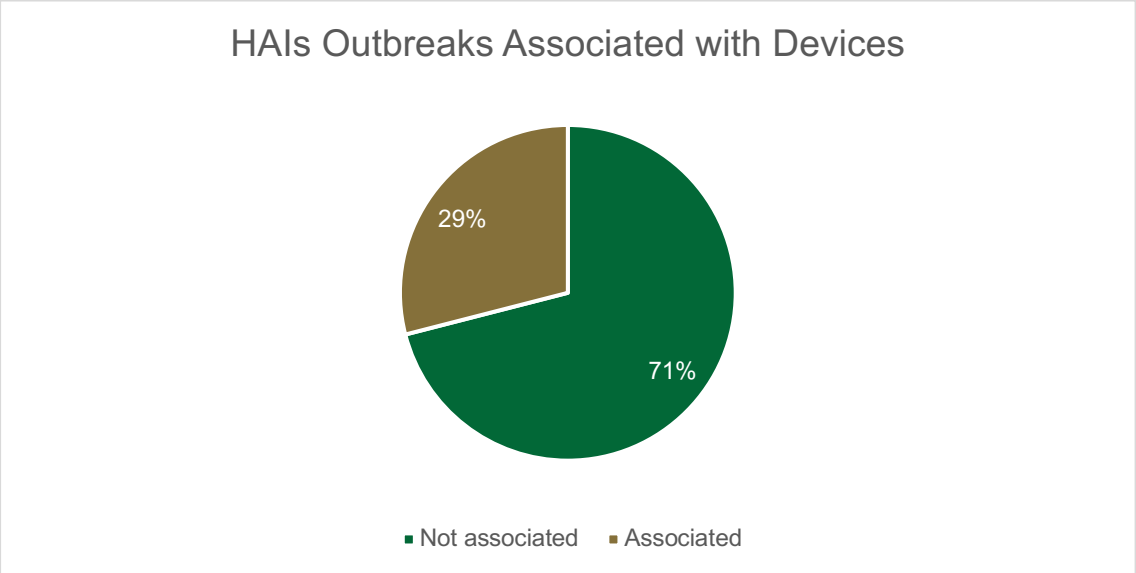


Figure 10: Percentage of Healthcare-Associated Outbreaks Cases associated with Devices,2023.

Figure 10 shows that 71% of reported cases in Healthcare-Associated Outbreaks are not associated with medical device. Central validation approach was implemented collaboratively with the Healthcare-Associated Infection Surveillance department.

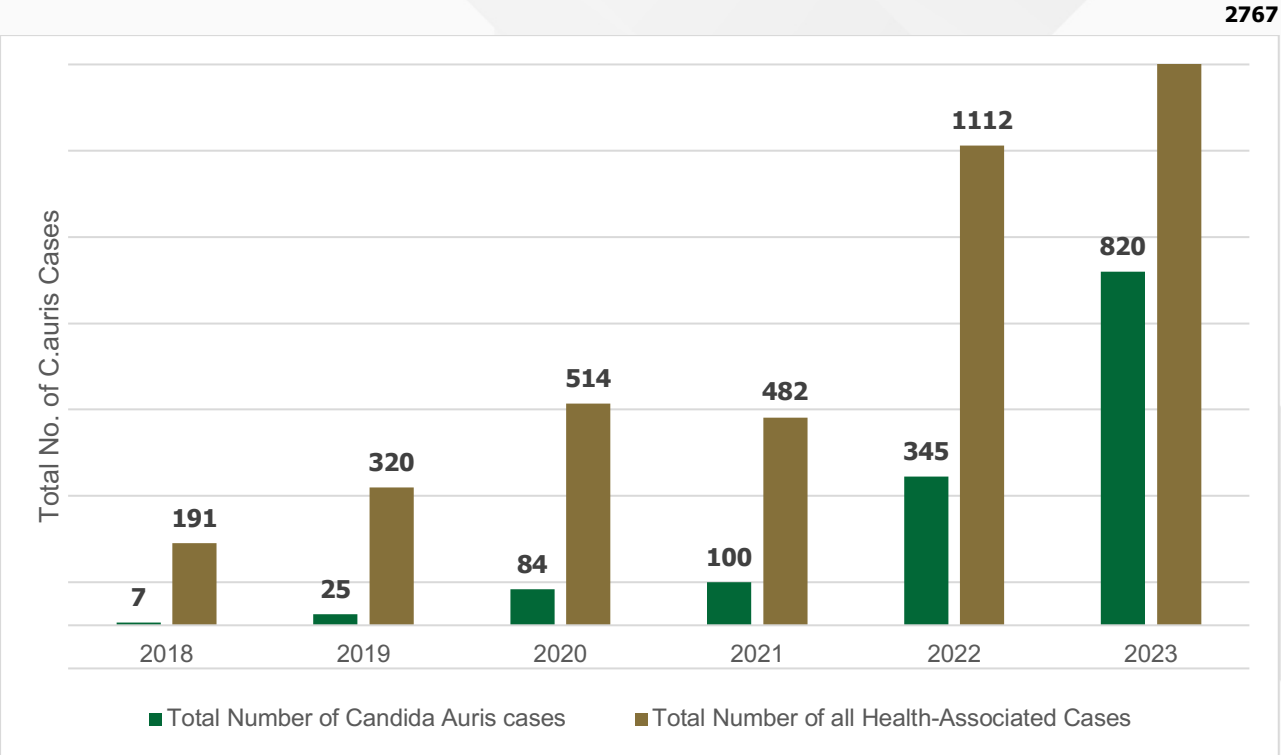


Figure 11: Trend of Candida auris and Total Healthcare-Associated Outbreaks Cases-over Years, 2018 – 2023.

In 2023, a total of 820 cases of Candida auris were recorded, accounting for 30% of all Healthcare-Associated Outbreaks cases. The percentage of Candida auris cases increased over the years. This can be attributed to the improvement in the process of training, notification from the first case, the implementation of updated guidelines and activation of screening policy in 2023.

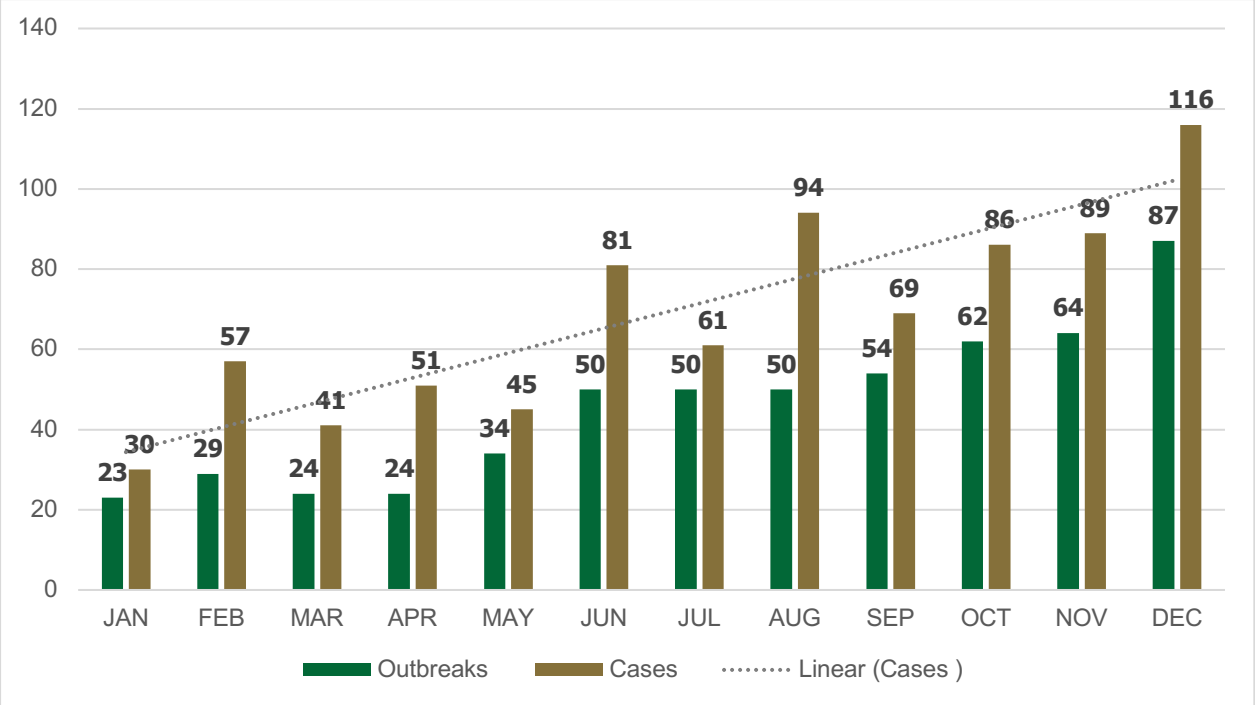


Figure 12: Number of Candida auris Outbreaks and Cases per month, 2023.

The highest number of Candida auris outbreaks (87) and cases (116) were reported in December. That increasing trend in last quarter might be due to the implementation of CAPS which, as previously mentioned, leads to better detection.

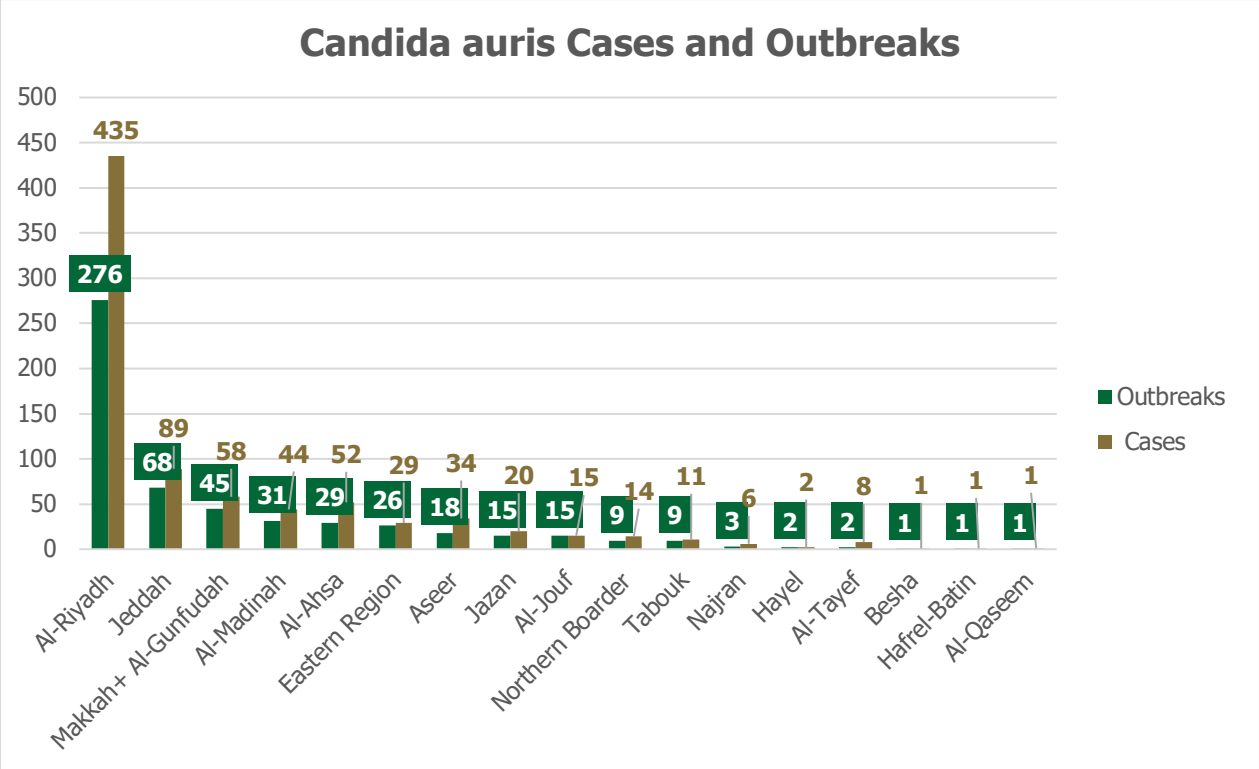


Figure 13: Number of Candida auris Cases and Outbreaks per region, 2023

Regions reported 551 outbreaks of candida auris of 1240 total outbreaks (44.4%), with 820 Candida auris cases out of 2767 cases (30%). Al-Riyadh region reported the highest number of Candida auris outbreaks, 276 out of 551 total outbreaks, and 435 out of the total 820 reported Candida auris cases.

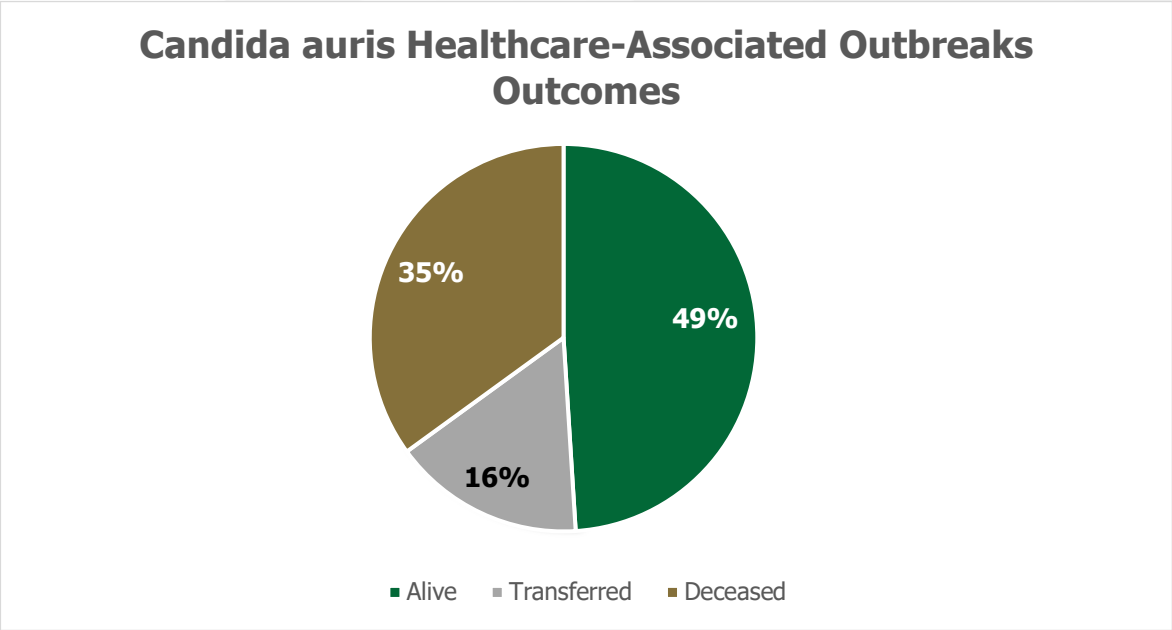


Figure 14: Candida auris Healthcare-Associated Outbreaks Outcomes, 2023.

in 2023, 35% of the patients with Candida auris involved in outbreaks deceased, while 49% survived, and 16% were transferred to another healthcare facility or different ward.

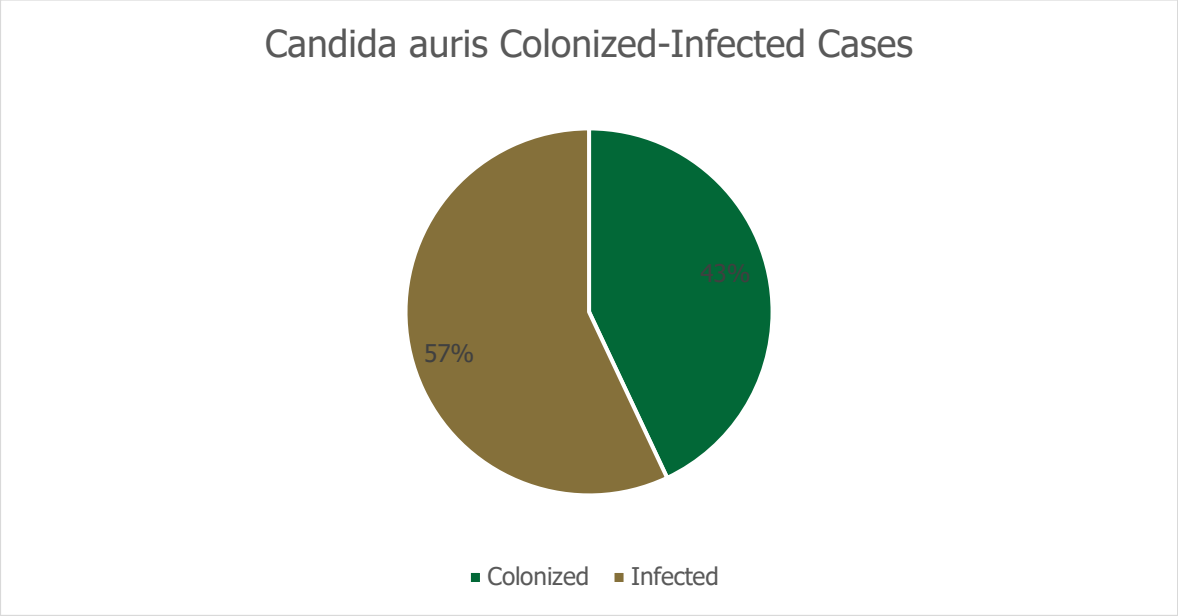


Figure 15: Percentage of Candida auris colonized-infected cases, 2023.

In 2023, 57% of reported cases of Candida auris were for infected patients and 43% were for colonized patients, which emphasizes the importance of contact tracing when discovering a positive case.

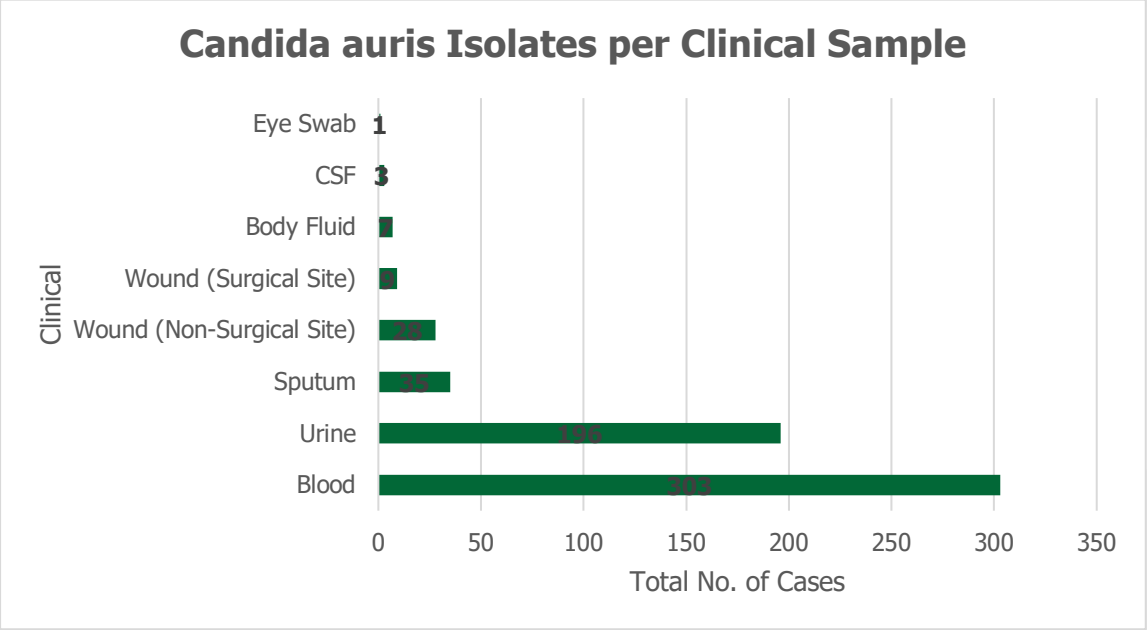


Figure 16: Distribution of Candida auris isolates per sample site (clinical samples), 2023.

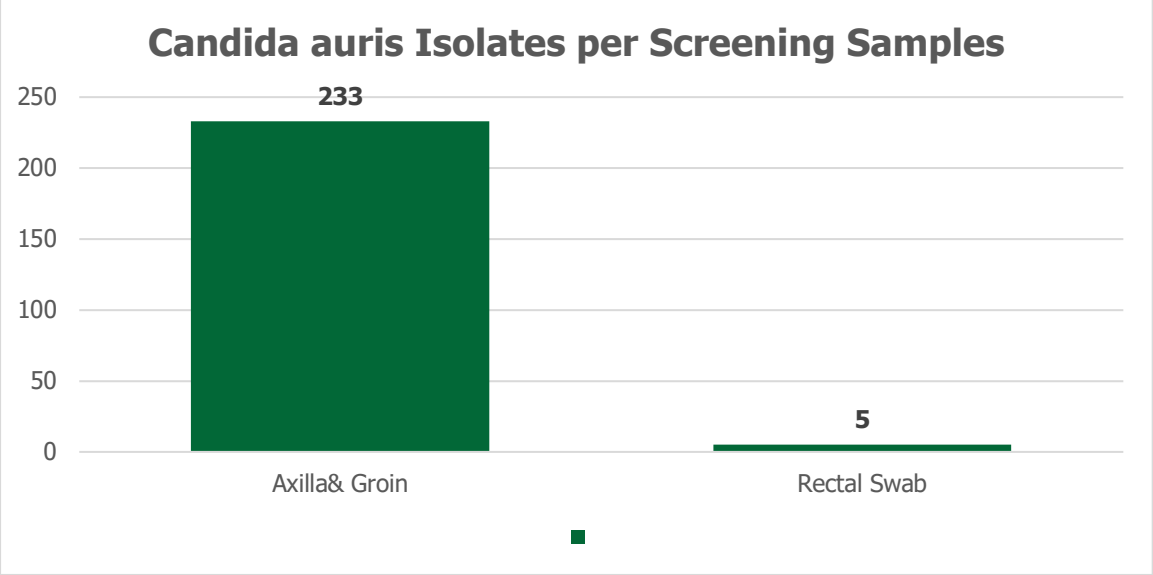


Figure 17: Distribution of Candida auris isolates per sample site (screening samples), 2023.

The above figures (16-17) illustrate a total of 820 cases of Candida auris were isolated from various patient sites. The highest number of cases (303, 36%) were isolated from blood samples, followed by screening (axilla and groin) with (233, 28.4%) samples. This indicates that healthcare facilities activated the process of contact tracing when discovering a positive case as mentioned.

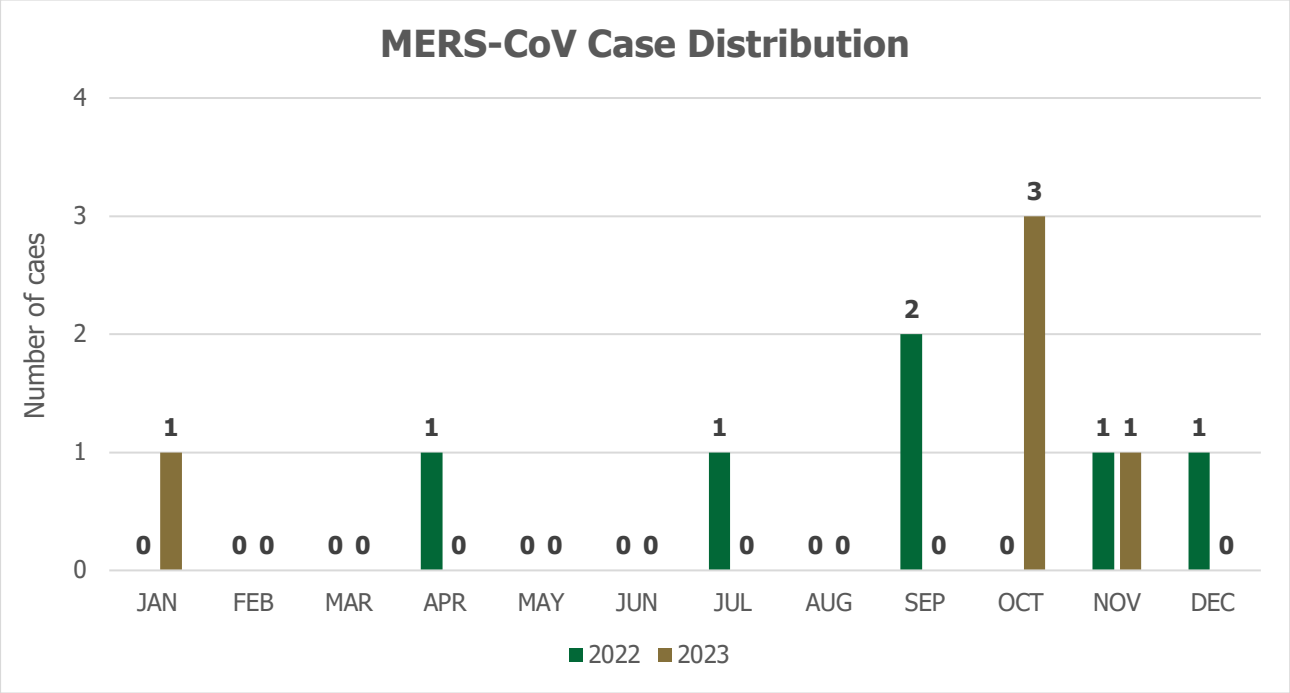


Figure 18: MERS-CoV Case Distribution over Months, 2022 – 2023.

Five MERS CoV cases were recorded in 2023, while six cases were recorded in 2022.

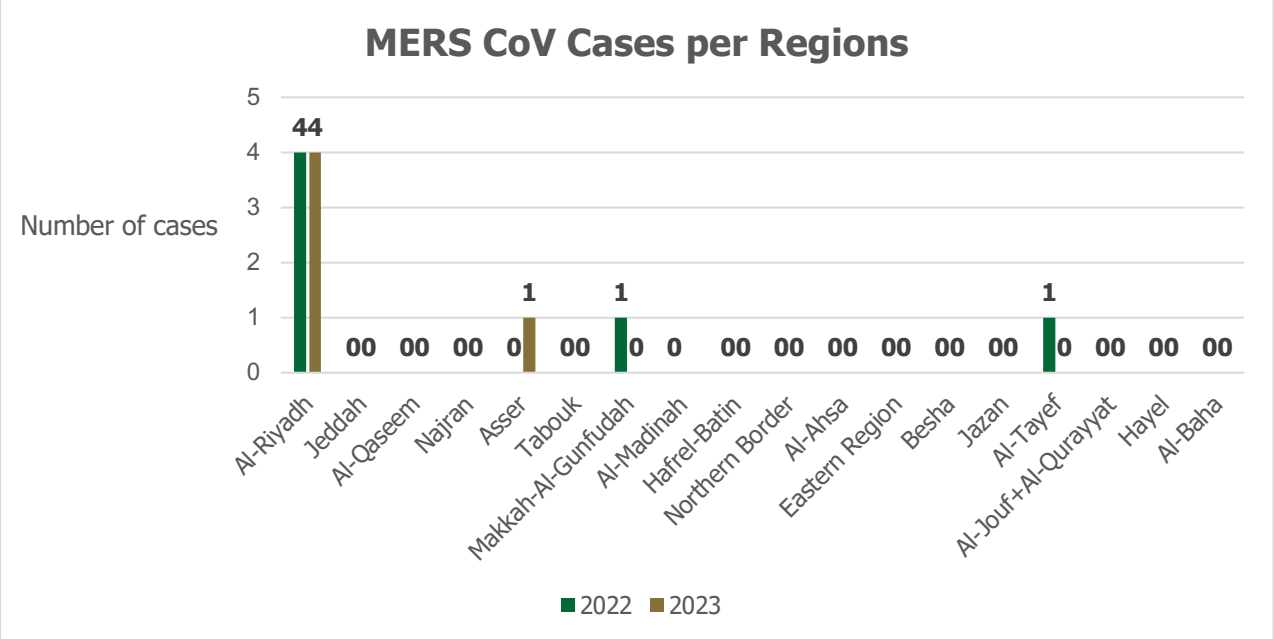


Figure 19: Distribution of MERS CoV Cases per Regions, 2022-2023.

In figure 19, Al-Riyadh region recorded the highest MERS CoV cases in 2023 and 2022.

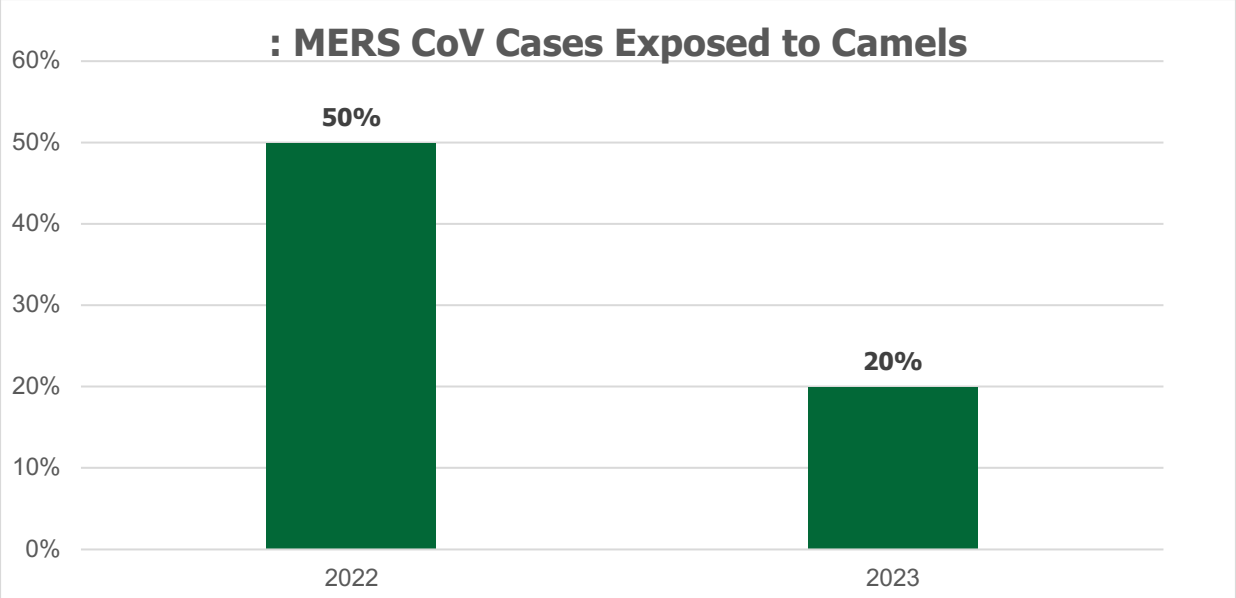


Figure 20: MERS CoV Cases Exposed to Camels, 2022-2023.

The above figure shows that in 2023 (20%) of reported MERS-CoV cases had a history of close contact with camels while in 2022 (50%) of reported cases had a history of close contact with camels.

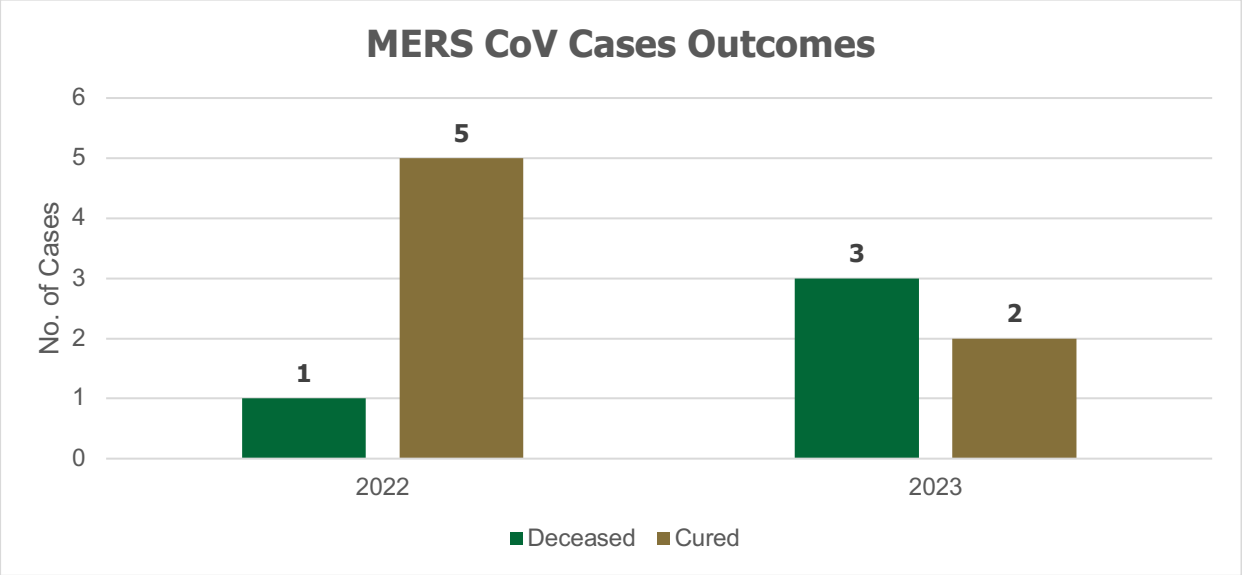


Figure 21: Outcomes of MERS CoV Cases, 2022-2023.

Figure 21shows that in 2023, 3 MERS CoV cases were deceased (60%), and 2 cases were recovered while in 2022, 1 case was deceased (16.6%), and 5 instances were recovered.

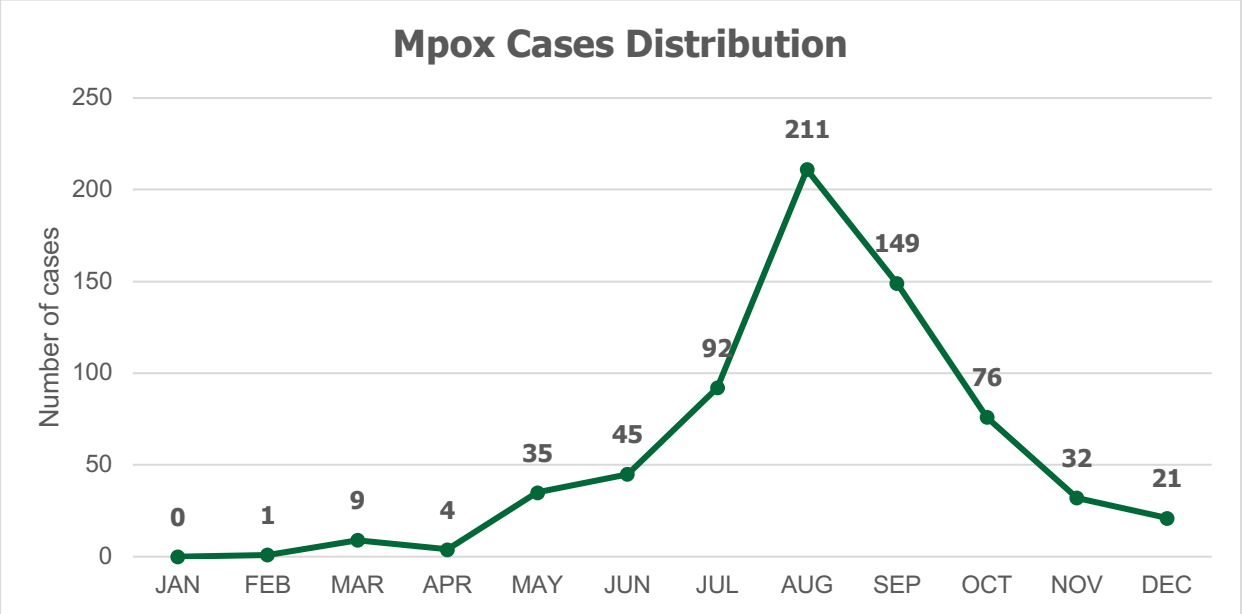


Figure 22: Mpox Cases Distribution per month, 2023.

In August 2023, the highest number of Mpox cases was reported (211 cases). The upward trend in case numbers occurred during the third quarter, aligning with the period of summer vacation (increasing the possibility of traveling and contact with other cases).

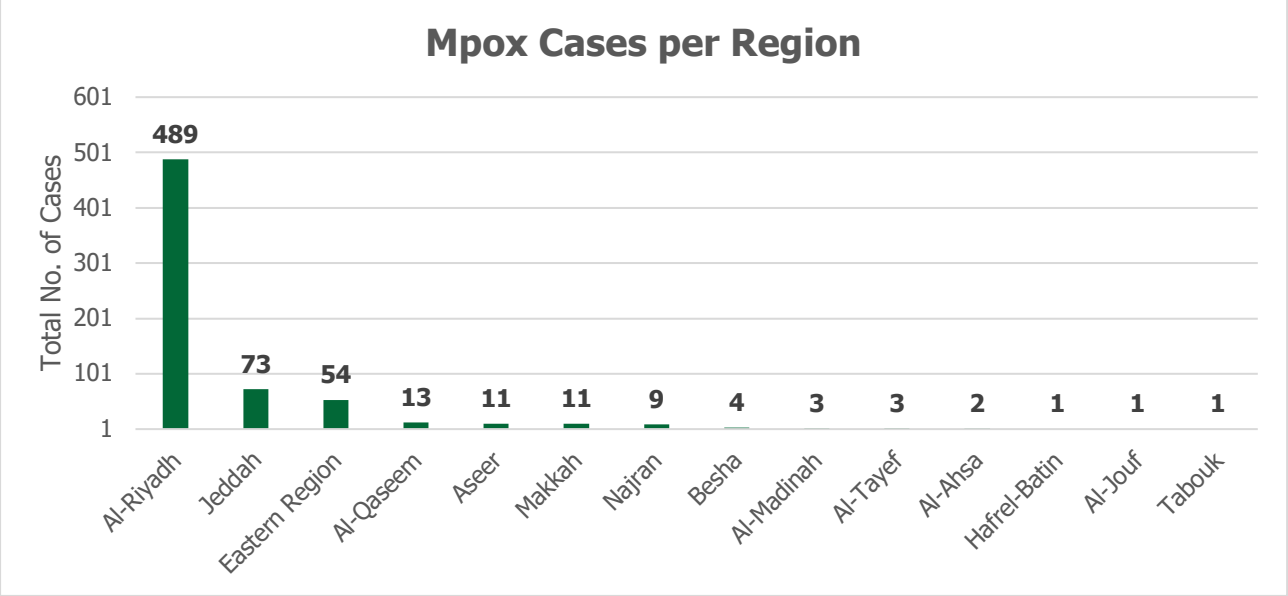


Figure 23: Distribution of Mpox cases per region, 2023.

The highest number of Mpox cases was 489 cases reported in Al-Riyadh, and the lowest was 1 in Al-Jouf, Tabouk, and Al-Tayef.

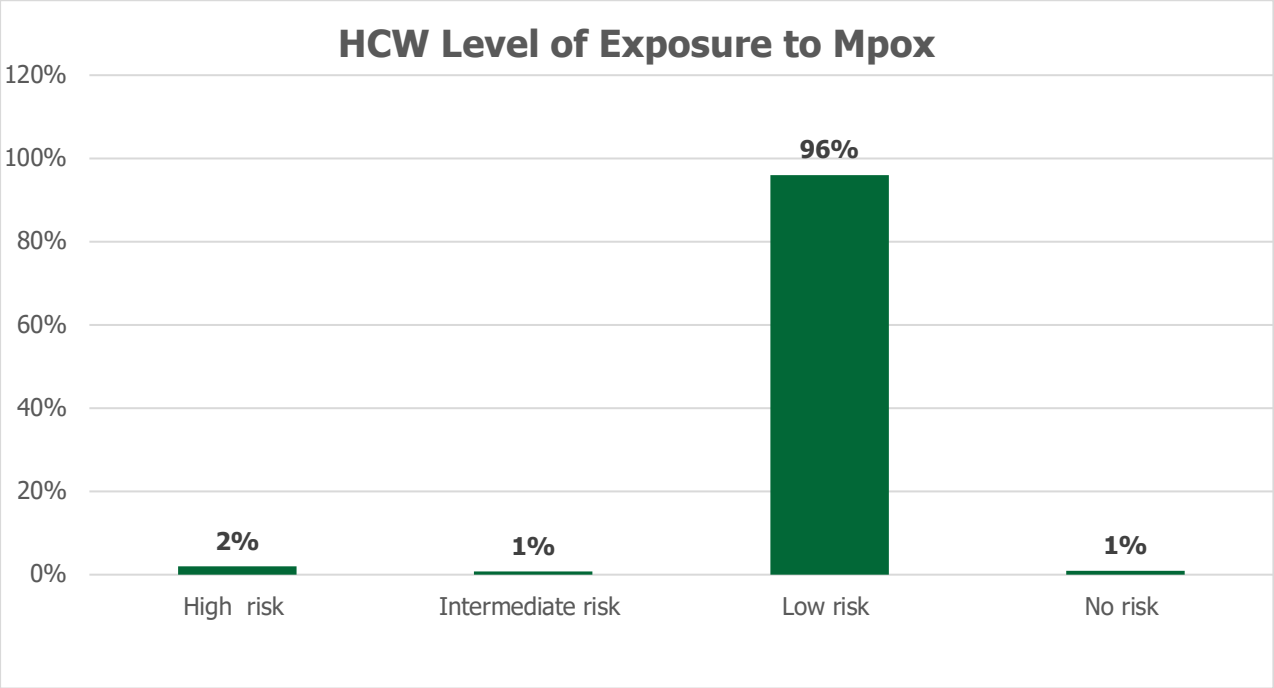


Figure 24: Percentage of HCWs Exposed to Mpox Cases by level of exposure, 2023.

Figure 24 shows that 97% of healthcare workers exposed to Mpox cases had Low or No risk, which could indicate good compliance with infection control recommendations.

While the rest 3% had high or intermediate risk according to the risk assessment tool. Healthcare with intermediate or high risk were advised to be vaccinated,72 HCWs were vaccinated.

6. 2023 GDIPC Publications

1. National Healthcare-Associated Infections Report 2022 - Saudi Arabia
2. Impact of COVID-19 pandemic on the rates of central line–associated bloodstream infection and catheter-associated urinary tract infection in an intensive care setting: National experience

7. Recommendations

1. Enhance and continuously develop the GDIPC's national platforms.
2. Develop and update continuously or as needed, manuals, guidelines, policies, and procedures according to the international scientific updates.
3. Strengthen the role of regular follow-up of the hospitals' corrective action plans by the regional coordinators to effectively address and solve the problems.
4. Enhance the GDIPC validation processes, specifically for the assessment of the HCAIs rates or other surveillance's measurements and activities.
5. Provide the necessary training for infection preventionists in the regions, according to the training needs assessment (TNA).

وزارة الصحة

Ministry of Health

General Directorate of Infection Prevention and Control in Healthcare Facilities
Ministry of Health, Kingdom of Saudi Arabia
Email: gdipc@moh.gov.sa
Visit us at: www.gdipc.sa

Ministry of Health building, Infection Prevention & Control Directorate
Riyadh,
As Sulimaniyah, King Abdulaziz Rd