REVIEW ARTICLE

The Use of Technology in Enhancing Nurses' Pain Management Competencies: A Narrative Review

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Abstract:

Background:

Effective pain management is a critical aspect of nursing care, and technological advancements have the potential to improve nurses' competency in assessing, monitoring, and intervening as a strategy for improved patients' pain experiences and outcomes.

Objective:

This review aimed to explore various technologies employed in pain management, their implications on nurses' competencies, and the challenges and benefits associated with their implementation.

Methods:

Using keywords from relevant studies, we searched the following electronic databases for pertinent literature and freely accessible full text: PubMed, ScienceDirect, IEEE Xplore, and Google Scholar.

Results:

Findings from the literature provide valuable insights into the various technologies employed by nurses to assess pain, such as wearable technology, virtual reality, mobile applications, and telehealth platforms, that give nurses a chance to develop their expertise in pain management, put evidence-based interventions into practice, and track patient response to care. Additionally, the benefits of implementing technology applications in pain management, including its ability to broaden nurses' knowledge, hone their decision-making skills, and customize patient care with the use of simulation platforms and remote monitoring tools, were identified. Furthermore, issues like technological literacy, time restraints, privacy concerns, and ethical considerations need to be addressed for the effective incorporation of technology into pain management procedures.

Conclusion:

To improve patient care and outcomes, nurses can use technology to improve their pain management skills by recognizing the possible benefits and resolving related problems. Conclusively, areas for future research and development and implications to nursing practice, education, and research were outlined.

Keywords: Technology, Pain management, Pain assessments, Nursing practice, Competency, Nurses.

1. INTRODUCTION

Effective pain management is a fundamental component of nursing care that strengthens nurses' critical reasoning and decision-making abilities [1] to reduce patients' suffering and enhance their general well-being. In the past two decades, the healthcare sector has witnessed advances in methods for cont-

rolling pain owing to technological improvements [2]. The pain management technological approach encompasses a variety of techniques, including the use of wearable devices, virtual reality, computer-based training modules, mobile applications, and telehealth platforms, among others [3, 4]. These technologies not only give nurses the chance to improve their ability to measure pain but also facilitate the use of evidence-based interventions in tracking patients' therapeutic responses. For instance, Mahna, Ouda [5] research on the impact of

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evidence-based nursing interventions on children's pain management in Africa found that using storytelling, reflexology and massage, cartoon videos, and music techniques can effectively lessen post-operative pain in children having abdominal surgery; thereby, demonstrating how important the role of nurses is in determining and treating patients' pain.

Additionally, the quality of care offered, especially treatment given in opioid crises, as well as the policy initiatives nurses engage in to address opioid addiction, are highly impacted by nurses' competence in pain management [6]. The use of technology in pain treatment procedures has increased nurses' abilities, knowledge, and judgment, leading to enhanced patient outcomes, and experiences.

One such key areas which technology has impacted on nurses' pain management competency is the provision of accessible and tailored educational resources such as mobile applications and computer-based modules offering interactive and educational content [7]. This feature gives nurses the most recent knowledge on pain assessment instruments, pharmaceutical and non-pharmacological therapies, and best practices in pain management. With the aid of these tools, nurses can increase their knowledge base and keep up with the most recent evidence-based practices.

Moreover, technology advancements provide platforms for simulation and virtual reality that let nurses practice pain assessment methods and therapies in a supervised and realistic setting [8]. Various pain scenarios can be replicated in virtual reality simulations, enabling nurses to hone their decision-making skills, sharpen their critical thinking, and increase confidence in their ability to manage pain effectively [9].

Despite the apparent advantages, there are certain difficulties in incorporating technology into pain treatment procedures. The lack of technology literacy, time limits, privacy issues, the requirement for continual training, and other issues may provide challenges for nurses. For technology to be successfully incorporated into pain treatment methods, the difficulties and ethical issues surrounding its application must be addressed. In this narrative review, the use of technology to improve nurses' pain management skills is examined, with an emphasis on the advantages, difficulties, and practical implications for the future.

2. MATERIALS AND METHODS

The thorough identification of material pertinent to the integration of technology in strengthening nurses' pain management competencies was made possible by the systematic search across four databases. The chosen databases spanned a wide range of academic fields, ensuring a complete understanding of the subject and enhancing the accuracy and thoroughness of the review. Using a combination of keywords and Medical Subject Headings (MeSH) terms, the search was carried out in PubMed/MEDLINE, IEEE Xplore, Google Scholar, and Web of Science. The keywords covered terms for technology, pain management, nursing, education, and competency development. To broaden the search's scope, different phrase combinations were also taken into account.

Articles written in English from the beginning to the current day were the main focus of the literature search. Studies that looked at how to better integrate technology into nursing practice were considered. The range of technology tools explored included electronic health records (EHRs), smartphone apps, virtual reality simulations, and wearable technology. Articles that did not specifically highlight how technology is used in improving pain treatment were omitted from consideration. Furthermore, articles not available in full text were excluded.

3. RESULTS

This section discusses the key outcome of the literature search.

3.1. Overview of Pain Concept

Many diseases present pain as a common and frequent symptom, which increases the desire of people to seek medical intervention. Pain is regarded as having the biggest impact on all facets of the life of a patient [10] and is characterized by a negative perceptual and/or psychological sensation connected to, or frequently expressed in terms of, real or possible harm to the tissue, as stated by the International Association for the Study of Pain [11].

In sub-Saharan Africa, where pain is frequently underdiagnosed and undertreated, almost 80.5% of patients reported a nonzero level of pain, meaning they experienced the worst kind of pain, and 30.0% of patients reported moderate to severe pain [12]. The severity of pain depends to a greater extent on the factors responsible for the pain occurrence.

On rare occasions, a specific uncommon injury or illness can be directly connected to pain, while occasionally, the reason for the discomfort may be less obvious or unknown. Hundreds of diseases tend to cause pain disorders and situations, including cancer, trauma, inflammation, and infection, or may occasionally be a sign of a serious or fatal condition [13]. Among other things, headaches, sore throats, toothaches, burns, bruises, and cramps are some of the typical causes of pain.

Some authors have identified several kinds of pain, including the acute, chronic, neuropathic, and visceral types [14, 15]. Depending on the underlying cause, it is possible to feel more than one type at once [16].

While the approach to effective care of each pain type differs, an earlier investigation revealed that a specific type of neural stimulus, BurstDRTM, was effective at lowering pain and improving daily life for those experiencing persistent pain in the viscera [15]. Effective pain treatment can be impacted by a variety of variables, including a lack of standardized pain management protocols, inadequate knowledge, and the complexity of pain care [17]. Similar to this, prior researchers have identified a major contributing factor to inadequate pain management as the propensity to disregard patient reports of pain as well as the complexity and multi-dimensional approach to pain management [15, 18]. As a result, effective pain management calls for knowledgeable healthcare professionals with the right attitudes and evaluation abilities [19]. Additionally, to promote effective pain control and enhanced

quality of life, several researchers have also advocated for the incorporation of technology into pain management [20].

3.2. Technologies for Pain Assessment

Several technologies for pain assessment can assist medical professionals in gathering unbiased data and boosting the precision of pain assessments. To assess pain, the following technologies are frequently used:

3.2.1. Electronic Pain Assessment Tools and their Features

Digital technologies have been proven to enhance higher-quality pain assessment, made possible through various electronic pain assessment tools. Digital tools have been dramatically useful interactive approaches to visually capture a multidimensional evaluation of pain, taking into account its type, intensity, and site [21]. Hoti, Atee [22] described the electronic Pain Assessment Tool (ePAT) as a service option that uses automated facial assessment along with other diagnostic indicators to evaluate the existence and intensity of pain in dementia patients. The ePAT tool employs a multimodal strategy to boost the objectivity of pain evaluation in dementia patients who are non-communicative by utilizing automated facial recognition technology, digitalization, and computer vision algorithms.

In a similar view, Pain-QuILT, developed by Lalloo and Stinson [23] shows the precise position of painful stimuli using a dynamic anatomy-mapping technique by identifying and moving pain signals to the appropriate location of the body. For instance, employs images to convey the quality of discomfort, such as using a lit match to represent pain with heat or flaming sensation.

3.2.1.1. Smartphone Applications for Pain Assessment and Documentation

In recent years, smartphone applications for pain evaluation and documentation have become more common. Both individuals and medical professionals can use these apps as simple and easily available tools to evaluate and record pain experiences. Applications for smartphones that measure and record pain include:

i. Pain Rating Scales: The Numeric Rating Scale (NRS), Visual Analog Scale (VAS), and Faces Pain Scale are just a few of the built-in pain rating scales that are available in many smartphone applications [24]. These scales offer a consistent method for evaluating pain and can make it easier to observe changes in pain levels over time [25]. Its use has been tested for various purposes, such as for surgery purposes. For example, a prospective randomized control trial revealed no clear significance in the Smartphone application called PANDA (Pain Assessment using a novel digital application), a new digital tool for measuring pain that combines the numeric rating scale (NRS-11) and the visual analog scale (VAS-101) in digital form, with a paper version of the rating scale [26]. Also, Pain rating scales offer graphic representations of pain data, as in the case of data visualization intervention for pediatric chronic pain assessment [27]. This visualization could be in the form of charts or graphs, which can be used by patients and medical personnel to track progress, spot trends,

and decide on the best pain management methods.

ii. Monitoring and Tracking: Smartphone apps frequently provide tools for tracking different pain-related symptoms, including location, duration, quality, and associated factors (such as triggers and symptom-relieving elements). With the help of these elements, patients can describe their pain experiences in greater detail. For instance, Karasneh, Al-Azzam [28] developed and utilized a smartphone monitoring app for ratings of dysmenorrhea and changes in user behavior among female users during the menstrual period. The benefits of the smartphone app include its user-friendly ability, and the ability to offer an intuitive interface that makes them accessible to a variety of users [29]. As it is very simple to use, it encourages consistent participation in pain evaluation and documentation.

iii. Journaling and Diary: Some apps also provide journaling and diary capabilities that let users keep a daily log of their pains, activities, and medications prescribed and used. Users of this tool may be able to recognize patterns, pain triggers, or potential exacerbating variables. A similar instance to the utilization of this tool is among individuals with a diagnosis of migraine, a smartphone headache diary application created to record details about headache trigger causes and characteristics for three months [30]. The study revealed that greater pain intensity, headache-related impairment, and medication discontinuation were all linked to headaches with trigger factors.

3.2.2. Wearable Devices for Real-time Pain Monitoring

Real-time pain monitoring is now possible because of wearable technology. Insights on pain intensity, patterns, and associated factors can be gained from these devices' ability to record physiological and behavioral data related to pain [31]. Wearable technology comes with physiological sensors that can monitor many factors related to pain, including heart rate, skin conductance, muscle activity, and body temperature [4]. The advantage it has over other mobile health technologies is that it has sensors that offer objective information that can support judgments about subjective pain and stress levels [31]. There is not much study being done in the area of pain and wearable technology. There has been some research on how pain patients' physical activity patterns differ from that of normal controls when tracked by wearing accelerometers.

The use of wearable activity trackers in patients with rheumatism and orthopedic disorders, including osteoarthritis and lumbar pain), as assessed in 17 studies, found that there was an improvement in the number of steps and amount of time devoted to doing physical activity [32]. The investigators did not distinguish between improvements in activity and effort brought on by pain, but they did remark that the pain increased with long-duration trials exceeding 2 months compared to controls.

3.2.3. Telehealth and Telemedicine Applications in Pain Assessment

These technologies can be used to conduct remote pain assessments. It goes over the advantages of video evaluations, remote monitoring, and virtual consultations for enhancing

patient access to pain management in off-the-grid or underserved places [33]. Applications for telehealth and telemedicine have become important resources for pain evaluation, particularly in circumstances when in-person consultations could be difficult or inconvenient. One of the most significant telehealth goals is to get medical services close to the care consumer by allowing distant but speedy evaluation and treatment, permitting one-on-one interaction among health medical personnel, and reducing the need for unneeded travel to hospitals [34]. The remote consultations goal of Telehealth allows medical professionals to confer with patients remotely, enabling the assessment of pain complaints in real-time [33]. Providers can visually observe patients, ask pertinent questions, and evaluate the nature and intensity of pain using video conferencing. With Telehealth, patients can use self-reporting tools such as questionnaires and rating scales to report their pain experience Moreover, healthcare professionals can collect data on pain severity, location, quality, and related characteristics with the use of these self-reporting methods. Additionally, patients can use digital imaging to take pictures or videos of specific painful locations. This enables medical professionals to visually evaluate any swelling, redness, sores, or other external symptoms that may be causing the discomfort [22].

3.2.4. Virtual Reality Approaches to Pain Management

Virtual reality (VR) offers engrossing, engaging, and aesthetically pleasing experiences that can help patients focus on something other than their discomfort [8]. This is accomplished by substituting thrilling activities or serene settings for painful sensations, even among cancer patients who often experience chronic pain [35]. By donning a headset and employing haptic gloves or controllers, users of virtual reality can immerse themselves in a dynamic, adaptive, 3D, 360-degree synthetic world in which they can move and interact with tactile and sensory feedback [9]. For both doctors and patients, the degree to which opioid replacement or reduction and pharmaceutical analgesics can be lowered as a result of VR offers considerable clinical benefits [23]. Virtual reality (VR) has been proven effective as an intervention for short and long-term pain management in the last 20 years Ahmadpour, Randall [36].

According to Meilleur [9], VR is an effective tool with numerous therapeutic applications that diverts the brain from the perception of pain signals and lessens feelings of pain severity and discomfort. This is accomplished by altering the neurotransmitters and neural circuitry of the brain systems in charge of the sensations and affective aspects of pain [36]. Thus altering the ascending pain transmission networks. A previous randomized controlled trial that investigated the degree of distractibility of the VR technology among healthy volunteers showed that the subjects felt more present and more immersed, validating the attentional distraction theory of VR in pain management [37].

Additionally, VR is a useful non-pharmacological pain management strategy, owing to its role in minimizing the need for painkillers or analgesics [37]. People who may be concerned about opioid use or who want to reduce their dependence on medication will find this to be especially helpful. Virtual reality (VR) can be utilized as a stand-alone treatment or as a supplement to pharmaceutical therapies, adding another method of pain management. The degree to which opioid replacement or reduction by VR can replace or reduce pharmaceutical analgesics has considerable benefits for doctors and patients [8, 37].

3.3. Benefits of Utilizing Technology in Pain Monitoring

In general, embracing the use of technology such as smartphone apps and telehealth for pain evaluation and documentation provides a practical and effective tool to track pain experiences. They can motivate people to actively participate in pain management and help patients, as well as healthcare professionals can communicate perfectly. Recent reviews show that technological advancement encourages regular communication and observation of patients among healthcare professionals [33, 38]. Technology-enabled pain monitoring offers opportunities for continuous and remote monitoring and objective measurements [39]. The important role of technology-enhanced pain includes:

3.3.1. Promotion of Objective Pain Assessment

Quantitative EEG (qEEG), which uses signals from filtered and computational analysis to visualize brain electroencephalography (EEG) recordings, has shown that patterns of brain activity in response to different external stimuli and sensations, including pain, can provide an objective measurement of pain [40]. In a different view, the gathering of data *via* technology aids medical professionals in developing a more thorough understanding of the patient's pain experience, enabling more precise diagnoses and individualized treatment plans or determining the caliber of the services offered [41, 42]

3.3.2. Connectivity with Other Healthcare Solutions

Electronic health records (EHRs) and other medical facilities can be integrated with pain monitoring systems by employing technology [43]. Previous studies found that the integration of technology into patient pain management promotes collaborative care, facilitates effortless data sharing between doctors and nurses, and allows for a comprehensive approach to pain management [44]. This ensures that every staff has constant accessibility to essential pain information, enabling well-coordinated care and partnership among care providers and patients' wearable devices [43]. Invariably, the commonly acknowledged four-fold goal of improved wellness actions, greater patient satisfaction, reduced expenditures, and enhanced clinician expertise can all be directly impacted by a telehealth platform connected with an interoperable Electronic Health Record (EHR) system [44, 45].

3.3.3. Continuous Pain Monitoring

Technology enables continuous monitoring of pain levels, providing prompt tracking of patients' symptoms and other medical outcomes [39]. This capability is particularly valuable for chronic pain conditions, as occurs in cancer, as it allows healthcare providers to track patterns, identify triggers, and evaluate the effectiveness of interventions over time [46].

3.3.4. Improved Involvement of Patients in Their Pain Management

The use of technology-enabled pain monitoring stimulates patients to actively participate in their pain management, which increases patient engagement [39]. Four hospices participated in a pilot cluster randomized controlled trial of the pain-relieving program EMPOWER (Effective management of pain: overcoming worries to enable relief) to assess its preliminary efficacy. The findings indicated that empowerment has advantages for both patients and caregivers [47]. Using applications, wearable technologies, and other digital tools, people can track and monitor their pain levels, symptoms, medication use, and lifestyle factors that may affect their pain [4, 32]. Patients' increasing involvement in pain management makes them more likely to follow treatment programs and achieve better overall results, which makes them develop a sense of control and accountability. For example, the trauma-informed approach describes patients as individuals who need a voice in their treatment planning and an active role in the decision-making process [42]. Clinical decisions are frequently made without much input from or communication with patients in traditional treatment. In contrast, patients are actively involved in their care, and their feedback guides the path of the care plan in a trauma-informed approach [42].

Overall, these technological advantages improve pain management, more individualized care, and patient outcomes.

3.4. Limitations of Technology Application in Pain Management and Considerations

While technology can significantly improve pain treatment, it also has limitations and problems that need to be taken into consideration. The following are some restrictions and things to keep in mind when using technology to alleviate pain:

Smartphones offer a promising approach to pain management; however, potential inaccuracies in self-reporting, variations in app quality, and the need for validation of these apps' effectiveness and reliability are some of their limitations. Additional concerns are those involving privacy and data security concerns, and lack of expertise in the use of pain technology need to be considered before choosing to utilize any app [48].

Greater than ever, healthcare organizations are adopting electronic records and digital services, which has given cybercriminals greater opportunity to disclose the confidential medical information of millions of patients. According to research, the healthcare sector in the United States is the most frequently breached, with 385 million patient records exposed between 2010 and 2022 [49].

For Telehealth medicine, it is crucial to take into account any potential restrictions, like technological obstacles, patient comfort or familiarity with the platform, and the requirement for a dependable internet connection. To maintain patient confidentiality during telehealth encounters, providers must also make sure that employees have the right training and follow privacy laws [50].

Hasoon and Urits [51] claimed that telemedicine hampered clinicians' capacity to do a physical examination to more precisely identify pain causes. Additionally, there were few in-person interactions with the medical professional and staff members, which can be extremely helpful when a patient displays worries or abnormal behavior like abusing alcohol or illegal substances [52]. Telemedicine also made it more challenging to accurately carry out random urine drug tests or drug/pill counts when it came to opioid management [51]. Overall, employing telemedicine for several specialties has had several drawbacks [53].

Ethical issues are another challenge in technological patient pain management. According to Draper and Sorell [54], Technology should be used responsibly and ethically in pain management to avoid too heavy reliance on technology at the expense of interpersonal engagement and individualized care [41]. In essence, patient autonomy and informed consent should be honored while implementing technology-based therapies. A previous study found that the therapeutic relationships that nurses have with patients and families in their role as caregivers may be considered to be adversely affected or distracted by digital devices [55]. Additionally, significant ethical questions have been raised as to what level of pain and suffering can or should be justified to elicit and/or justify professional intervention or the question of when treating pain and suffering becomes excessive [56]. These ethical issues are the reason why some caregivers may be reluctant to adopt digital technology in patient management [57].

3.5. Nurses' Role in Utilizing Technology in Pain Management

Indeed, technology is becoming more and more significant as nursing practice develops. Technology has transformed the roles of nurses with the advent of innovations like artificial intelligence, wearable devices, and monitors, involving the launching of intelligent robots into health systems, home environments, and nursing homes. As such, levels of patient care that were previously unattainable have been achieved as a result of the integration of nursing practice with health technology. A few of its impacts on nurses' roles and practices are outlined below.

1. Pain Assessment and Monitoring: Wearable monitors provide nurses with the ability to quickly monitor patients while taking on other duties. The gadgets offer information on vital signs such as oxygen levels, electrocardiography, and breathing rate. When a patient needs immediate assistance, caregivers are notified, greatly cutting down on response times [58]. While technology-assisted pain assessment and monitoring by nurses is essential, a variety of technical instruments are used by nurses to collect factual information and monitor patients' pain levels over time, such as wearable technology, smartphone apps, and electronic pain scales.

2. In the process of making decisions about pain treatment, nurses are essential. Nurses must be well-prepared, knowledgeable about pain evaluation and treatment strategies, and free from wrong attitudes or assumptions to avoid utilizing inadequate and inefficient pain relief measures. Samarkandi [59] identified some of the erroneous misconceptions that could hamper effective pain management by Nurses as notions

that people frequently seek recognition rather than report true pain and that the only way to diagnose pain is through health indicators. It is, therefore essential that nurses represent patients' interests in pain treatment, making sure that technology is applied with the utmost consideration for patients' needs.

3. Patients may now communicate with medical professionals from the comfort of their residences through mobile apps. Patients update their information on the applications as nurses counsel and help them with a range of health conditions [58], including using technology to manage their pain [56]. They respond to patient concerns, give patients the information they need, and encourage them to use technology tools, ensuring that patients are empowered and confident in controlling their pain [45].

4. Nurses take into account the moral or ethical issues raised by the use of technology in pain management. When gathering and utilizing pain data *via* technology, they maintain patient privacy, confidentiality, and consent. They promote the use of technology in an ethical manner and speak out against any potential biases or inequities [60].

5. To successfully incorporate technology into pain treatment strategies, nurses collaborate with interdisciplinary teams. To guarantee thorough and all-encompassing pain management, they consult with physicians, pharmacists, physical therapists, and other healthcare professionals, sharing pain data and coordinating care [58]. Research suggests that healthcare based on interdisciplinary teamwork is related to greater patient safety, decreased hospital admission rates, and lower rates of complications and medical errors [61]. For instance, many hospitals are starting to integrate various communication channels into a single, efficient system. By using badges or headsets, nurses can communicate in real time with their colleagues and other healthcare professionals. These innovations deliver alerts in emergencies and instantly upload patient health information to Electronic Medical Record (EMR) systems [58].

3.6. Leveraging Technology in Pain Management: Implications for Nursing Practice, Education, and Research

There are numerous implications for nursing practice, education, and research regarding the use of technology to manage pain. The following are some crucial aspects for each area that also influence the competency of nurses:

3.6.1. Nursing Practice

1. Since the integration of technology into pain management has become a fast-growing area in today's modern world, nurses need to stay abreast of technological advancements and be knowledgeable about how to use them. These include possessing knowledge of the use of wearable gadgets, telemedicine platforms, virtual reality systems, and electronic pain assessment instruments for more effective pain control.

2. Patient Support and Education: Patients' knowledge of technology-enabled pain management strategies is greatly influenced by nurses. Nurses should answer any queries or concerns, give detailed instructions on how to utilize the tools and continue to offer support to patients.

3.6.2. Education

3. Nursing education programs should include material on technology in their curricula. This includes introducing students to various pain assessment tools, digital health platforms, and pain management applications in virtual reality. The use of technology for pain monitoring and assessment should be taught to nursing students practically.

4. Patient-centered care should be prioritized, and technology education should reflect this. Students should learn how to communicate clearly and educate others about using technology while involving patients in decision-making and responding to their unique needs.

3.6.3. Research

5. There is a need for research to assess the efficacy and effectiveness of various technology-based interventions in the treatment of pain, adherence to treatment regimens, and quality of life. Best practices and evidence-based recommendations for incorporating technology into nursing practice can be found through research.

6. Additionally, Research should concentrate on analyzing how easy it is to use technology tools for pain management. This entails evaluating the level of satisfaction of patients and caregivers, identifying obstacles to technology acceptance, and comprehending elements that contribute to successful implementation.

7. Studies on the use of technology in pain management should address ethical issues involving data security and privacy, informed consent, the possibility of bias in algorithms, and equal access to technology.

CONCLUSION

The narrative review on "Use of Technology in Enhancing Nurses' Pain Management Competencies" clarifies, in its conclusion, the important role that technology plays in enabling nurses to deliver more thorough and effective pain treatment. A thorough analysis of scholarly articles from numerous databases has turned up a lot of data demonstrating how technology has improved nurses' capacity to detect, track, and treat patient pain.

The use of electronic health records (EHRs), smartphone apps, virtual reality simulations, and wearable technology has shown significant advantages in facilitating precise pain assessment, individualizing treatment programs, and guaranteeing timely interventions. Nevertheless, it's equally critical to recognize that integrating technology requires a balanced strategy. As technology develops further, considerations for usability, accessibility, and ethical implications must all be taken into account as technology develops in order to give nurses the tools they need to effectively improve their pain management skills without adding needless complexity or risk. Notably, technology-driven educational initiatives and training materials are efficient ways to advance nurses' expertise in pain management. The

promotion of online tools, webinars, and interactive platforms for nurses to update their knowledge and expertise in pain management would ultimately enhance patient outcomes and lead to better pain management techniques.

LIST OF ABBREVIATIONS

ePAT	=	electronic Pain Assessment Tool
NRS	=	Numeric Rating Scale
VAS	=	Visual Analog Scale
VR	=	Virtual Reality
3D	=	3 Dimensional
qEEG	=	quantitative Electroencephalography
EHRs	=	Electronic Health Records
EMPOWER	=	Effective Management of Pain Overcoming Worries to enable relief)
EMR	=	Electronic Medical Record

CONSENT FOR PUBLICATION

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CONFLICT OF INTEREST

The authors declare that there is no potential conflict of interest, either financial or otherwise.

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