



Original Article

Bacterial contamination of cell phones of medical students at King Abdulaziz University, Jeddah, Saudi Arabia



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ABSTRACT

Cell phones are commonly used in healthcare settings for rapid communication within hospitals. Concerns have been increased about the use of these devices in hospitals, as they can be used everywhere, even in toilets. Therefore, they can be vehicles for transmitting pathogens to patients. This study aimed to examine the presence of pathogenic bacteria on the surfaces of cell phones that are used frequently by preclinical medical students. This cross-sectional study identified both pathogenic and nonpathogenic bacteria on cell phones of 105 medical students at King Abdulaziz University, Jeddah, Saudi Arabia, using standard microbiological methods. Out of 105 cell phones screened, 101 (96.2%) were contaminated with bacteria. Coagulase-negative staphylococci were the most abundant isolates (68%). Seventeen (16.2%) cell phones were found to harbor *Staphylococcus aureus*. Gram-positive bacilli were isolated from 20 (19%) samples. Viridans streptococci and *Pantoea* species were also isolated but at lower levels. Our findings indicate that cell phones can act as reservoirs of both pathogenic and nonpathogenic organisms. Therefore, full guidelines about restricting the use of cell phones in clinical environments, hand hygiene, and frequent decontamination of mobile devices are recommended at an early stage in medical schools, to limit the risk of cross-contamination and healthcare-associated infections caused by cell phones.

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1. Introduction

Cell phones have become one of the essential devices used for communication in daily life, and they are commonly used almost everywhere. Medical students and healthcare workers use these phones for rapid communication within hospital settings. Evidence shows that many

medical conditions have been controlled after the innovations of mobile communications [1,2]. These conditions include diabetes [3] and asthma [4], and an increased rate of vaccination by travelers reminded by short message service (SMS) [5]. However, one of the most common concerns regarding heavy use of mobile devices is that they can act as a vehicle for transmitting pathogenic bacteria and other microorganisms [6,7]. Contamination can spread from outside surfaces to > 80% of exposed hands [8]. Moreover, a previous study reported that > 90% of cell phones of healthcare workers were contaminated with microorganisms and > 14% of them carried pathogenic bacteria that commonly cause nosocomial infections [9].

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People rarely disinfect mobile phones and they are cumbersome to clean. As a result, these devices have the potential for contamination with various bacterial agents [10]. Many researchers have studied cell phone contamination among healthcare workers and in the community. However, little work has been reported in our region on bacterial contamination on cell phones used by medical students. So, the present study aimed to investigate the presence of pathogenic bacteria on cell phones that are frequently used by preclinical medical students.

2. Materials and methods

2.1. Study design

This cross-sectional study was performed from April 2015 to June 2015, at the Department of Medical Microbiology and Parasitology, Faculty of Medicine, King Abdulaziz University (KAU), Jeddah, Saudi Arabia. A total of 105 samples were collected from the cell phones of 105 volunteer 2nd- and 3rd-year medical students who were asked to complete a written questionnaire for data collection. The questionnaire included variables such as the use of cell phones in toilets, the use of disinfectants to clean the surface of the cell phone, and the use of cell phones at work. Also, written informed consent was signed by the students prior to sample collection. The study was approved by the Unit of Biomedical Ethics at the Faculty of Medicine, KAU.

2.2. Sample collection

Samples were obtained from cell phones of all participants using sterile cotton swabs. Prior to sample collection, swabs were moistened in sterile water and were rotated over the front screen and the back of the cell phones. All swabs were immediately inoculated into Amies transport media (Amies, Copan, Italy) and processed within 1 hour. Swabs were then inoculated onto fresh brain–heart infusion broth and incubated overnight at 37 °C with aeration at 190 rpm. A subsequent culture was carried out on blood and MacConkey agar plates, and incubated aerobically at 37 °C for 18 hours.

2.3. Bacterial identification and antibiotic susceptibility

Single colonies grown on both blood and MacConkey agar plates were tested using standard microbiological methods. Single colonies were tested using colonial morphology, Gram stain, and catalase test. A slide coagulase test (Microgen Staph, Microgen Bioproducts, Camberley, UK) was used to differentiate *Staphylococcus aureus* from other coagulase-negative staphylococci. Further antimicrobial susceptibility tests were carried out for *S. aureus* isolates to test their methicillin susceptibility, using 1 µg oxacillin and 30 µg cefoxitin (Oxoid, Basingstoke, Hants, UK) placed on Muller–Hinton agar. The zones of inhibitions were measured and interpreted according to the Clinical and Laboratory Standards Institute [11].

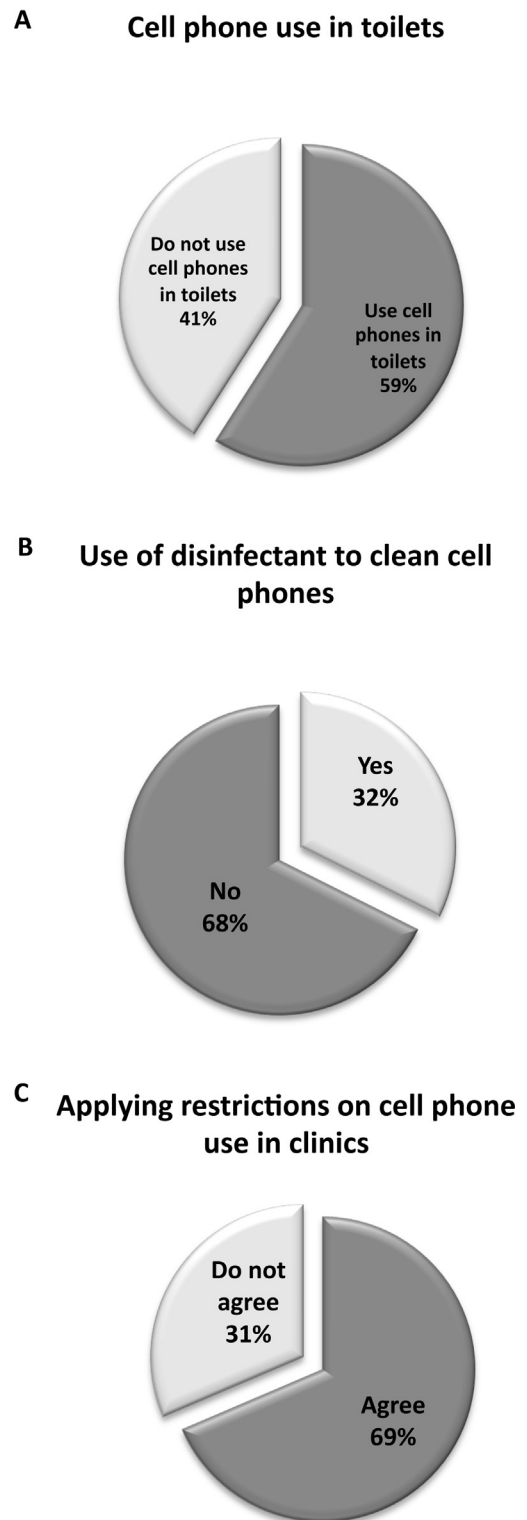


Figure 1. Behavioral distribution of cell phone usage among medical students at King Abdulaziz University.

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