



**Microbial Contamination and Resistance Profile of Bacteria Isolated from
Mobile Phones in a Health Care Setting in Dubai, UAE**

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Abstract

Objective: To assess the prevalence, microbial profile of organisms isolated from mobile phones used by health care personnel in Dubai, UAE.

Methodology: A total of 230 mobile phones from healthcare providers in various clinical settings were swabbed and cultured using standard microbiological techniques. The pathogens were identified and classified into Gram-positive cocci (GPC), Gram-negative bacilli (GNB), and others. Resistance screening was performed for *Staphylococcus aureus* isolates to detect methicillin resistance.

Results: Microbial growth was observed in 114 of the 230 samples (49.6% of the total samples). Among these, 98 samples (85.9%) were Gram Positive Cocci and 14 samples (12.3%) were Gram Negative Bacteriae. Gram Positive Isolates included 83 *Micrococcus* species. and 15 *Staphylococcus aureus* samples, of which 1 was an MRSA sample. GNB isolates comprised of 10 *Klebsiella* species. and 4 *E. coli*, with no resistance detected. One fungal spore and one *Bacillus* spore were also identified.

Conclusion: Mobile phones in clinical settings harbor significant microbial contamination, which poses a significant threat to the patients they treat. Although resistance was low, the presence of MRSA and spore-forming organisms underscores the need for routine disinfection protocols and awareness among healthcare personnel.

Keywords: Mobile phones, microbial contamination, MRSA, Gram-positive cocci, Gram-negative bacilli, Dubai.

1. Introduction

Cell phones are essential in all aspects of daily life. They have especially played a critical role in enhancing services in the healthcare industry, making it easier for healthcare workers to communicate and go about their routine much more comfortably. Moreover, these improved facilities born as a result of the introduction of mobile phones in the aforementioned sector have resulted in the development of the healthcare system and the more efficient administration of treatment to patients. However, due to infrequent sanitization of cell phone surfaces and lack of surveillance of staff sanitary measures in hospitals and clinics alike, mobile phones have become germ reservoirs and have been found to serve as silent carriers of healthcare-associated diseases,

putting the healthcare worker and their friends and family at risk. According to statistics regarding this concern, around 80,000 to 180,000 infections could be avoided annually (Gastmeier et al.,2010), specially via sufficient hand cleanliness and increased intensity of cellular phones cleaning (Tannhäuser et al.,2022).

The pathogenic composition and prevalence in the cell phones of various classes differ depending on a variety of external factors. For instance, in high-income countries, 75–96% of healthcare workers' mobile phones were found to be infected, with Coagulase-negative staphylococci (CoNS) and *Micrococcus* being the most common strains. In low- and middle-income countries' healthcare settings, the bacterial prevalence ranged from 42% to 100%, with the most prevalent bacteria being coagulase-negative staphylococci, *E.coli*, *Acinetobacter* species, *Pseudomonas* species, and MRSA bacteria.

The global burden of healthcare-associated infections (HAIs) is increasing, resulting in increased patient mortality and costs for maintenance and treatment. Contamination of the mobile phones used by healthcare workers has resulted in the discovery of the prevalence of drug-resistant organisms such as MRSA and vancomycin-resistant enterococci (VRE) on their surfaces, which could be fatal for the patients that healthcare workers are diagnosing and treating. This study aims to assess and investigate microbial carriage on mobile phones used by laboratory staff in Dubai, UAE, with emphasis on prevalence, organism distribution, and resistance profile.

2. Materials and Methods

2.1 Study Design

A cross-sectional study was conducted at QLABS Clinical Laboratory, Karama, Dubai. A total of 230 mobile phones were sampled over a 2-month period from various laboratories, clinics and other healthcare settings.

2.2 Study Period

This study was conducted from July 11th to September 11th 2025.

2.3 Sample Collection

Sample Collection and Microbiological Analysis

Mobile phone surfaces were swabbed using saline-moistened sterile swab sticks, following strict aseptic protocols. Particular attention was given to the keypad and rear surfaces. Swabs were inoculated onto blood agar (BA) plates, MACConkey medium, Sabouraud dextrose agar and incubated aerobically at 37°C for 24–48 hours.

Identification of Bacterial Isolates

Bacterial colonies were identified using standard microbiological techniques, including Gram staining, selective media culture, biochemical profiling (TSI, Citrate, Indole, MR, VP, Urease, Coagulase, Catalase and Oxidase) and confirmed through API and bioMérieux software and latex agglutination.

Antibiogram Profiling

Antibiotic susceptibility was assessed using the Kirby-Bauer disk diffusion method. Test organisms (adjusted to 0.5 McFarland standard) were inoculated onto Mueller-Hinton agar (MHA) plates. Antibiotic discs — (Gram positive: Penicillin, Oxacillin, Cefoxitin, Ciprofloxacin and Erythromycin) Gram Negative (Ampicillin, 1st 2nd and 3rd generation Cephalosporin, Carbapenem, Beta lactam lactamase inhibitor)—were applied using sterile forceps. Plates were incubated at 37°C for 24 hours under aerobic conditions.

2.4 Identification and Classification

Isolates were identified using Gram staining and standard biochemical tests. ATCC strains, specifically ATCC staph aureus 25923 and ATCC E.coli 25922 were used for quality control. Organisms were classified as GPC (Gram Positive Bacteria), GNB (Gram Negative Bacteria), fungal spores, or *Bacillus* spp.

2.5 Resistance Screening

Staphylococcus aureus isolates were screened for methicillin resistance using cefoxitin disc diffusion. Gram negative organisms were screened for ESBL and other resistance pattern.

3. Results

3.1 Overview

A total of 230 samples were assessed for bacterial growth, out of which 114 (49.6%) isolates showed growth of GPCs and GNB's alike. Out of the 114 samples, 98 (85.9%) were Gram Positive Bacterial Isolates, 14 (12.3%) were Gram Negative Bacterial Isolates, and the remaining two samples consisted of 1 fungal spore (0.9%) and 1 bacillus isolate (0.9%). For the GPC isolate distribution, 83 (84.7%) of the 98 samples were Micrococci isolates, 15 (15.3%) were Staphylococcus isolates, and within those 15 samples, 1 (6.7% of *S. aureus* isolates) was identified as an MRSA isolate. Continuing with the GNB distribution, 10 out of the 14 samples were Klebsiella Species (71.4%) and the remaining 4 were *E. coli* isolates.

3.2 Distribution of Isolates

Group	Count	% of Positives
Gram-positive cocci (GPC)	98	85.9%
Gram-negative bacilli (GNB)	14	12.3%
Fungal spore	1	0.9%
<i>Bacillus</i> spore	1	0.9%

Table 1: Distribution of Isolates

3.3 Breakdown of GPC

Group	Count	% of Positives
<i>Micrococcus</i> spp.	83	84.7%
<i>Staphylococcus aureus</i>	15	15.3%
MRSA	1 from <i>S. aureus</i>	6.7% of <i>S. aureus</i> isolates

Table 2: Breakdown of GPC

3.4 Breakdown of GNB

Group	Count	% of Positives
<i>Klebsiella</i> spp	10	71.4%
<i>E. coli</i>	4	28.6%

Table 3: Breakdown of GNB

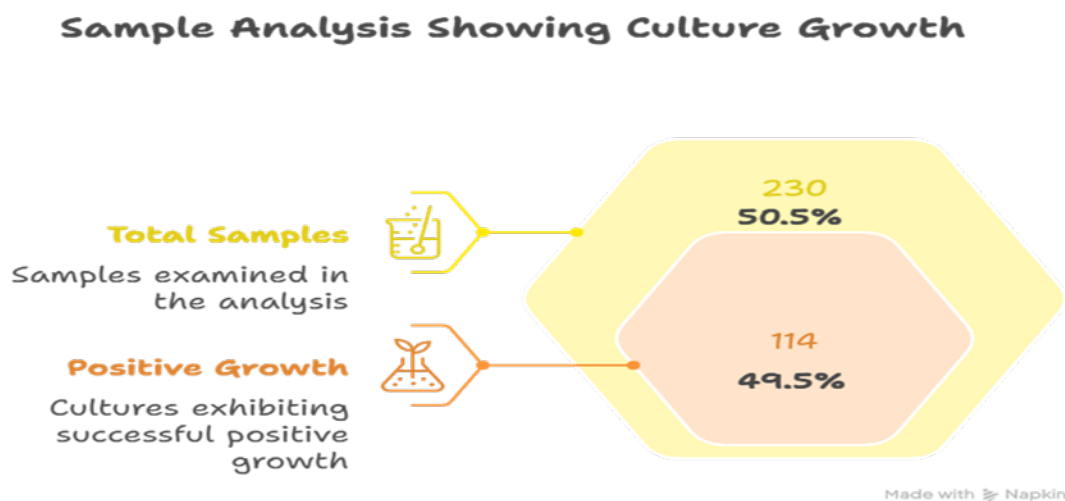


Figure 1: Brief Culture Growth Distribution Chart

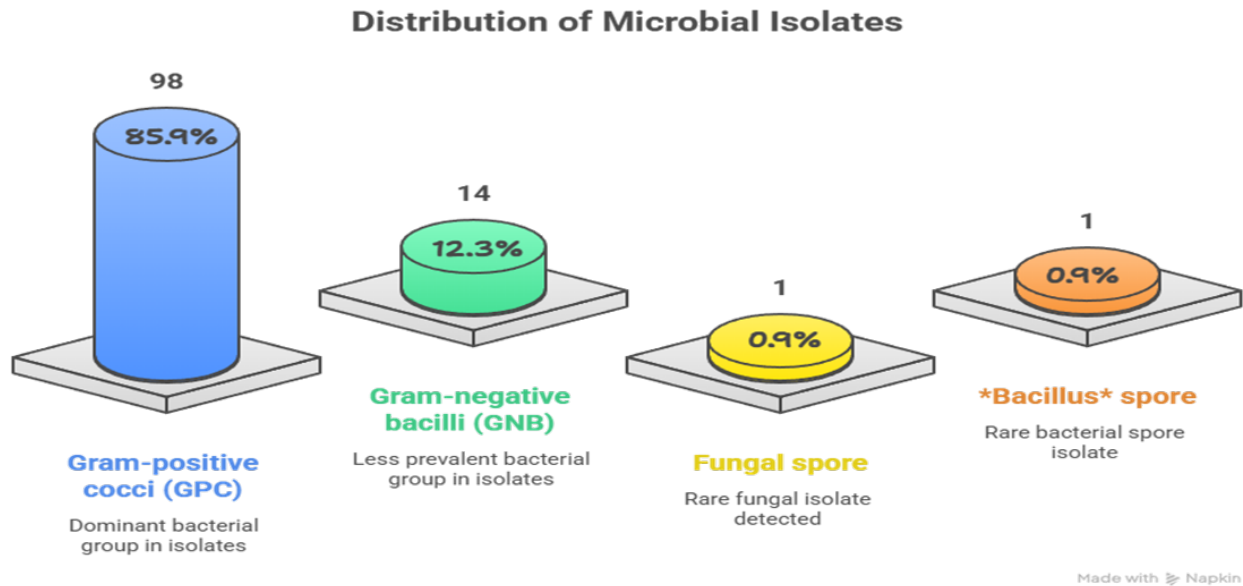


Figure 2: Distribution of Microbial Isolates

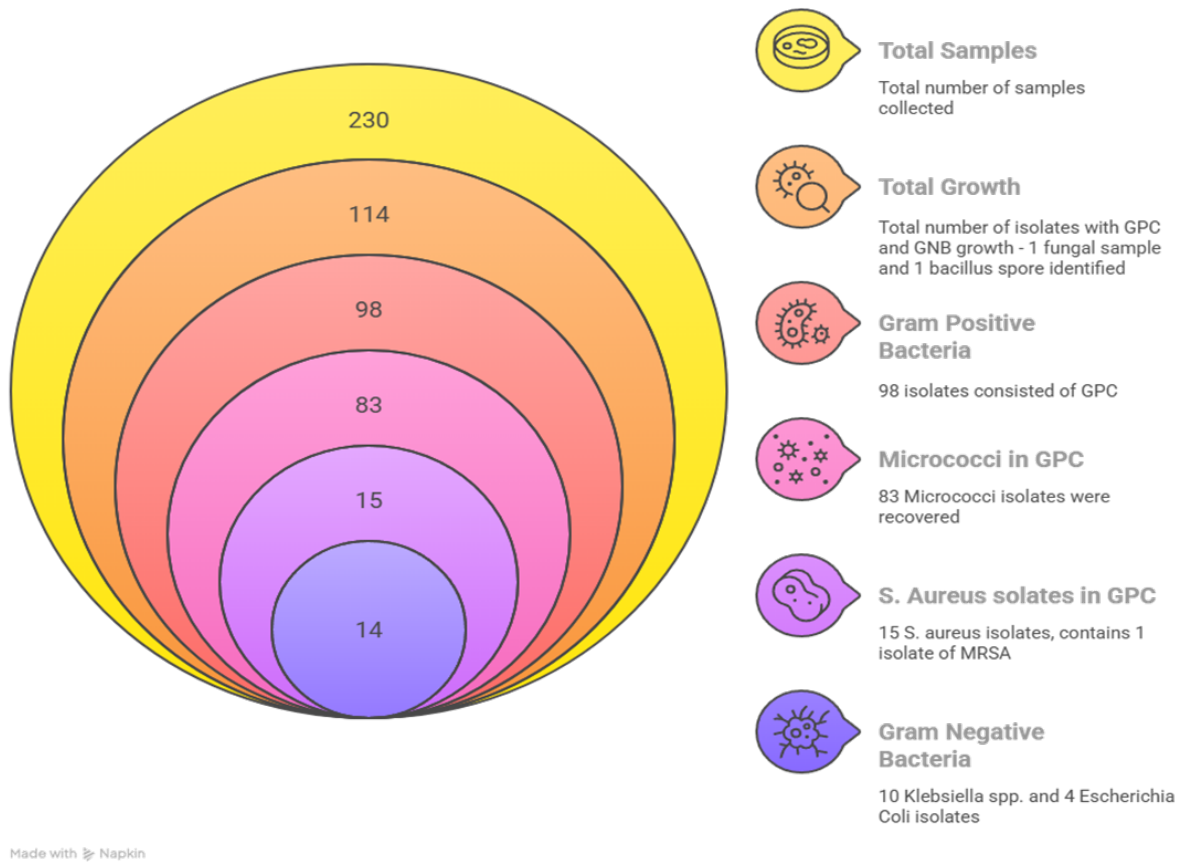
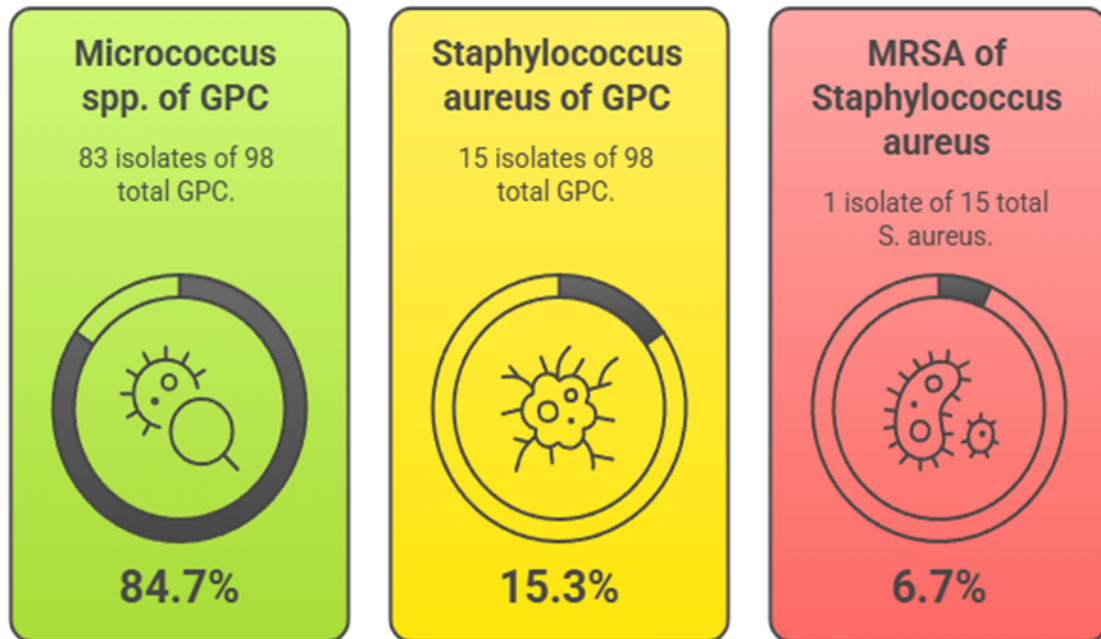


Figure 3: Detailed Distribution of Isolates

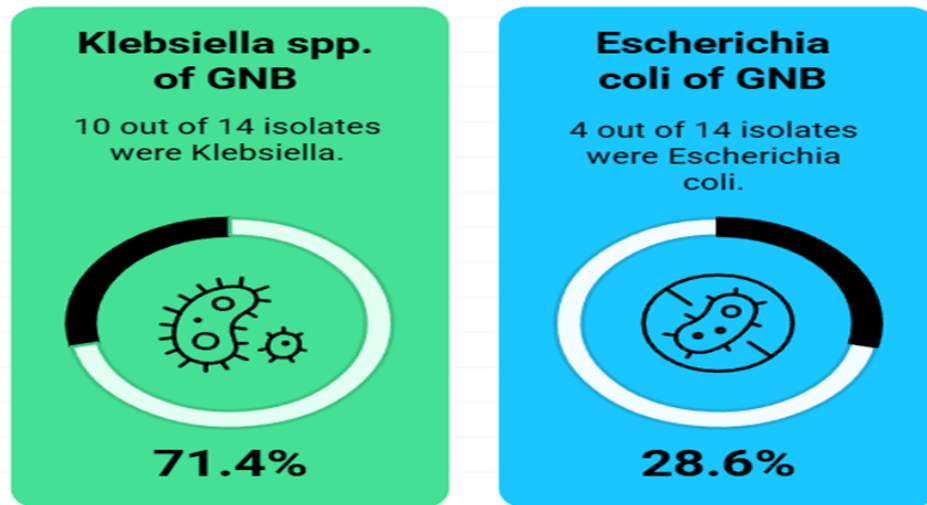
Gram-Positive Cocci (GPC) Species Distribution



Micrococcus spp. is the predominant GPC species, while MRSA represents a small fraction of S. aureus isolates.

Figure 4: Distribution of Gram-Positive Bacterial Isolates

Gram-Negative Bacilli (GNB) Species Distribution



Klebsiella spp. is the predominant Gram-Negative Bacilli.

Figure 5: Distribution of Gram-Negative Bacterial

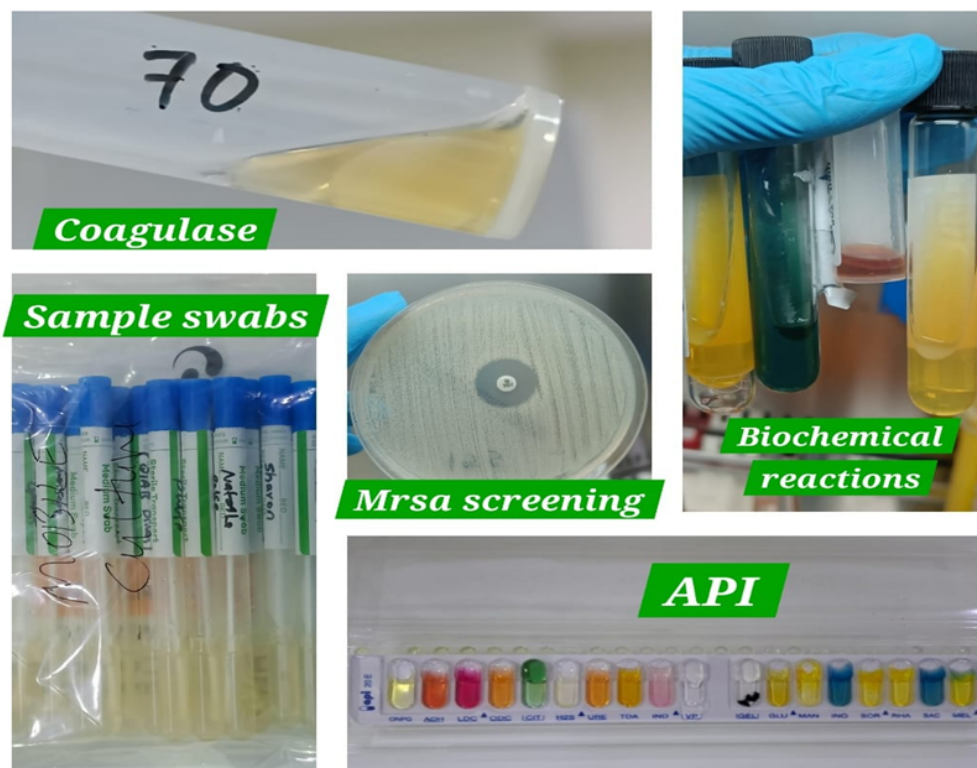


Figure 6: Sample Collection and Processing Results

4. Discussion

The contamination rate of 49.6% aligns with global studies reporting 40–70% prevalence on mobile phones in healthcare settings. GPCs, particularly *Micrococcus* spp., dominated the isolates, further highlighting the significance of skin flora transfer in hospital environments. The detection of MRSA, though low, is clinically significant due to its role in hospital-acquired infections. Absence of resistance in GNB isolates may reflect effective antimicrobial stewardship or limited exposure to resistant strains in this cohort. However, the presence of fungal and bacillus spores is concerning and despite strict adherence to sanitation measures in healthcare settings, proves that pathogenic contamination cannot be completely avoided. HCWs need to take more caution in this aspect to avoid such dangerous circumstances.

Comparative studies from India and the UAE have shown similar trends, with CoNS and *S. aureus* being the most frequently isolated organisms. The low resistance profile in this study contrasts with findings from tertiary care centres where multidrug-resistant strains are more prevalent. This may reflect differences in patient load, disinfection practices, and environmental controls. However, the presence of low resistance bacteria doesn't completely eliminate the dangers associated with this type of contamination. If the same unsanitary measures continue in healthcare settings, the prevalence and intensity of pathogens and their impact on patients and healthcare workers in the near future will certainly rise to a concerning extent.

5. Conclusion

The present study demonstrates that mobile phones used by healthcare personnel (HCPs) can serve as reservoirs for Spread of infection.

Although the majority of isolates identified were opportunistic in nature, their potential to cause nosocomial infections in vulnerable patient populations underscores the importance of routine device hygiene. Based on our findings, we recommend that HCPs adopt regular disinfection practices, such as cleaning mobile phones with 70% isopropyl alcohol. Such measures are simple yet effective in reducing the risk of healthcare-associated infections (HAIs), especially during the presence of mutant strains, when stringent infection control protocols are imperative.

Mobile phones used in clinical laboratories are frequently contaminated with bacteria, primarily Gram-positive organisms. While antibiotic resistance was minimal, the detection of MRSA and spores warrants regular disinfection and staff education. Implementation of phone hygiene protocols may reduce the risk of cross-contamination and nosocomial transmission.

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Conflicts of Interest

None declared.

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