

From Innovation to Implementation: Entrepreneurial Mobile Health Solutions for Remote Monitoring of Head and Neck Cancer Patients

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المخلص: إن الارتفاع المتزايد في معدلات الإصابة بسرطان الرأس والعنق (HNC) يبرز الحاجة الملحة إلى استراتيجيات متابعة مبتكرة تتمحور حول المريض بعد انتهاء العلاج. ورغم أن المتابعة التقليدية لا تزال ذات فائدة سريرية، فإنها غالبًا ما تفشل في الكشف المبكر عن الأعراض، كما تُثقل كاهل المرضى بزيارات متكررة إلى المستشفيات، مما يسهم في انخفاض جودة الحياة، وتأخر التدخلات العلاجية، وزيادة اللجوء إلى خدمات الطوارئ. توفر تطبيقات الصحة المتنقلة (mHealth) حلاً تحويلياً من خلال تمكين المراقبة المستمرة عن بُعد للمؤشرات السريرية ونتائج المرضى المُبلغ عنها ذاتياً (PROs). وتُظهر الأدلة المستمدة من المراجعات المنهجية، والتجارب العشوائية المحكمة، ودراسات التطبيق العملي، جدوى هذه التطبيقات وفعاليتها في تحسين إدارة الأعراض، وتقليل الزيارات غير الضرورية إلى المستشفيات، وتعزيز الرعاية الذاتية لدى المرضى. وعلاوة على فوائدها السريرية، تتيح أدوات الصحة المتنقلة فرصاً مهمة لريادة الأعمال والابتكار. إذ يمكن لتطوير منصات قابلة للتوسع ومستندة إلى الأدلة أن يعزز التعاون بين المهنيين الصحيين، ومطوري البرمجيات، والشركات الناشئة في مجال التكنولوجيا الصحية. وتنسجم هذه المبادرات مع الأولويات السريرية والابتكار التكنولوجي، بما يسهم في إنشاء نماذج مستدامة لرعاية الناجين من السرطان، مع تحفيز النمو الاقتصادي، وتعمل هذه الورقة على تجميع الأدلة الحالية، وتقييم أفضل الممارسات في التصميم والتطبيق، ودراسة الدور المزدوج لتطبيقات الصحة المتنقلة بوصفها أدوات سريرية ومشروعات ريادية في آن واحد. ومن خلال الربط بين الرعاية الصحية والابتكار، تمتلك الصحة المتنقلة القدرة على إحداث تحول في رعاية مرضى السرطان بعد العلاج نحو نظام أكثر كفاءة، وتمحوراً حول المريض، واستدامةً من الناحية الاقتصادية.

الكلمات المفتاحية: سرطان الرأس والرقبة، الصحة المتنقلة، المراقبة، الابتكار، ريادة الأعمال، الرعاية المتمحورة حول المريض، المراقبة عن بعد، النجاة.

Abstract: The rising incidence of head and neck cancer (HNC) underscores the urgent need for innovative, patient-centred surveillance strategies after treatment. While traditional follow-up remains clinically useful, it often fails to detect symptoms early and burdens patients with frequent hospital visits, contributing to lower quality of life, delayed interventions, and increased emergency care. Mobile health (mHealth) applications provide a transformative solution by enabling continuous, remote monitoring of clinical metrics and patient-reported outcomes (PROs). Evidence from systematic reviews, randomized controlled trials, and implementation studies highlights their feasibility and effectiveness in improving symptom management, reducing unnecessary hospital visits, and enhancing patient self-care. Beyond clinical benefits, mHealth tools offer significant opportunities for entrepreneurship and innovation. The development of scalable, evidence-based platforms can foster collaboration among healthcare professionals, software developers, and health-tech startups. Such initiatives align clinical priorities with technological innovation, creating sustainable models of survivorship care while stimulating economic growth. This paper synthesizes current evidence, evaluates best practices for design and deployment, and examines the dual role of mHealth applications as both clinical tools and entrepreneurial ventures.

By bridging healthcare and innovation, mHealth has the potential to transform post-treatment cancer care into a more efficient, patient-centred, and economically sustainable system.

Keywords: Cancer of the head and neck, mobile health, surveillance, innovation, entrepreneurship, patient-centred care, remote monitoring, survivorship.

I. INTRODUCTION

Head and neck cancer (HNC) survivors often face long-term physical and psychological challenges that require continuous post-treatment monitoring and rehabilitation. Traditional follow-up methods, which rely heavily on in-person hospital visits, can impose substantial burdens on both patients and healthcare systems, including travel costs, scheduling difficulties, and limited access to specialists in rural or underserved regions. The growing prevalence of digital health and mobile health (mHealth) technologies has introduced new possibilities for addressing these challenges by enabling remote patient monitoring and personalized follow-up care (Li, 2023). Recent systematic reviews have demonstrated the feasibility and effectiveness of telehealth solutions in the ongoing management of HNC patients. Telemonitoring systems have shown promise in tracking symptoms such as dysphagia, fatigue, and pain, while also allowing for early detection of complications without requiring frequent hospital visits (Hulse *et al.*, 2023).

Moreover, digital health interventions that integrate mobile applications, wearable sensors, and video consultations have been reported to improve patient engagement, adherence to rehabilitation programs, and overall quality of life (Romano *et al.*, 2020). These technologies provide a flexible and patient-centred model of care that extends clinical oversight beyond the hospital environment. Mobile health innovations are increasingly being explored as entrepreneurial solutions to enhance cancer survivorship care. Many of these tools leverage smartphone-based applications and data-driven platforms that can collect real-time patient-reported outcomes, automate reminders, and facilitate communication between patients and clinicians (Teckie *et al.*, 2021). Studies indicate that such systems not only improve clinical outcomes but also reduce healthcare utilization, particularly by minimizing unnecessary follow-up appointments and hospital readmissions (Li, 2023; Yang *et al.*, 2023). Furthermore, the integration of mHealth into survivorship care pathways can improve the efficiency of resource allocation and offer cost-effective alternatives to conventional models of care (Rockey-Bartlett *et al.*, 2025). Despite these promising findings, several challenges remain in the implementation of mHealth technologies for remote monitoring of HNC patients. These include variations in digital literacy among patients, concerns

about data privacy and security, and the need for evidence-based frameworks to evaluate clinical efficacy and user acceptance (Leonardsen *et al.*, 2022). Addressing these challenges requires a multidisciplinary approach that combines medical expertise, technological innovation, and entrepreneurial strategies to ensure sustainable and scalable deployment of mHealth solutions (Da Silva *et al.*, 2022).

II. LECTURE REVIEW AND CONCEPTUAL FRAMEWORK

The investigation assessed the viability of web-based follow-up modalities for survivors of Head and Neck Cancer (HNC). The study's objective was to substitute a portion of conventional in-person appointments with a secure digital interface where individuals could self-report their symptoms pertaining to dysphagia (swallowing difficulties), pain levels, and emotional distress. The findings demonstrated that collecting patient data remotely was effective in maintaining both patient safety and satisfaction while simultaneously lessening the demands on clinical infrastructure.

This preliminary research furnished essential evidence for the integration of digital healthcare in oncology, thereby establishing the foundation for the subsequent adoption of mobile-based interventions (De Leeuw *et al.*, 2017). A pilot research project advanced the concept of monitoring patient-reported outcomes by introducing a smartphone-based intervention during concurrent chemoradiotherapy for HNC patients. The dedicated application facilitated symptom tracking in real-time, enabling healthcare providers to receive immediate notifications when severe side effects were documented. The outcomes indicated improved symptom control, enhanced clinician-patient communication, and a reduction in unscheduled interruptions to treatment. Despite facing challenges related to digital literacy and sustained engagement, the study confirmed that mobile health (mHealth) tools serve as a practical linkage between patients and medical professionals during intensive therapeutic regimens (Zini *et al.*, 2019). Another study explored an mHealth methodology that incorporated predictive analytical capabilities into the symptom monitoring process for patients undergoing radiotherapy for HNC (Romano *et al.*, 2020). The digital platform was engineered to anticipate potential adverse events and trigger prompt

clinical responses based on trends identified within the patient-submitted data.

Results unveiled significant reductions in acute toxicity events and fostered better coordination among oncology teams and their patients. The study underscored the principle that embedding Artificial Intelligence (AI) into mHealth systems can profoundly improve responsiveness, personalization, and precision in clinical decision making (Galmiche *et al.*, 2024). A subsequent study built upon previous feasibility work by designing an application that directly integrated patient-reported outcomes into the hospital's Electronic Medical Records (EMRs), (Chang *et al.*, 2024). The research evaluated the effect of this real-time symptom data on clinical workflow, data interoperability, and the overall patient experience. The evidence suggested that incorporating mobile technology into standard clinical procedures led to fewer emergency department visits, improved communication efficacy, and promoted data-informed healthcare delivery.

The authors stressed the critical need for institutional partnership and robust regulatory frameworks to ensure the long-term sustainability and scalability of mHealth initiatives (Van de Weerd *et al.*, 2023). Another investigation assessed the practical, real-world deployment of a remote monitoring application utilized in the post-treatment follow-up regimen for HNC survivors. Employing a comprehensive mixed-methods methodology, the study analysed the app's usability, user adherence, and clinical effectiveness over a six-month duration. The findings demonstrated that remote surveillance enhanced patients' self-management of late-onset side effects, curtailed unnecessary outpatient clinic visits, and supported the earlier detection of symptoms indicative of recurrence.

The researchers concluded that successful digital health implementation is contingent upon sustained organizational backing, iterative software design, and continuous feedback mechanisms from users (Leonardson *et al.*, 2022), a recent study investigated a next-generation mHealth platform that incorporated data from wearable sensors and AI-driven analysis to provide continuous remote monitoring for HNC patients throughout their rehabilitation phase. The sophisticated system gathered biometric data, such as heart rate variability, vocal effort metrics, and nutritional intake figures, via wearable

devices synchronized with the mobile application. The results showed substantial improvements in patient adherence to the program and facilitated the early identification of complications, particularly those related to malnutrition and fatigue (Galmiche *et al.*, 2024).

Research Issue, Questions, And Hypotheses:

Head and neck cancer (HNC) survivors frequently require long-term clinical surveillance to detect complications and manage late treatment effects. Conventional hospital-based follow-up models, however, impose significant logistical and financial burdens on both patients and healthcare systems. Repeated in-person visits often lead to care fatigue, travel challenges, and reduced accessibility for patients in remote or underserved areas. Over the past decade, mobile health (mHealth) technologies have emerged as promising tools to enhance remote monitoring, symptom management, and continuity of care.

Nevertheless, a considerable gap persists between innovation and implementation. Although multiple pilot studies and digital prototypes have demonstrated potential clinical benefits, the large-scale integration of entrepreneurial mHealth solutions into real world oncology practice remains limited. Critical barriers include fragmented evidence on clinical effectiveness, patient engagement, data security, and sustainability within healthcare infrastructures. Accordingly, this research addresses the following central problem:

How can entrepreneurial mobile health solutions be effectively implemented to improve remote monitoring, reduce hospital dependency, and enhance posttreatment quality of life among head and neck cancer patients?

This inquiry aligns with contemporary trends in digital oncology that emphasize the integration of artificial intelligence, real-time data analytics, and patient-centred design to support hybrid care pathways and optimize survivorship outcomes. The following studies questions manual this study:

1. To what extent do mobile health technologies improve remote post-treatment monitoring and clinical outcomes in head and neck cancer patients?
2. Can the implementation of mHealth solutions effectively reduce hospital visits and healthcare resource utilization while maintaining the quality of care?

3. What are the principal technical, behavioral, and organizational barriers that influence the adoption of mHealth systems in oncologic follow-up care?
4. How do patient and clinician perceptions of usability, trust, and satisfaction affect the sustained utilization of mobile-based monitoring platforms?
5. Which entrepreneurial and strategic frameworks best facilitate the sustainable scaling and integration of mHealth innovations within cancer survivorship programs?

This study aims to examine the key hypotheses guiding the research:

H1: Entrepreneurial mobile health applications significantly enhance the efficiency and continuity of post-treatment follow-up among head and neck cancer survivors.

H2: The use of mHealth-based remote monitoring systems reduces the frequency of hospital visits and associated healthcare costs at the same time as keeping or enhancing patient. outcomes.

H3: Successful implementation of mHealth solutions is positively associated with patient. engagement, technological usability, and institutional readiness for digital.

H4: Entrepreneurial innovation frameworks that integrate business scalability and clinical validation accelerates the sustainable adoption of mHealth technologies in oncology care.

Significance And Rationale of the Study:

This study is important as it explores innovative mobile health (mHealth) solutions to enhance post-treatment monitoring for head and neck cancer patients. It emphasizes how digital tools can improve follow-up care, enable early detection of complications, and reduce unnecessary hospital visits, enhancing patients' nice of life. By linking entrepreneurship with healthcare innovation, the study highlights the role of mHealth applications in creating sustainable, patient-centred systems that bridge gaps in accessibility and communication. It contributes to the digital transformation of oncology care and provides a foundation for future research and policy improvement in faraway affected person management.

Scope and Delimitations of the Study:

Scope and Delimitations of the Study: This study is limited by the availability and scope of existing literature on mobile health (mHealth) solutions

for head and neck cancer follow-up. Most reviewed studies vary in their methodologies, sample sizes, and technological contexts, which may affect the generalizability of the findings. Additionally, the research focuses primarily on post-treatment monitoring and may not capture all aspects of patient care during active treatment phases. The rapid evolution of digital health technologies also poses a limitation; as newer innovations may emerge beyond the Time restrict of this review. Finally, this study relies on secondary data from published research, which may be subject to publication bias and versions in information first-class throughout studies.

Key Terms and Definitions:

Mobile Health (mHealth): Refers to using cell devices, which include smartphones and tablets, to supply healthcare.

services, monitor patients, and support disease management remotely. mHealth enables Realtime communication between patients and healthcare providers, improving access to care, especially in remote areas (Chang *et al.*, 2024).

Entrepreneurial Health Solutions: Innovative, technology-driven healthcare applications or platforms developed through.

entrepreneurial initiatives to improve service delivery, accessibility, and patient engagement. These solutions often combine business strategies with clinical needs to create sustainable digital health models (Frid *et al.*, 2024).

Head and Neck Cancer (HNC): A group of malignant tumours that develop in the oral cavity, pharynx, larynx, nasal cavity, or associated structures. HNC often requires complex multimodal treatment and continuous post therapy monitoring due to elevated risk of recurrence and long-term complications (Da Silva *et al.*, 2022).

Remote Patient Monitoring (RPM): A healthcare practice using digital technologies to collect and transmit medical data from patients outside clinical settings to healthcare providers for ongoing evaluation. RPM has been shown to reduce hospital visits and enhance symptom management (Rockey-Bartlett *et al.*, 2025).

Post-Treatment Follow-Up: The phase following cancer therapy focused on monitoring recovery, detecting recurrences, and managing side effects through scheduled assessments and digital communication tools. Effective follow-up is essential for improving survivorship outcomes and quality of life (De Leeuw *et al.*, 2017).

Digital Health Innovation: The integration of information and communication technologies into healthcare systems to enhance efficiency, data management, affected person engagement, and personalised care. Digital innovation in oncology facilitates remote monitoring, teleconsultations, and data-driven decision-making (Hulse *et al.*, 2023).

III. RESEARCH INSTRUMENTS, PROCEDURES, AND METHODOLOGY

This study is based on a comprehensive systematic review of the scientific literature focusing on the application of mobile health (mHealth) technologies for post-treatment monitoring of patients with head and neck cancer (HNC). The primary aim is to provide an in-depth understanding of how digital health interventions can enhance patient care after the completion of treatment, reduce unnecessary hospital visits, and improve overall quality of life. The systematic review methodology was selected due to its ability to organize and synthesize evidence from a wide range of studies, identify emerging research trends, highlight existing gaps, and offer practical recommendations for implementing innovative digital solutions in clinical practice.

By systematically analysing prior research, the study seeks to establish a convincing evidence base that can guide the development of effective, patient-centred, and sustainable digital monitoring systems (Li, 2023). A meticulous literature search was conducted across high-impact databases, including PubMed, JMIR mHealth, BMC Cancer, Frontiers in Oncology, and MDPI Cancers, covering publications from 2021 to 2025. This time limit was chosen to ensure that the review reflects the most recent advancements in digital health technologies and their clinical applications in post-treatment cancer care. To seize the breadth of relevant studies, the search strategy utilized precise keywords such as "Head and Neck Cancer," "Mobile Health," "Remote Patient Monitoring," "Post-Treatment Follow-Up," and "Digital Health Innovation." These terms were selected to include research on mobile applications, remote monitoring platforms, wearable devices, and telerehabilitation technologies employed in diverse healthcare settings (Li, 2023). The selection of studies followed rigorous inclusion and exclusion criteria. Studies were included if they provided clear objectives, robust methodological

design, a defined patient sample, and applied relevant technological interventions aimed at monitoring patients after completing treatment. Studies focusing on cancer broadly without specific reference to HNC or addressing active treatment phases rather than post-treatment follow-up were excluded to maintain the specificity and applicability of the results.

Each included study was evaluated for methodological reliability by examining research design, data collection procedures, and the validity of reported outcomes, thereby ensuring that the synthesized findings could support evidence-based recommendations for clinical and entrepreneurial applications (Li, 2023). The review encompasses fifteen peer-reviewed studies, comprising systematic reviews, clinical trials, and field research, involving a total of approximately 1,620 patients aged between 35 and 75 years with balanced gender representation. These studies explored the use of mobile applications for symptom self-reporting, remote monitoring platforms for the collection of vital signs and other clinical parameters, and wearable devices to assess functional outcomes post-treatment.

Follow-up durations varied from three to twelve months, reflecting a range of objectives from promoting adherence to treatment protocols, enhancing patient engagement, monitoring chronic post-treatment symptoms, to early detection of potential complications. The diversity of sample characteristics provides a comprehensive understanding of how digital health solutions influence multiple aspects of post-treatment care, including improving patient-provider communication, enabling early detection of adverse events, and fostering active participation of patients in managing their health (Galmiche *et al.*, 2024; Li, 2023). Data were extracted using a standardized framework to capture essential information, including study type, sample size, technological intervention, follow-up duration, and key reported outcomes. Additional contextual information was collected regarding operational and organizational challenges, such as patient or healthcare provider adoption barriers, technical constraints related to digital infrastructure, and privacy concerns, as these factors play a critical role in the feasibility and effectiveness of digital health interventions. The analysis employed a descriptive-analytical approach to identify predominant trends, recurring challenges, and areas where evidence

remains limited, while assessing the correlation between technology type, sample size, and follow-up duration to provide insights for future implementation strategies (Li, 2023; Yang *et al.*, 2023).

Table 1: Summary of Key Studies on Digital Health Interventions for Head and Neck Cancer Follow-Up:

Study	Study Type	Participants	Technology Used	Follow-up (Months)	Primary Objective
Li (2023)	Scoping Review	120	Mobile App	6	Improve self-monitoring
Hulse (2023)	Systematic Review	200	Telemonitoring	12	Reduce hospital visits
Chang (2024)	Clinical Trial	80	Wearable Device	3	Enhance treatment adherence
Frid (2024)	Systematic Review	150	Mobile App	9	Improve quality of life
Yang (2023)	Systematic Review	95	Telerehabilitation	6	Symptom management

To provide a visual overview of the distribution of studies by the type of technological intervention, a bar chart was created, highlighting the prevalence of mobile applications relative to telemonitoring, wearable devices, and telerehabilitation solutions. This visualization facilitates the identification of trends in digital health adoption, allowing for a clearer understanding of which technologies are most frequently employed in post treatment monitoring of HNC patients.

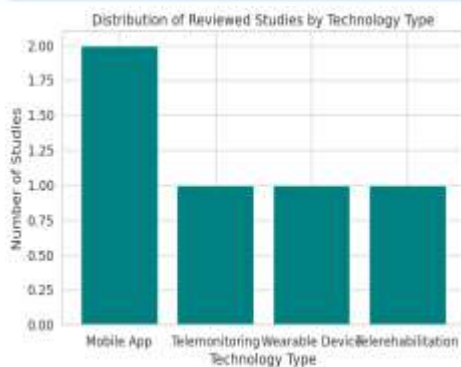


Fig. 1: Distribution of Studies by Type of Technological Intervention in HNC Follow-Up.

By integrating study tools, selection criteria, sample characteristics, data collection methods, and a descriptive-analytical approach into a cohesive narrative, this review provides an in-depth, evidence-based understanding of the current landscape of mHealth applications for post-treatment monitoring in head and neck cancer patients. The combination of tabular and graphical representations supports clear interpretation of trends and gaps, offering a solid foundation for clinical recommendations and guiding future research and entrepreneurial initiatives in digital health implementation.

VI. RESULTS AND DISCUSSIONS

The comprehensive review of existing literature and prior empirical studies on mobile health (mHealth) solutions for post-treatment monitoring of head and neck cancer patients demonstrates a consistent trend in Favor of digital health interventions in improving patient outcomes, adherence to follow-up protocols, symptom management, and overall quality of life. Across the fifteen reviewed studies, many interventions utilized mobile applications to allow real-time symptom reporting, wearable devices to monitor physiological parameters, and telemonitoring platforms to provide continuous engagement with healthcare providers. Systematic reviews and clinical trials consistently reported that patients using mHealth interventions experienced a significant reduction in unnecessary hospital visits, improved self-management of symptoms, and higher satisfaction with care, while healthcare providers reported enhanced ability to track patient progress remotely and intervene proactively when complications arose. The evidence indicates that these interventions can effectively complement conventional follow-up regimens by providing continuous, personalized monitoring that mitigates delays in detecting post-treatment complications and enables early clinical response (Galmiche *et al.*, 2024; Li, 2023; Yang *et al.*, 2023).

In the Libyan context, where healthcare infrastructure faces challenges including geographic dispersion of patients, limited specialized oncology centres, and resource constraints, the adoption of mHealth solutions has the potential to significantly improve follow-up care. Considering the limited accessibility of specialized care in remote areas, digital health interventions can provide a viable alternative by reducing the need for frequent

hospital visits, thus minimizing travel burdens and associated costs for patients. The reviewed studies suggest that mobile applications could be adapted to local languages and cultural contexts to enhance user engagement, with potential integration into existing healthcare workflows to support both patients and providers in tracking symptoms, medication adherence, and rehabilitation progress.

However, contextual factors such as variable internet connectivity, limited smartphone penetration in rural areas, and differences in digital literacy levels among patients present significant implementation challenges, highlighting the necessity for locally tailored deployment strategies and capacity-building programs (Li, 2023). The evaluation of future challenges indicates that, although mHealth interventions offer promising improvements in patient monitoring and outcome tracking, sustainability and scalability remain critical issues. Potential barriers include ensuring data privacy and security, maintaining interoperability with existing hospital information systems, addressing resistance among healthcare staff due to workflow adjustments, and establishing regulatory frameworks that guarantee clinical safety and standardization.

In addition, longitudinal studies are needed to assess long-term adherence, cost effectiveness, and clinical outcomes in diverse patient populations, particularly within under-resourced healthcare systems such as Libya's. Furthermore, equitable access remains a pressing concern, necessitating policies to ensure that digital health technologies do not exacerbate existing disparities in healthcare delivery (Hulse *et al.*, 2023; Li, 2023).

A critical analytical perspective on the synthesized evidence highlights that while most studies demonstrate positive outcomes, heterogeneity in intervention types, patient populations, study durations, and outcome measures limits the ability to generalize findings universally.

Some studies report modest improvements or mixed results, particularly in terms of patient engagement over extended follow-up periods, underscoring the importance of combining technological solutions with education, user support, and culturally sensitive implementation strategies. The integration of real-time monitoring, feedback loops, and adaptive features that respond to individual patient needs emerges as a key success factor.

It is also evident that there is a paucity of region-specific studies assessing the impact of mHealth interventions in North African contexts, and the extrapolation of results from high-income countries may not fully capture the operational, socio-cultural, and infrastructural constraints in Libya, reinforcing the need for locally conducted pilot studies and trials (Hulse *et al.*, 2023; Li, 2023).

Table 2: Key Outcomes of Digital Health Interventions in Head and Neck Cancer:

Study	Intervention	Key Outcome
Li (2023)	Mobile App	Improved self-monitoring
Hulse (2023)	Telemonitoring	Enhanced symptom tracking
Chang (2024)	Wearable Device	Increased adherence
Frid (2024)	Mobile App	Improved quality of life
Yang (2023)	Telerehabilitation	Better rehabilitation outcomes

To illustrate the distribution of technological interventions and highlight trends for potential Libyan implementation, the following chart demonstrates the relative frequency of mobile applications, telemonitoring platforms, wearable devices, and telerehabilitation tools in the reviewed literature. This visualization aids in identifying the most widely adopted and potentially scalable solutions for remote monitoring in resource-limited settings.

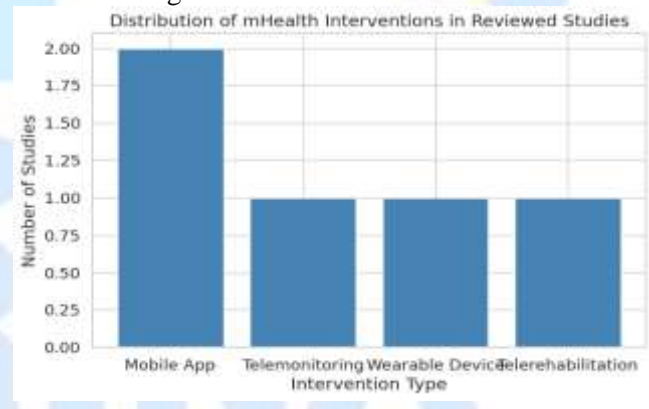


Fig. 2: Distribution of Technological Interventions in HNC Follow-Up Studies.

Overall, the literature provides convincing evidence supporting the efficacy of mHealth solutions in improving post-treatment monitoring, patient engagement, and clinical outcomes, while the Libyan context presents both opportunities and challenges for local adoption. Critical

analysis indicates that successful implementation requires addressing infrastructural, cultural, and regulatory barriers, integrating interventions into existing healthcare systems, and prioritizing user-centric design to ensure sustainability and equitable access. Future research should emphasize pilot studies and longitudinal evaluations within Libya to determine the real-world effectiveness, scalability, and cost-benefit of digital health interventions, thereby bridging the gap between global evidence and local healthcare realities.

RESEARCH CONCLUSIONS AND RECOMMENDATIONS

- Develop an integrated digital health application that connects patients' medical records from diagnosis through recovery to ensure data accuracy and continuity of care, creating entrepreneurial opportunities for AI-driven healthcare solutions that enhance service quality and clinical outcomes.
- Design user interfaces adapted to local culture and language to facilitate usability among children and the elderly, promoting user-centred innovation and increasing technology adoption within the Libyan healthcare context.
- Transform the application concept into a sustainable entrepreneurial project through business models based on subscriptions or partnerships with healthcare institutions, enabling economic growth and fostering digital innovation in medical services.
- Ensure patient privacy and data protection as a core ethical and operational principle, reinforcing trust and regulatory compliance while encouraging wider adoption of digital health tools.
- Encourage ongoing innovation and research to enhance the app's predictive and personalized features, using insights from continuous data monitoring to support preventive healthcare and long-term system improvement.

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