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ORIGINAL ARTICLE

Which practice is best to manage the Hidden curriculum for the best use of mobile devices in clinical practice? A systematic review.

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ABSTRACT… Objective: To evaluate the literature regarding the practices to manage the hidden curriculum for the best use of mobile devices in clinical practice. **Study Design:** Systematic Review. **Setting:** Articles selected for review from Canada, United Kingdom, Japan, Ireland and Saudi Arabia. **Period:** July to Dec 2023. **Methods:** Following databases were searched: PubMed (12,579), the Cochrane Library (348), scopus (84), PsycInfo (21), CINAHL (220), Google Scholar (1,414). Primary variable (Evaluation of the development of clinical skills made possible by mobile devices) and secondary variable (to determine how satisfied students are with their mobile learning experience). The quality of study was critically appraised according the Critical Appraisal Skills Programme (CASP) scale. **Results:** The research findings indicate that using mobile devices into medical education has a variety of effects. Positive instructor perspectives, more student involvement, and higher learning outcomes were frequently reported by participants. Medical students' growth of technological competency and readiness for the changing healthcare landscape have been found to be accelerated by mobile devices. The integration of virtual simulations and applications that are interactive has had a positive impact on the development of clinical abilities. Positive effects included themes of individualization, collaborative learning communities, and a better understanding of patient-centered care. On the other hand, issues including the digital divide, diversions, and security threats were recognized as obstacles that called for a careful strategy to reduce any negative effects. When everything is considered, the findings confirm the revolutionary potential of mobile device incorporation in medical education and highlight how it helps to create a dynamic, technologically advanced learning environment for prospective medical professionals. **Conclusion:** This study provides insight on how adding mobile devices into medical education has a revolutionary effect. The research indicates enhanced learning outcomes, increased student involvement, and altering faculty perspectives through insightful stories and compelling arguments.

Key words: Clinical Practice, Hidden Curriculum, Mobile Devices, Medical Education, Systematic Review.

INTRODUCTION

In an era defined by the relentless evolution of technology, the integration of mobile devices into healthcare settings has become a cornerstone, reshaping the landscape of clinical practice.[1-3] The utilization of smartphones and tablets by healthcare professionals holds the promise of improving patient care, communication, and access to information. However, this technological advancement brings forth a complex interplay between innovation and the preservation of fundamental human rights within the healthcare sector.[4] The dynamic role of mobile devices in healthcare transcends traditional boundaries, offering real-time access to patient data, medical literature, and collaborative networks. From streamlining diagnostics to enabling telemedicine and remote patient monitoring, these tools have the potential to enhance healthcare outcomes and patient experiences.[5] Yet, within this transformative landscape, the hidden curriculum emerges, embodying the unspoken norms, values, and socio-cultural influences that guide the use of mobile devices in clinical practice. Mobile devices, once mere communication tools, have evolved into dynamic platforms with profound implications for patient care.[6-8] As healthcare professionals increasingly

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integrate these devices into their workflows, the ethical, legal, and social considerations inherent in this evolution come to the forefront. This transformative power carries a responsibility to safeguard fundamental human rights in the patient-provider relationship. Issues of privacy, data security, informed consent, and equitable access to healthcare services are scrutinized in the context of mobile device use. Examining how the hidden curriculum may inadvertently compromise these rights becomes crucial to ensuring that technological advancements align with ethical and legal standards.[9-15] Exploring the intersection of mobile technology and human rights in clinical practice is essential to address ethical considerations arising from the rapid integration of devices. This inquiry seeks to uncover the hidden curriculum shaping professional conduct, ensuring that patient autonomy and confidentiality are preserved. By scrutinizing this intersection, the aim is to contribute actionable insights for healthcare professionals, policymakers, and educators to navigate responsibly and uphold fundamental human rights in the evolving landscape of healthcare technology.

METHODS

A systematic review of qualitative study conducted according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guidelines. Upon approval from Institutional Research Committee literature search was carried out with ethical approval number 1624.

Research Question

How explicit policy or practice can improve the informal or hidden curricula to make best use of mobile phones in a clinical setup.

Objective

To evaluate the literature regarding the practices to manage the hidden curriculum for the best use of mobile devices in clinical practice.

Search Strategy

The following electronic databases were utilized to conduct a systematic literature search in order to find relevant publications on the best way to manage the hidden curriculum for the best use of mobile devices in clinical practice: PubMed, Scopus, psycinfo, CINAHL, and the Cochrane Library. We found more records by looking through Google Scholar. The restrictions included full-text, human, and English language studies. The following synonyms and key words were used:

Synonyms and related terms

Mobile devices OR handheld devices OR smartphones OR tablets
Clinical practice OR healthcare settings OR medical environment
Hidden curriculum OR implicit learning OR unspoken norms
Training programs OR education interventions
Policy implementation OR guidelines

Combine keywords with Boolean operators

Mobile devices AND clinical practice AND hidden curriculum
Smartphone OR tablet OR handheld device
Hidden curriculum OR informal learning) AND mobile devices

Our search strategy is iterative, allowing us to refine keywords and terms based on the relevance and coverage of the initial search results. This adaptability ensures a comprehensive and focused retrieval of relevant literature

Study Selection

Three independent reviewers select the appropriate studies according to the eligibility criteria based on the article titles and abstracts. PubMed (12,579), the Cochrane Library (348), Scopus (84), PsycInfo (21), CINAHL (220), Google Scholar (1,414), and articles that were unsuitable were all removed from the study along with their titles and abstracts. The full-text articles were then screened to see if they were suitable for review. When selecting the articles to be examined by agreement, the reviewers discussed and resolved any doubts or conflicts that could have risen up.

Inclusion Criteria

- Studies that explicitly explore the integration, impact, or ethical considerations of mobile technology in healthcare settings.

- Studies that discuss the intersection of mobile technology with human rights, emphasizing privacy, autonomy, informed consent, and equity in the context of clinical practice.
- Research conducted within clinical practice settings, encompassing hospitals, clinics, and other healthcare facilities.
- Studies that explicitly address ethical considerations associated with the use of mobile technology in healthcare, with a focus on maintaining patient rights and well-being.
- Studies published within the last fifteen years to ensure the relevance of the information to current advancements in mobile technology and healthcare practices

Exclusion Criteria

- Studies that are written in languages other than English to make sure we can understand and share the findings widely.
- If a study doesn't really talk about mobile phones, tablets, or similar devices, it was not included.
- Studies published more than fifteen years ago were not included unless they provide crucial information that is still very relevant today.

Study Selection Process

The process of selecting studies involved three screening stages: full-text screening, abstract screening, and study title screening. There were three independent reviewers for each of the three screening phases, and the corresponding author arbitrated any disagreements or conflicts among the three reviewers. After the titles and abstracts of the chosen research were reviewed, the full texts of the selected articles were retrieved and examined. Lastly, an extensive relevancy check was performed on entire texts.

Outcome's Measure

Primary variable is the evaluation of the development of clinical skills made possible by mobile devices and secondary variable is to determine how satisfied students are with their mobile learning experience.

Study Quality and Risk of Bias Assessment

Data extracted for external validity and reporting quality included study ID (first author name with the year and reference), study design characteristics (data regarding experimental design and study groups, number of participants per group), participants details. Critical Appraisal Skills Programme (CASP) scale was used for study quality assessment. Three independent reviewers performed the study quality evaluation; any conflicts/disagreements were resolved upon comparing the recorded data and discussion with the corresponding author. The CASP scale has 10 quality assessment items (yes, can't tell or no), which are used for calculating the final CASP score (0–10). Sackett's levels of evidence were used for simplifying study quality levels, and a study was considered to be Level 1 (higher quality) if it scored 6 on the CASP scale and Level 2 (low quality) if it scored <6.

Data Extraction

For the primary and secondary variables and sample size details were retrieved by three independent reviewers. Any conflicts/disagreements were resolved on discussion with the corresponding author and comparing the recorded data. The Microsoft data extraction form was consisting, of details of the included studies: study design, population details, target variables, and study findings. Data were extracted from the texts, tables, and figures of the included studies.

Data Synthesis

We performed qualitative analyses. The data extracted were summarized in table form to effectively present the characteristics and results of the included studies in narrative form.

Compliance with Ethics Guidelines

The authors of this study did not conduct any clinical or preclinical experiments with people or animals instead it is based on the earlier investigations.

RESULTS

Study Selection

A systematic search on electronic databases Google Scholar, PubMed, the Cochrane Library, scopus, psycinfo and CINAHL search resulted in

14666 articles. A total of 3 articles were identified from references to other studies. A total of 2382 dups were removed through EndNote. Titles and abstract screening by two independent reviewers resulted in the exclusion of 12278 studies. The 10,638 articles were deemed eligible for full-text screening. Finally, 6 articles were eligible for inclusion in the systematic review (Figure-1 PRISMA flow diagram).

Study Characteristics

Table-I provides a summary of the included studies characteristics. The articles all were written in English and were qualitative studies. The oldest article was published in 2012 and the most recent one was published in 2023. The number of participants in the sample ranges from 25-40. In total 193 participant included in the six studies. The studies involved a total of 102 males and 91 females. Participant's ages range from 25-27 years old. The focus group participants were chosen through a combination of random and quota sampling, with stratification based on race and gender to guarantee a representation of viewpoints.[4,16-20]

Four major themes came out, according to Heidi Lempp and Clive Seale: the value of hierarchy, haphazard teaching, getting ahead by competition, and personal encouragement. In the personal encouragement theme, 26 out of the 36 students named 46 specific staff members as positive role models who encouraged and encouraged them.

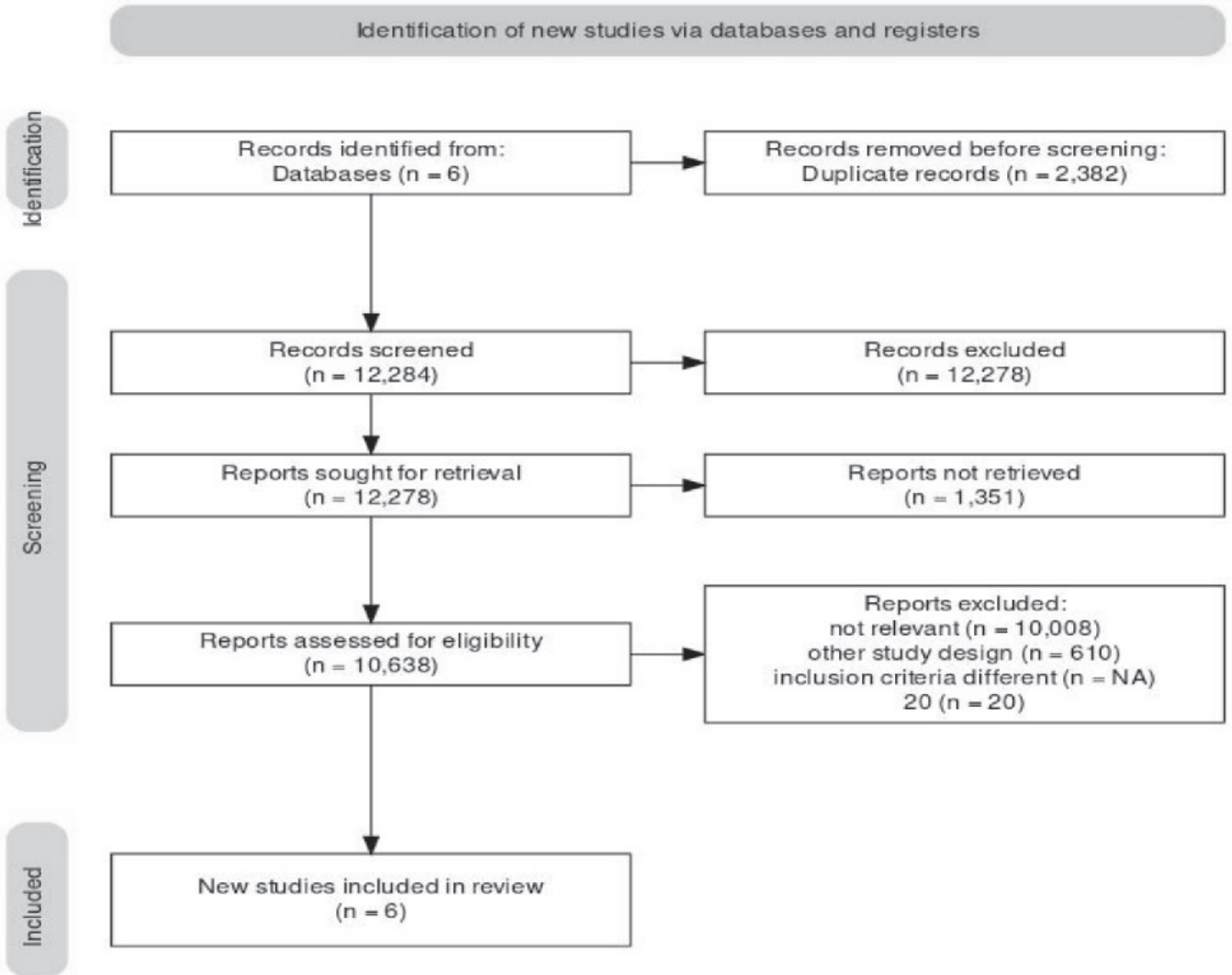

Figure-1. Prisma flow chart

s.no	Study ID and Country	Study Design	Participant Information	objectives	Data collection	conclusion
1	Doja et al 2016 Canada (16)	Qualitative study	40 (m =20, f = 20) Mean age =25	To increase our understanding about how student nurses' experiences of supernumerary status are embedded in the hidden curriculum in clinical practice and contribute to the theory–practice gap in nursing	Via semi structure interview	To reintegrate student nurses' learning, educators in universities and clinical practice have to understand how the hidden curriculum and expectations around supernumerary status among trained staff affect learning for students.
2	Heidi Lempp, Clive seale 2021 United Kingdom (4)	Qualitative study	36 (m = 18, f=18) Mean age = 26	To study medical students' views about the quality of the teaching they receive during their undergraduate training, especially in terms of the hidden curriculum	Via semi structure interview	the hidden curriculum now needs attention to produce the necessary fundamental changes in the culture of undergraduate medical education.
3	Whit et al 2012 Canada (17)	Qualitative study	26 (m=13, f =13) Mean age =27	Examine the cumulative impact of mobile device integration on medical students' education, keeping track of their personal development, continuous education, and skill application in clinical settings.	Via semi structure interview	Although it accommodates a variety of learning methods, mobile technology enhances student engagement and learning outcomes.
4	Murakami et al 2020 Japan (18)	Qualitative study	25 (m = 18, f = 7) Mean age = 25	Make scientific recommendations for how to best use mobile devices into medical education, taking into consideration obstacles, maximizing benefits and guaranteeing that the goals of the course of study are met.	Via Focus group interview	Using mobile devices into medical education enhances engagement among learners, fosters the development of dynamic clinical abilities, and enhances learning outcomes.
5	Bandini et al Ireland 2017 (19)	Qualitative study	38 (m = 19, f = 19) Mean age = 26	Examine possible obstacles to the successful implementation of mobile devices in medical education, such as pedagogical, technological, and organizational problems.	Via semi structure interview	The study highlights the significance it is to incorporate mobile devices into medical education. It illustrates the mutually beneficial connection between mobile technology and enhanced engagement among learners, improved educational results, and the development of advanced clinical skills.
6	Almairi 2023 Saudi Arabia (20)	Qualitative study	28 (m = 14, f =14) Mean age = 26	Examine the views and mindsets of medical faculty members about the use of mobile devices in the classroom, take into consideration the advantages, difficulties, and recommendations for improvement.	Via Focus group interview	The examination of mobile device integration in medical education indicates how learning dynamics are significantly affected by it.

Table-I. Characteristics of study

In contrast, the majority of students (25/36) talked about how teaching is often haphazard, especially when it comes to clinical staff, who frequently disregard their own schedule. As earlier research has shown, one of the main ways that students learned about the significance of hierarchy in medicine was through humiliating instruction. The majority of students (18/36) stated that the distinguishing feature of medicine is competition rather than cooperation, a belief that was especially prevalent among clinical students.[4] After saturation was attained, Doja et al. conducted five focus groups in all. Ten pre-clerkship students, ten clerkship students (two groups), ten residents, 10 staff/faculty members, and ten residents participated in focus groups. The collection of staff and academic members included practitioners in both inpatient and outpatient settings, as well as experts from surgical and medical specialties. Our study revealed six main themes: (1) the belief that some specialties are "superior" than others; (2) the maintenance of medical hierarchies; (3) a culture that tolerates unprofessional behavior; (4) the setting an example for others to follow; (5) the sense that idealism and emotional neutrality have been lost; and (6) cultural and contextual norms.[16]

Whit et al. conducted semi-structured interviews with 26 participants, and five main themes came out of the faculty and student replies in the focus groups and interviews. First, participants discussed the general topic of medical school's concealed curriculum. Second, it was significant to consider the issue of values modeled in medicine. Third, during their medical training, instructors and students discussed the evolution and changes. Respondents pointed out the obstacles associated with obtaining a medical degree in the fourth place. Lastly, instructors and students described coping mechanisms they used to get through medical school.[17] Focus group interviews, according to Murakami et al., offered deep insights into participants' viewpoints and experiences with mobile device integration in medical education.

The topics that were found were enhanced learning outcomes, student involvement and interaction, faculty adaptation and views, and implementation issues. These themes helped to provide a deeper knowledge of the implications, difficulties, and suggestions related to this integration.[18]

Four themes emerged from Bandini et al.'s semi-structured interviews with 38 participants: time management and flexibility, clinical skill development, personalization of learning, and collaborative learning communities. In contrast, Almairi's focus group interviews with 28 participants revealed three themes: the impact on patient-centered care understanding, technological literacy as a competency, and evolving educational roles.[19,20]

Study quality and risk of bias

The quality of the evidence was ascertained by evaluating the studies utilizing the Critical Appraisal Skills Programme (CASP) scale (Figure-2). The listed studies' methodological quality varies from moderate to excellent. The CASP consists of three sections totaling ten points, with section a having six more questions, section b having three, and section c having just one. Two of the studies were of a moderate quality, while the other three were of the highest caliber. One study's caliber was inadequate. Figure-2 depicts the general layout of the quality assessment.

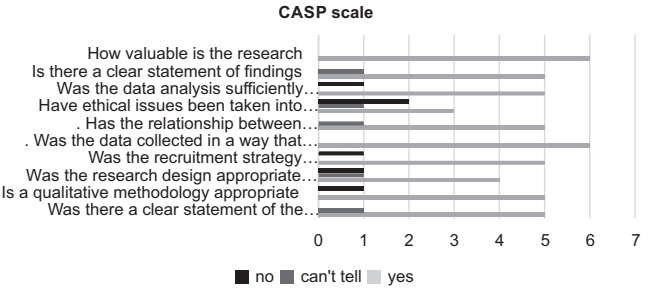

Figure-2. Risk of bias graph. The review author's judgments about each risk of bias item are presented as percentages across all included studies

DISCUSSION

The results of this research are consistent with the revolutionary effects of incorporating mobile devices into medical education. By enabling

anytime, anywhere access to educational resources and promoting increased student engagement through individualized and interactive experiences, mobile technology improves accessibility to learning.[21] The study underscores how crucial mobile devices are in helping medical students become technologically proficient and ready for a future in which technology will play a major role in healthcare. Through interactive applications and virtual simulations, integrating technology also favorably influences the creation of clinical abilities.[22] The significant influence of mobile technology is highlighted by the formation of cooperative learning groups and the promotion of improved understanding of patient-centered care.[18] There are, nevertheless, difficulties in striking a balance between conventional and technologically improved teaching techniques. There are, nevertheless, difficulties in striking a balance between conventional and technologically improved teaching approaches.[23] The suggestions made by the participants, which promise a long-term improvement in medical education, stress the necessity of adapting to this changing educational paradigm and call for increased infrastructure and continual professional growth.[24] Although the use of mobile devices in medical education has revolutionary advantages, there are certain noteworthy drawbacks that should be taken into account. Inequitable access to devices can impede equitable participation by creating a digital divide among pupils.[25] The drawbacks of integrating mobile technology into learning environments are highlighted by worries about distractions and decreased concentration during lectures. Strong security measures are required due to the serious security and privacy hazards involved with keeping private patient information on devices.[26] Obstacles include lack of uniformity in mobile device usage, staff and student resistance to change, and technical difficulties. Furthermore, there are worries that placing too much focus on technology could overshadow more conventional teaching strategies and lower the standard of medical education.[27] These difficulties demand careful approaches to issues with security, pedagogical alignment, and access in order to guarantee a just and effective incorporation of mobile devices in medical education.[28]

CONCLUSION

There is a fundamental potential, based to research on mobile device integration in medical education. Due to its ability to support a variety of learning styles, mobile technology has had a beneficial effect on student engagement and learning results. Faculty attitudes emphasize the significance for constant assistance and the cautious balancing of traditional and technologically advanced instructional approaches. Technology barriers are just one type of challenge that requires proactive answers. The study highlights the significance of developing students' technical proficiency as well as a supportive infrastructure. Looking ahead, the research points to the necessity for a dynamic, highly technological learning environment that not only adjusts to the demands of the present but also gets students ready for the changing face of healthcare. This paper lays the groundwork for future developments and enhancements in medical pedagogy by stressing the critical role those mobile devices play throughout the education of healthcare professionals.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Maidha Jadoon	Conceived and designed the study, analyzed and interpreted the data, and wrote the manuscript.	
2	Afreenish Malik	Was responsible for data collection and helped in writing the manuscript.	
3	Fatima Aman	Analyzed and interpreted the data, helped in writing the manuscript.	
4	Ayesha Bibi	Provided design and data collection.	
5	Summara Khan	Provided design and data collection.	
6	Raima Bilal	Provided design and data collection.