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Research

Enhancing students' digital capabilities to improve preparedness for clinical practice

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ABSTRACT

Background: Digital health capability is a core requirement for contemporary nursing graduates; however, undergraduate curricula often provide limited structured exposure to electronic health records prior to clinical placement.
Aim: To examine the impact of embedding an academic electronic health record (AEHR) into a first-year nursing curriculum on students' digital readiness and perceived preparedness for practice.
Methods (Design): A mixed-methods exploratory design was used with first-year nursing students (N = 336) at an Australian university. An eight-item adapted survey was administered before and after AEHR learning activities delivered across a 10-week teaching period. Descriptive and inferential statistics were applied, and free-text responses were analyzed thematically.
Results: Students reported increased confidence in navigating digital systems and completing clinical documentation following AEHR exposure. Qualitative findings indicated enhanced preparedness for placement, reduced anxiety, and greater awareness of digital skill development, with students valuing early, hands-on exposure.
Conclusions: Embedding AEHR in first-year nursing curricula supports the development of digital literacy, confidence, and readiness for clinical practice. Broader adoption of AEHR may help address persistent digital readiness gaps in nursing education.

Introduction

Nurses play a pivotal role in the quality of information management within healthcare (Akhu-Zaheya et al., 2018). Digital health capability is now a core expectation of contemporary nursing practice, with most health services transitioning toward fully integrated electronic medical record systems over the past 5 years (Australian Digital Health Agency, 2022). As a result, new graduates are expected to enter the workforce with baseline digital documentation skills and confidence navigating electronic systems. Paper-based documentation systems have long been criticized for being time consuming, repetitive, and error-prone and obstructive to effective communication amongst healthcare providers (Akhu-Zaheya et al., 2018). In contrast, electronic health records (EHRs) offer increased efficiency, legibility and accessibility; transforming how clinical information is recorded and shared among healthcare workers (Akhu-Zaheya et al., 2018; Baxter & Andrew, 2018). In order to support and enhance the use of EHRs in the clinical environment there needs to be a shift in undergraduate nursing curricula to increase exposure to EHRs and embed the development of digital skills.

Background

The widespread adoption of EHRs has revolutionized healthcare documentation and information management (Mollart et al., 2020; Williams et al., 2021). EHRs have replaced traditional paper-based systems, offering numerous benefits such as improved data accessibility, increased efficiency, and patient safety (Herbert & Connors, 2016; Johnson & Bushey, 2011; McMullen et al., 2014; Williams et al., 2021).

However, this technological shift has exposed a gap between what nursing and midwifery students are taught in educational settings and what they encounter in clinical practice (Kleib et al., 2021). Recent studies continue to show that despite increased digitalization of healthcare since 2020, undergraduate nursing students report low confidence in digital documentation, limited exposure to EHR systems, and variable digital literacy entering clinical placement

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(Australian Digital Health Agency, 2022; Kleib et al., 2022). Nursing students are not adequately prepared for the digital demands of modern healthcare (Herbert & Connors, 2016; Williams et al., 2021). Undergraduate, nursing, and midwifery educational programs often lack a systematic and thorough integration of digital health technologies, particularly EHR systems, into their curricula (Mollart et al., 2020; Williams et al., 2021). Students receive limited exposure to EHRs (Herbert & Connors, 2016), often introduced through brief demonstrations or simulated scenarios, rather than hands-on, practical experience. This lack of preparation leads to a workforce that is not fully prepared meet the demands of digital healthcare (Mollart et al., 2020).

A growing body of work has identified the need for structured frameworks to guide the development of nursing students' digital capabilities. The Australian National Digital Health Capability Framework (ADHA, 2022) outlines essential domains including digital professionalism, data quality, information management, and safe digital communication. Embedding these domains into undergraduate programs provides a structured foundation for building EHR competence. International frameworks similarly highlight the importance of early, scaffolded digital learning for entry-to-practice nurses (Skiba, 2020).

Nursing students may struggle with basic digital literacy related to EHR systems, such as navigating the interface, understanding data fields, and utilizing various functionalities (Baxter & Andrew, 2018). Even if students have some theoretical knowledge, they may lack the practical skills to apply that knowledge in the clinical setting. This can lead to errors, inefficiencies, and frustration.

Academic electronic healthcare records (AEHRs) are purpose-built systems for teaching and Learning. AEHRs focus on developing the connection of theoretical knowledge to practical application, narrowing the theory-practice gap (Herbert & Connors, 2016; Mollart et al., 2020).

Integrating EHR into nursing education is central to ensuring that graduates are well-equipped to use these systems effectively in their daily practice (Baxter & Andrew, 2018). This includes understanding data entry, retrieval, and analysis within EHRs. Proficiency in EHR use directly impacts patient care (Akhu-Zaheya et al., 2018; Herbert & Connors, 2016; McMullen et al., 2014). Accurate and timely documentation, access to patient information, storing, and sharing patient information electronically has become standard practice (Baxter & Andrew, 2018). This process through EHR systems facilitates effective communication as well as contribute to increased continuity of care and better patient outcomes (McMullen et al., 2014; Williams et al., 2021). The current level of EHR preparation in nursing and midwifery programs is insufficient (Herbert & Connors, 2016). Students do not gain the necessary skills and confidence to utilize EHRs competently.

AEHRs, specifically designed for educational purposes, enable students to gain familiarity with digital heath technologies prior to clinical exposure (Johnson & Bushey, 2011). Embedding AEHR activities within early undergraduate subjects allows students to practice documentation, data interpretation and digital communication in low-risk environments. This structured exposure aligns with calls in the literature for scaffolded digital capability development throughout nursing programs (ADHA, 2022; Kleib et al., 2022). Unlike clinical systems, AEHRs prioritize understanding digital technology principles, ethical use, and effective patient interaction within a person-centered care framework (Johnson & Bushey, 2011). This approach prevents students from being overwhelmed by complex clinical functionalities.

Literature shows that incorporating AEHR enhances students' collaborative capabilities, critical thinking processes, and skill application (Herbert & Connors, 2016; Johnson & Bushey, 2011). Despite the benefits, AEHR integration faces significant barriers. According to Raghunathan et al. (2022), several common obstacles hinder the integration of AEHR into nursing curricula, including high costs, funding shortages, faculty limitations, technology infrastructure issues, packed curricula, and limited interoperability. The lack of preparation of student nurses in electronic documentation can adversely affect patient care.

The inclusion of AEHR into undergraduate nursing curricular enables authentic practice and increases work readiness (Williams et al., 2021). AEHR adoption by all health science programs provides opportunities for collaborations in learning and teaching across professional and interdisciplinary education (Johnson & Bushey, 2011).

Therefore, the aim of this study was to evaluate the impact of an AEHR intervention on first-year undergraduate nursing students' perceived digital capability, documentation confidence, and preparedness for clinical placement. Specifically, this study explored (1) changes in students' self-reported digital capability before and after AEHR exposure, and (2) students' perceptions of the usefulness of AEHR for supporting learning and placement readiness.

Method

Study design

This study employed a mixed-methods exploratory design combining quantitative surveys and qualitative thematic analysis to evaluate changes in nursing students' perceived preparedness for clinical practice and perceived usefulness of an AEHR system following its integration into a first-year clinical subject. Although the broader teaching period included a cohort of 336 students, participation in the research components (pre and postsurvey) was voluntary. The study was guided by the *Australian Digital Health Capability Framework*, which informed the structure of the training content and the selection of survey items. Unlike earlier work by Moore et al. (2010), which used a cross-sectional design with a 41-item survey to assess preparedness for clinical practice among final-year Chinese medicine students, this study adapted a reduced version of this tool to suit the implementation and evaluation of the AEHR intervention within a nursing education context.

Participants and setting

All students enrolled in the first-year clinical subject (N = 336) were invited to complete the AEHR preparedness survey at two timepoints. The AEHR system was integrated into the subject as a structured learning activity. The AEHR intervention consisted of structured weekly activities across the 10-week subject, including digital documentation tasks, clinical data entry, and guided exploration of core AEHR functions. Activities were intentionally scaffolded to align with the Digital Health Capability Framework's domains of data literacy, digital communication, privacy and security, and digital professionalism. Students were invited to complete a short online survey immediately before and after clinical placement.

Sampling strategy and eligibility

A convenience sample was employed, consisting of student nurses enrolled in an undergraduate first year nursing clinical subject. Eligibility was defined solely by enrolment in the subject; no age restrictions were applied, and all students were proficient in English. All enrolled students were eligible to participate. The sample comprised 293 female and 43 male student nurses. In total, n = 336 students met the eligibility criteria. Consent was implied through the act of survey completion, consistent with standard ethical practice for anonymous questionnaire based research.

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Survey instrument

The original instrument, the *Preparation for Hospital Practice Questionnaire*, consisted of 41 items across eight dimensions. A simplified, modified version of this tool was developed, consisting of eight single-item questions, each broadly aligned to one of the eight original dimensions (e.g. interpersonal skills, professional networks, self-directed learning, etc). Each item was designed to broadly reflect one of the eight original dimensions. While this approach reduced psychometric complexity, it was selected to ensure feasibility for first-year students within time-constrained learning environments. Single-item measures have been shown to be valid for assessing global constructs when respondents have clear, unambiguous understanding of the construct being measured (Happ et al., 2019). However, this approach inherently limits construct validity and reliability assessment.

Given this significant reduction in item number and modifications to item content, analysis of internal consistency or dimension reliability (e.g. Cronbach's alpha) as done in the original study, was not undertaken. Instead, the primary focus was on exploring changes in perceived usefulness and preparedness pre and post AEHR activity using descriptive statistics and simple variance analyzes. Results should therefore be interpreted as descriptive and exploratory rather than as precise measurements of capability.

Four optional open-ended question was included in the survey, designed to capture students' subjective experiences, perceived benefits, and suggestions for improvement. Responses were voluntary and anonymous.

Data analysis

Quantitative data were analyzed using SPSS (v29). Descriptive statistics (frequencies, means, and standard deviations) were computed for each of the eight survey items at both timepoints. Changes in mean scores were examined across the two timepoints to identify any shifts in student perceptions. Due to the small number of items and the study's focus on perception rather than psychometric validation, no factor analysis or reliability testing was performed.

Data cleaning was conducted prior to statistical analysis. Random missing values in the AEHR responses were replaced using the series mean imputation method, provided that less than 10% of the response values were missing from the participant.

For individual AEHR exposure items, the Mann–Whitney *U* test was applied to compare responses between the pre and post AEHR training. An allocation ratio of $t = n1/N$ was used (Happ et al. 2019), corresponding to the study sample sizes of $n1 = 20$. Although this unbalanced design reduced test efficiency *t* compares to equal allocation, it was determined to provide acceptable statistical power for the analysis considering generally lower post survey response rate (Zhao et al., 2008).

To evaluate differences in total AEHR scores of participants before and after subject completion, an independent samples *t* test was conducted. Given the small sample size of the study, bootstrapping technique was employed to increase the robustness of inference so bias-corrected confidence intervals and *p*-value can be obtained.

Qualitative data from open-ended responses were analyzed using inductive thematic analysis following the six-phase approach outlined by Braun and Clarke (2006). This method was selected for its flexibility and suitability for exploratory research aimed at identifying patterns of meaning across a dataset.

Results

A total of 78 students completed at least one phase of the AEHR survey (preplacement $n = 59$; postplacement $n = 19$). An independent samples *t* test was conducted to compare total AEHR scores for students before the AEHR course ($N = 59$, $M = 14.83$, and SD = 5.75) and post course completion ($N = 19$, $M = 17.16$, and SD = 4.14). Levene's test indicated unequal variances, $F(1, 76) = 4.27$ and $p = 0.042$. However, there was no significant difference in total score $M = -2.327$, SD = 1.209, $t(76) = -1.92$, and $p = 0.061$ (two tailed) between and pre and post AEHR training. To account for the small sample size and unequal group sizes, bootstrap resampling (1,000 samples) was applied. The bootstrapped 95% confidence interval for the mean difference (−4.648, 0.093), indicating that the difference was not statistically significant.

Table 1
Medians of item score before and after AEHR training.

	Pre ($N = 59$)	Post ($N = 19$)	X^2	*p*
EHR understanding	2.0	2.0	0.10	0.757
Digital privacy and security	2.0	2.0	0.04	0.850
Competent documenting clinical data	2.0	2.0	0.85	0.356
Access and use of digital clinical data	2.0	2.0	0.14	0.704
Digital information interpretation	2.0	2.0	0.75	0.385
Digital technology adoption	2.0	2.0	0.49	0.485
Recognize my own limitation	2.0	2.0	3.80	0.051
Be responsible for digital learning	2.0	2.0	0.29	0.592

Eight individual items from the AEHR short survey were compared between the pre and post training using the Mann–Whitney *U* test. Across all items, the median score remained at 2.0 at both pre and post training (Table 1). No statistically significant differences were observed between pre and postcourse groups through the independent sample median test indicating AEHR training didn't produce a detectable shift in median based distribution overall. Item "the inclusion of the AEHR in NS1882 (prepared me to recognize my own limitations in digital skills) was statistical significance between pre and post training groups following Yates' continuity correction, $X^2(1, N = 78) = 3.8$, $p = 0.05$. This finding suggests that AEHR exposure may enhance students' metacognitive awareness of their digital capability gaps, which is an important precursor to skill development and self-directed learning.

Qualitative results

Qualitative data were collected via four open-ended questions in presurveys and postsurveys. Data were analyzed inductively using Braun and Clarke's (2006) six-phase framework. Four interrelated themes were generated: (1) Psychological Preparation for Placement, (2) Experiential Learning and Skill Development, (3) Authenticity and Transferability to Clinical Practice, and (4) System Design and Pedagogical Integration Challenges.

Theme 1. Psychological Preparation for Placement

Students frequently described AEHR as reducing the uncertainty associated with clinical placement and increasing their confidence with electronic documentation. Many framed the system as providing a "first look" at digital records prior to entering clinical environments. One student reflected that AEHR "helped me gain an understanding of my strengths and weaknesses with digital health information," while another stated it "helped gain confidence to use in a clinical setting." Exposure to the system was perceived as making placement "less daunting for students."

However, confidence-building coexisted with anxiety. Some students reported that the system was "overwhelming and made me feel like I had to know everything about it going into placement." Others expressed uncertainty about expectations, noting, "I'm unsure what expectations will be when we get out on practice."

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These accounts suggest AEHR functioned as a psychological bridge to practice, reducing novelty while simultaneously surfacing perceived gaps in competence. Confidence appeared closely tied to perceived authenticity and the degree of instructional support.

Theme 2. Experiential Learning and Skill Development

Students strongly valued active engagement with the system. The opportunity to "actually enter basic data into AEHR" and "actively type in data" was frequently cited as a positive feature. Participants described "practicing how documentation would be" and "learning how to input clinical data such as vital signs," indicating that procedural engagement supported skill acquisition.

The structured format was also appreciated. Students valued "step-by-step modules to fill in patient information," which facilitated navigation through complex documentation processes. For some, AEHR represented meaningful rehearsal for practice: "Practicing documentation using the same software I will be using in the healthcare system."

Nevertheless, students sought greater repetition and feedback. One commented, "I don't feel we covered writing progress notes enough," while another stated, "I did not really know if what I was doing was correct." External students particularly noted the absence of feedback mechanisms. Suggestions included "more exercises using it," "videos that demonstrate jumping between areas," and structured opportunities to confirm they were "on track individually."

Overall, students demonstrated a clear preference for scaffolded, repeated, and feedback-informed engagement rather than isolated exposure.

Theme 3. Authenticity and Transferability to Clinical Practice

A prominent concern was the perceived disconnect between AEHR and the system used in hospitals. Several students noted that AEHR "is not what it looks like in hospital" and was "not similar to the ieMR." One observed that it was "significantly easier to use than ieMR—does not feel like it is preparing you to adequately utilize this tool on placement." Another cautioned that it "could build a false sense of security."

Students recognized that while AEHR supported foundational understanding, its simplified interface raised questions about skill transferability. This tension between accessibility and realism shaped perceptions of preparedness. Some appreciated "getting an idea of what a digital platform might look like," yet felt the system was "very basic."

These responses highlight students' sophisticated awareness of the difference between simulation and practice and their desire for closer alignment with clinical systems to enhance authenticity.

Theme 4. System Design and Pedagogical Integration Challenges

Students identified both technical barriers and curriculum misalignment as limiting factors. Technical issues included the system being "laggy at times," "wouldn't load," and "sometimes didn't save." Navigation was described as "confusing with finding items," and the inability to progress without completing all fields was frustrating: "It wouldn't let us move to other parts until it was completed." In some cases, "information wasn't provided for some parts but it wouldn't let us pass," highlighting inflexibility in system design.

Beyond usability concerns, students emphasized insufficient integration with the broader curriculum. They noted that "some other documents in the clinical skills workshops are still paper based" and that AEHR "wasn't integrated into the clinical labs at all... so it didn't add anything to the course." Many recommended embedding the system more consistently, including using it "to document QADDS and the different assessments" and incorporating it "in every tutorial."

These comments suggest that both technological design and curriculum alignment influenced perceived value. When AEHR was experienced as isolated or technically cumbersome, its pedagogical impact was diminished.

Synthesis

Across themes, students recognized AEHR as a valuable introduction to electronic documentation that supported psychological preparation and skill development. However, its effectiveness was moderated by perceived authenticity, curriculum integration, technical reliability, and the level of structured pedagogical support provided. Students' responses indicate that educational electronic health record systems must be both authentic and scaffolded, and embedded coherently within curricula, to maximize confidence and transferability to clinical practice.

Discussion

The aim of this study was to evaluate the impact of an AEHR intervention on undergraduate nursing students' perceived digital capability and preparedness for documentation in clinical practice. Although conducted within an Australian undergraduate nursing program, the findings are transferable to associate degree nursing programs in the United States, where students similarly report limited exposure to EHR systems prior to clinical placement. AEHR integration offers a scalable, low-risk approach to developing documentation confidence regardless of program length or national regulatory context.

AEHR training is increasingly recognized as essential for contemporary nursing education, empirical evidence demonstrating its influence on student preparedness remains limited. This study contributes to this developing area of inquiry by examining changes in students' self-reported confidence and capability before and after a 10-week AEHR-embedded subject.

Overall, quantitative findings demonstrated no statistically significant differences in overall preparedness between pre and postsurvey responses, qualitative feedback highlighted clear perceived benefits of AEHR exposure, including reduced anxiety, improved confidence, and the development of foundational digital documentation skills. These findings are consistent with prior literature suggesting that AEHR integration may not yield immediate measurable shifts in quantitative outcomes but provides meaningful learning experiences that influence students' perceptions and readiness for practice (Kleib et al., 2021; Williams et al., 2021).

The absence of significant quantitative improvement could reflect several factors. First, the short timeframe of AEHR exposure, limited to a single semester, may not have been sufficient for measurable growth in digital competence to emerge. Previous research has indicated that sustained and scaffolded exposure to digital health systems is required to embed skills effectively (Mollart et al., 2020; Herbert & Connors, 2016). Second, the small sample size and attrition between pre- and post-intervention surveys reduced the power to detect statistical differences, a common challenge in exploratory educational studies. Nonetheless, the identified significance around students' recognition of their own digital limitations is notable, as self-awareness of capability gaps is a crucial first step toward skill development and lifelong learning (Raghunathan et al., 2022).

The qualitative insights underscore the pedagogical value of AEHR integration. Students reported that AEHR exposure bridged theory–-practice gaps by providing authentic opportunities to document, retrieve, and reflect on patient data in a safe learning environment. This aligns with Johnson and Bushey's (2011) assertion that AEHRs prepare students for the realities of clinical documentation without overwhelming them with the complexities of live systems. By providing authentic, contextualized learning experiences in a safe environment, AEHRs enable students to practice and refine their skills before

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encountering high-stakes clinical situations. This aligns with situated learning theory, which emphasizes the importance of learning in contexts that mirror real-world practice (Lave & Wenger, 1991). Moreover, student calls for greater integration of AEHR into tutorials and simulation labs reinforce earlier findings that embedding digital systems across multiple learning contexts enhances transferability of skills and prepares graduates for digitally enabled healthcare environments (Baxter & Andrew, 2018; McMullen et al., 2014).

Importantly, the findings also speak to the role of AEHRs in cultivating confidence and reducing anxiety prior to placement. Students' suggestions for real-time documentation in simulation, more detailed instructional resources, and mechanisms to address technical glitches highlight areas for enhancement and indicate strong learner engagement with the technology. This responsiveness echoes broader shifts in nursing education toward embedding digital literacy as a core graduate attribute and aligns with national capability frameworks such as the Nursing and Midwifery Digital Health Capability Framework (Australian Digital Health Agency, 2020).

Taken together, these findings suggest that while measurable outcomes of AEHR integration may take longer to emerge, the early benefits of exposure are significant. Embedding AEHR use across multiple subjects and progressively scaffolding digital capability development could amplify the impact over time, ensuring graduates are not only competent in digital documentation but also confident in applying these skills in diverse clinical contexts. Furthermore, alignment of AEHR activities with interprofessional and person-centered care scenarios may enhance collaboration and better reflect contemporary healthcare practice (Williams et al., 2021).

The findings of this study are consistent with a growing body of literature on AEHR integration in nursing education. Mollart et al. (2020) found that nursing students reported low confidence in using EHRs prior to clinical placement, despite having some exposure to digital systems in educational settings. Similarly, Kleib et al. (2021) reported that students valued AEHR exposure for reducing anxiety and building familiarity with digital documentation, even when objective competence measures did not show significant improvement. These studies, like the current research, highlight the sensitizing function of AEHRs as introductory experiences that prepare students psychologically and conceptually for digital practice, rather than producing immediate, and measurable competence.

However, some studies have reported more positive quantitative outcomes. For example, Baxter and Andrew (2018) found that students who participated in a year-long AEHR-integrated program demonstrated significant improvements in documentation accuracy and confidence compared to controls. Similarly, Herbert and Connors (2016) reported that sustained AEHR exposure across multiple semesters was associated with higher self-reported digital literacy and smoother transitions to clinical EHR systems. These findings suggest that the duration and intensity of AEHR exposure are critical factors in determining outcomes. The current study's single-semester intervention may represent a necessary but insufficient first step in a longer developmental trajectory.

The importance of scaffolded, progressive AEHR integration is further supported by recent systematic reviews. Williams et al. (2021) conducted a systematic review of electronic medical record use in nursing education and concluded that effective AEHR integration requires: (1) early introduction in foundational courses, (2) progressive complexity across the curriculum, (3) alignment with clinical practice standards, and (4) faculty development to support effective facilitation. The current study addresses the first criterion (early introduction) but highlights the need for continued development in the other areas.

International perspectives also emphasize the importance of structured frameworks for digital capability development. Skiba (2020) argued that nursing education must adopt competency-based approaches to digital health education, with clear learning outcomes and assessment criteria at each stage of the curriculum. The Australian Digital Health Agency (2022) provides such a structure, outlining essential domains and progressive levels of capability from novice to expert. Aligning AEHR activities with this framework, as was done in the current study, ensures that students develop capabilities in a systematic, coherent manner.

Implications for nursing education in practice

The findings of this study highlight the importance of strategically embedding AEHRs across the nursing curriculum to better prepare students for digital healthcare environments. A program-wide approach is recommended, ensuring progressive development of students' digital literacy and clinical documentation skills from first year through to completion. Integration should be mapped to the Nursing and Midwifery Digital Health Capability Framework (Australian Digital Health Agency, 2020) and aligned with the Australian Nursing and Midwifery Accreditation Council's *Registered Nurse Accreditation Standards* (2019) to demonstrate both national consistency and accreditation compliance. Collaboration between academic and clinical partners is essential to align AEHR learning activities with contemporary industry practices, while staff professional development must remain a priority to ensure confidence and competence in facilitating AEHR-based learning. Future research should examine the long-term impact of AEHR use on graduate outcomes and transition to practice, as well as opportunities for integration into interprofessional education. Such strategies will not only strengthen students' preparedness for practice but also advance the broader digital transformation of healthcare education in Australia.

Limitations

A key strength of this study lies in its focus on embedding an AEHR into the nursing curriculum, providing students with authentic, practice-oriented experiences that mirror contemporary healthcare environments. The integration of the AEHR aligns with national digital health capability frameworks and directly addresses the growing expectation that graduates are prepared for digital practice. Another strength is the collaboration between academic and professional staff in the development and implementation of the AEHR, which enhanced the authenticity of scenarios and ensured alignment with clinical standards. The study also contributes to the limited body of literature examining large-scale, program-wide implementation of AEHRs in Australian nursing education.

However, several limitations should be acknowledged. The evaluation of the AEHR was conducted within a single university context, which may limit the generalizability of results to other institutions with differing curricula, resources, or student cohorts. Student feedback was obtained through self-report measures, which may be subject to response bias and may not fully capture the breadth of student experiences or long-term skill development.

Finally, the study captured outcomes at a single point in time. Longitudinal evaluation would be beneficial to determine the sustained impact of AEHR integration on students' digital health capabilities, transition to practice, and readiness for workplace electronic systems.

Conclusion

The integration of an AEHR into the nursing curriculum provides students with authentic opportunities to engage in digital documentation, clinical reasoning, and patient-centered care within a safe learning environment. This study highlights the value of embedding AEHR experiences early and progressively across the program,

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supported by scaffolding, simulation, and strong alignment with professional standards. While challenges such as technical issues and student workload must be addressed, the overall findings suggest that AEHR use enhances student preparedness for clinical practice and supports the development of essential digital health capabilities.

The findings underscore the importance of adopting a program-wide, scaffolded approach to AEHR integration, with progressive complexity and intensity across multiple subjects and years. A single-semester intervention represents a necessary but insufficient first step in a longer developmental trajectory. Nursing programs should embed AEHR activities across multiple learning contexts (e.g., lectures, tutorials, simulation labs, and clinical skills practice), ensure close alignment with real-world EHR systems, and provide comprehensive instructional and technical support to maximize student engagement and learning.

As healthcare systems continue to evolve in response to digital transformation, it is imperative that nursing graduates are equipped to confidently navigate electronic health record systems and apply evidence-based care in technologically rich environments. The AEHR, when integrated purposefully and progressively within the curriculum, serves not only as a teaching tool but also as a bridge between theory and practice. Ongoing evaluation, collaboration with industry partners, and alignment with national digital health capability frameworks will ensure that nursing education remains responsive, innovative, and future-focused.

Declaration of competing interest

The authors declare that they have no known competing personal relationships or financial interests that may have influenced the study reported in this paper.

CRediT authorship contribution statement

Maude Chapman: Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Peter Hartin:** Writing – review & editing, Writing – original draft, Validation, Methodology, Conceptualization. **Caryn West:** Writing – review & editing, Validation, Conceptualization. **Lin Zhao:** Formal analysis.

Ethical Approval

Ethics approval for this study was obtained from the James Cook University Human Research Ethics Committee (Approval No. H9482).

Informed Consent

Participation was voluntary, and informed consent was obtained from all respondents.

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