Tabari Biomedical Student Research Journal

OPEN ACCESS

ORIGINAL: Examining the Knowledge, Attitude, and Performance of Operating Room Personnel about the Use of Personal Communication Devices

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ARTICLE INFO

Submitted: 12 Oct 2023
Accepted: 25 Nov 2023
Published: 02 Dec 2023

Keywords:
Attitude;
Awareness;
Operating room;
Performance;
Personal electronic devices

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Citation:
Azarmehr T, Pouladkhay F, Nasiri Formi E, Abjar R, Sargolzaei F. Examining the Knowledge, Attitude, and Performance of Operating Room Personnel about the Use of Personal Communication Devices. Tabari Biomed Stu Res J. 2023;5(3):33-39.

10.32598/tbsrj.v5i3.10541

ABSTRACT

Introduction: There is a growing concern about the impact of personal electronic devices (PEDs), including mobile phones, on healthcare, particularly in the operating room, as they can lead to distractions and reduced focus, compromising patient safety.

Material and Methods: This cross-sectional descriptive study involved 127 healthcare personnel and anesthesiologists working in teaching hospitals affiliated with Mazandaran University of Medical Sciences. The study aimed to investigate their awareness, attitude, and performance regarding the use of PEDs. Questionnaires were administered, and data analysis was carried out using statistical tests.

Results: All participants used mobile phones as their personal communication devices in the operating room. Most participants used their devices for various purposes, such as making calls, sending messages, and emails, playing games, and internet browsing. The mean attitude score was 65.34 ± 38.9, the mean performance score was 33.30 ± 32.4, and the mean awareness score was 88.5 ± 77.29. Factors like age, gender, field of study, educational level, and work experience did not significantly affect attitude, performance, or awareness scores.

Conclusion: It is essential for healthcare professionals to strike a balance between using personal electronic devices to enhance patient care and managing potential distractions. These findings can inform strategies to prevent distractions caused by mobile phone use and ensure patient safety in healthcare settings. Further research is needed in this area to provide effective solutions and mitigate risks associated with PED use in healthcare.

Introduction

In the contemporary world, the advent of modern information and communication technologies has brought about significant changes. The internet and mobile phones are two crucial components of these technologies that have progressed at a rapid pace compared to traditional media and have influenced various aspects of human social

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[DOI: 10.32598/tbsrj.v5i3.10541]

life. Mobile phones have become one of the most widely used communication devices, holding a powerful position in both individual and societal aspects of human life (1). Approximately 79% of the population in the United States and 90% of people in Asia and Europe have access to mobile phones, which are utilized for sharing emotions in social and virtual spaces, paying bills, scheduling appointments, and connecting to the internet (2).

The growth of technology and industry has shown a significant impact on human health dimensions (3). Mobile phone radiation, for instance, can lead to various health disorders such as impairments in sperm quality and motility in men, negatively affecting reproductive and cytogenetic aspects. Furthermore, the use of mobile phones and the internet while driving has led to distractions, resulting in numerous accidents (4).

The impact of personal electronic devices (PEDs) on other complex operations, such as healthcare, has received relatively little attention from researchers. PEDs provided many services to medical staff such as education improvement (4, 5), communication enhancement (4), access to new medicine (6), new treatment methods of rare diseases (7-9), and reducing treatments complications (10). Apart from these advantages, PEDs can also be a concerning factor leading to distraction and reduced focus in the operating room. Given the significant role PEDs play in our daily lives, it is not surprising that anesthesiologists and healthcare professionals face challenges in managing PEDs in the operating room and other patient care settings. Distractions caused by using mobile phones in the operating room have resulted in reduced attention and compliance with patient safety principle (11).

Distractions during surgery can be categorized into internal and external factors. The first category includes issues like searching for necessary patient-related information and team coordination, such as following up on test results. The second category pertains to the inevitable personal actions of healthcare personnel, such as sending text messages and checking notifications (11).

Patient safety is the primary concern in healthcare, and errors in service delivery can pose a serious threat to the patient's life. In this regard, there have been reports of a 53-year-old patient's death due to distractions caused by the use of mobile phones by anesthesia personnel during surgery (12). Another case report highlighted the death of a 61-year-old patient due to distractions caused by the anesthesia provider (13). The American College of Surgeons has issued guidelines for the use of smartphones, stating that surgical and anesthesia teams should only use mobile phones in essential situations, and personal use should be kept to a minimum. Since ensuring patient safety is one of the most critical responsibilities of healthcare personnel, the use of mobile phones in the operating room poses a serious risk (14).

However, a search of Iranian databases, SID and PubMed, reveals a lack of extensive research on the extent of mobile phone usage by anesthesia personnel in Iranian operating rooms. Therefore, there is a need for more comprehensive research and the provision of more effective solutions in this area. This research aimed to fill this research gap. The findings of this study can provide valuable insights to authorities and planners in developing practical strategies to prevent compromising patient safety due to distractions caused by mobile phone use. Thus, the primary objective of this study was to investigate the knowledge, attitude, and performance of healthcare personnel working in the operating room regarding the use of PEDs.

Methods

The present study was a cross-sectional descriptive study. The study population consisted of all the healthcare personnel and anesthesiologists working in educational hospitals affiliated with Mazandaran University of Medical Sciences in the year 2018-19. The sample size was calculated based on a study by Soto et al. (15). Using the

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Cochran formula, with values of α=0.05, P=0.0175, and d=0.05, the minimum required sample size was estimated at 105 individuals. To account for potential dropout, a total of 130 participants were recruited.

After obtaining ethics approval from Mazandaran University of Medical Sciences and coordinating with the operating room head nurse, the questionnaire related to the awareness, attitude, and performance of operating room personnel regarding the use of PEDs was administered to eligible participants. The inclusion criteria were surgical technologists, anesthesia technicians, and anesthesia residents working in educational and medical centers of Mazandaran University of Medical Sciences. In case of non-consent at any stage of the research, participants were excluded from the study.

The questionnaire included demographic information such as age and sex. The questionnaire was based on studies and was composed of valid documents credible articles. Afterwards, it was carefully studied by three faculty members and specialists and the necessary corrections were made based on their opinions. In order to ensure the validity of the designed questionnaire, the questions were evaluated with the Content Validity Index. In order to ensure the reliability of the questionnaire, using Cronbach's alpha coefficient, the internal consistency of the questions was evaluated, which had acceptable reliability (α=0.86).

After completing and collecting all the questionnaires, the data were analyzed using SPSS software version 16 (IBM, Armonk, NY, USA). In order to describe the data, central indicators and dispersion such as mean and standard deviation were used. relative risk was calculated and in order to perform analytical studies, was carried out using statistical tests, including T-test, Chi-square test, and Fisher's exact test, with a significance level set at P<0.05.

Results

In this sectional descriptive-analytical study, 127 healthcare personnel and anesthesiologists currently working in educational hospitals affiliated with Mazandaran University of Medical Sciences participated. Among them, 61 (48%) were male and 66 (52%) were female. The participants' average age was 54.31 ± 5.95 years, and the average work experience was 39.7 ± 22.5 years.

In this study, we present a comprehensive overview of participants' educational backgrounds and their utilization of PEDs within the operating room. The diverse composition of the participant pool is reflected in their respective roles and educational achievements.

A predominant segment, comprising 67.7% of the participants, consisted of skilled operating room technologists and technicians. Anesthesiologists constituted 7.3% of the cohort, bringing their specialized expertise to the study. Operating room nurses, accounting for 22.6%, played a crucial role in the investigation. Additionally, a smaller yet notable presence included 1.6% who were surgical specialists and 0.8% identified as surgical residents

Delving into the educational spectrum, the majority of participants, totaling 86.6%, held a bachelor's degree, underscoring a strong educational foundation within the cohort. A notable 10.2% possessed a master's degree, highlighting a significant level of advanced education among the participants. Further diversity was observed, with 0.8% having an associate degree, while an equivalent percentage comprised individuals with specialist qualifications. Additionally, 1.6% of participants were identified as surgical residents, reflecting the diverse educational pathways within the study population.

This detailed breakdown not only emphasizes the varied professional roles but also underscores the educational diversity among participants, providing valuable insights into the intersection of education and professional engagement within the context of PEDs use in the operating room.

All participants reported using a mobile

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phone as their PED in the operating room. When asked about the purposes for which they used their PED, 82.2% admitted to using it for various activities, including making calls, sending text messages, emails, playing games, and accessing the internet. Only 17% stated that they used their PED solely for making calls. These descriptive statistics are summarized in ***Table 1***.

Table 1. Mean and standard deviation of scores for awareness, attitude, and performance of healthcare personnel in the operating room

Variable	Mean ± SD	Min	Max
Attitude	34.65 ± 9.38	19	60
Performance	30.33 ± 4.32	15	47
Awareness	29.77 ± 5.88	21	40

In the analysis of factors using multiple linear regression, we found that age, gender, field of study, education level, and work experience did not significantly affect attitude and performance scores.

The results in ***Table 2*** show that the impact of the field of study (operating room, anesthesia, and intelligence) on personnel's awareness score about the use of PEDs is statistically significant. The awareness score for operating room personnel was 5.28 ± 81.55, for intelligence personnel was 2.24 ± 12.50, and for anesthesia specialists was 4.33 ± 74.64. However, age, gender, educational level, and work experience did not have a statistically significant effect on the awareness score of the personnel.

Table 2. Results of multiple linear regression for investigating influential factors on awareness score

Variable	Unstandardized B	Standardized B	S.E (B)	Confidence Interval for B	P-value
Age	-0.09	-0.11	0.22	(-0.55, 0.67)	0.385
Gender	-1.10	-0.12	1.27	(-3.66, 0.39)	0.619
Field of study	0.02	0.01	0.48	(-0.94, 0.96)	0.001
Education level	-0.27	-0.02	1.86	(-3.99, 0.88)	0.223
Work experience	0.12	0.12	0.26	(-0.41, 0.65)	0.447

Discussion

In the present cross-sectional descriptive-analytical study, 127 healthcare professionals working in the operating rooms of teaching hospitals affiliated with Mazandaran University of Medical Sciences participated. All participants used mobile phones as their PEDs. The study found that 8.22% of the participants used their PEDs for various purposes, including making calls, sending text messages, emailing, playing games, and browsing the internet. Meanwhile, 1.70% of participants used their PEDs only for making calls. This study's results contrast with Ventola et al.'s study, where participants predominantly used mobile phones for managing time, accessing patient records, test results, and prescriptions. The differences in results may stem from variances in culture and the regulations governing operating rooms and the hospitals where individuals work, as some hospitals may not permit access to patient records and hospital systems through personal phones (16). Respecting patient autonomy and upholding their rights stand as indispensable principles in contemporary healthcare. A cornerstone of this commitment is the acknowledgment and adherence to patients' bills of rights, which serve as guiding documents across all healthcare facilities. However, the proliferation of PEDs in the operating room by healthcare workers raises pertinent concerns regarding the potential encroachment upon these fundamental patient rights (17).

The influence of the participants' field of study (operating room, anesthesia, and perioperative nursing) on their awareness

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score regarding the use of PEDs was found to be significant (P=0.001). The awareness scores were higher for anesthesia specialists compared to operating room staff, and perioperative nursing staff ($12.50 \pm 2.24 < 81.55 \pm 5.28 < 74.64 \pm 4.33$). However, only nine participants had anesthesia specialization, while 84 participants had bachelor's or master's degrees in operating room technology, and 28 were anesthesia technologists. This difference in sample size might contribute to the results obtained. Age, gender, educational level, and work experience had no statistically significant effect on participants' awareness scores (P>0.05).

The need for communication has been a constant in human existence, enabling social interaction, knowledge sharing, and emotional connection. However, the COVID-19 pandemic, characterized by lockdowns and social distancing, elevated the importance of long-distance communication. During this period, the reliance on cell phones, tablets, and computers to maintain connections with family, friends, and colleagues became more evident. The distance created by the pandemic was bridged through video calls, messaging apps, and social media platforms. (18-20). The pandemic brought about a unique form of isolation, wherein physical proximity was limited, but digital connectivity soared. People turned to their PEDs to combat feelings of loneliness and separation. It became a lifeline to the outside world, allowing individuals to work, learn, and engage in leisure activities without leaving the confines of their homes. As a result, the significance of technology in maintaining a semblance of normalcy during unprecedented times became evident (21, 22). With the development and distribution of COVID-19 vaccines, the hope of a return to pre-pandemic routines emerged (23). Yet, the bond between individuals and their PEDs remains unwavering. The 'new normal' that emerged during the pandemic has led to a lasting integration of digital tools into various aspects of life. This continuity is not solely due to lingering concerns about health but is deeply rooted in the comfort and convenience that digital communication offers (24).

This study's findings suggest that age, gender, field of study, educational level, and work experience have no statistically significant effect on participants' performance and attitude scores. In contrast, this study posits that the use of PEDs is a potential cause of inattention and negligence in patient care. Several researchers argue that while technology advances improve access to information and resources, it may also lead to distractions, including PED use (25).

Cohen et al., in their study found that PEDs in various forms can be a source of distraction in healthcare settings. Therefore, it is essential for healthcare professionals to balance the use of PEDs to improve patient safety (13).

Conclusion

In conclusion, the present study demonstrated the potential impact of using PEDs in the operating room. The results indicate that field of study significantly influenced awareness scores. However, it is essential to strike a balance between utilizing personal electronic devices for enhancing patient care and managing potential distractions. Healthcare professionals should be aware of the possible implications of their device use to maintain a high standard of care and patient safety.

Acknowledgments

We express our gratitude to Mazandaran University Medical Sciences for their valuable contribution to this study.

Ethical standards statement

The protocol of this study was approved by the Research Ethics Committee of Mazandaran, University of Medical Sciences (code: IR.MAZUMS.REC.1398.4938). All patients voluntarily participated and provided informed consent by completing the necessary consent form.

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[DOI: 10.32598/tbsrj.v5i3.10541]

Conflicts of interest

The authors declare no conflict of interest.

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