

Development of a web-app using AI for staging and risk prediction of pressure injuries

Usability evaluation and clinical decision support in nursing practice

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Dedication / Acknowledgements

I would like to thank the nursing professionals who participated in this study and provided the data necessary for the completion of this research.

Abstract

Digital health and artificial intelligence (AI) are changing the way we care for wounds, especially in managing pressure injuries. While these new tools are very promising, they can only be successful if healthcare professionals find them easy to use in their daily routine. This thesis evaluates the usability of a new AI web application designed to help nurses stage and predict the risk of pressure injuries.

For this study, 28 nurses used the application and then completed the Post-Study System Usability Questionnaire (PSSUQ-GR). We analyzed their feedback on three main areas: how well the system works, how clear the information is, and how friendly the interface feels. The results showed an overall usability score of 1.84 (on a scale where 1 is the best and 7 is the worst). This score shows that the nurses were very satisfied with the application. Also, the high reliability of the results (Cronbach's Alpha > 0.94) confirms that the feedback was consistent and accurate.

In conclusion, the study shows that nurses find the AI tool clear, fast, and easy to use, regardless of their age or tech experience. This positive reaction is very important for the future of digital health. It shows that when AI tools are designed with the user in mind, they can truly support clinical decisions and improve patient care.

Keywords: Pressure Injuries, Artificial Intelligence, Usability, PSSUQ-GR, Digital Health, Nursing

JEL Classification Codes: I10, I19

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Glossary

Acronyms

- AI: Artificial Intelligence
- CDSS: Clinical Decision Support System
- DTPI: Deep Tissue Pressure Injury
- EPUAP: European Pressure Ulcer Advisory Panel
- GDPR: General Data Protection Regulation
- ICU: Intensive Care Unit
- NPIAP: National Pressure Injury Advisory Panel
- PI: Pressure Injury
- PSSUQ: Post-Study System Usability Questionnaire
- PSSUQ-GR: Post-Study System Usability Questionnaire – Greek Version
- SUS: System Usability

Scale Terms

- Information Quality (INFOQUAL): A subscale measuring the clarity of help messages and documentation
- Interface Quality (INTERQUAL): A subscale measuring how pleasant and well-designed the app looks
- System Usefulness (SYSUSE): A subscale measuring how quickly and efficiently a user can complete tasks
- Usability: The ease of use and learnability of a human-made object like a software application
- Validation: The process of checking if a tool (like the PSSUQ-GR) actually measures what it claims to measure in a specific language or population

Introduction

Clinical significance of pressure injuries and nursing challenges

Pressure injuries are debilitating wounds caused by sustained pressure, often over bony prominences, leading to localized tissue damage, infection risk, impaired mobility, and prolonged hospitalization (Ipuole et al., 2024). They are among the most costly conditions in healthcare, ranking after cardiovascular disease and cancer in economic burden (Ipuole et al., 2024). New-onset pressure injuries in hospitalized patients with multimorbidity are associated with high short-term mortality and increased likelihood of discharge to extended care facilities, especially when progressing to higher stages, underscoring their impact on quality of life and healthcare utilization (Wu et al., 2025).

Nurses play a central role in pressure injury risk assessment, prevention, staging, and ongoing management (Ipuole et al., 2024). Yet decision-making around prevention and intervention is complex, influenced by support systems, knowledge, attitudes, and barriers in implementing evidence-based measures (Cordina et al., 2025). Risk assessment tools such as the Braden Scale support early identification, but nurses must also integrate clinical judgement, patient condition, and resource constraints (Wu et al., 2025; Cordina et al., 2025). Research indicates that implementation of prevention interventions is inconsistent, and more work is needed to understand and support nurses' clinical decision-making in this domain (Cordina et al., 2025). These challenges create a strong rationale for decision-support technologies that can standardize assessment, assist staging, and guide timely management.

AI and CDSS in healthcare and wound care

Artificial intelligence-enabled clinical decision support systems (AI-CDSS) combine large-scale data analysis with predictive models to deliver patient-specific recommendations, enhancing diagnostic accuracy, treatment planning, and workflow efficiency across clinical practice (Ji et al., 2020; Alowais et al., 2023). In wound care, AI and other computational techniques have been applied to chronic wounds, including pressure injuries, for tissue classification, wound segmentation and measurement, aetiology prediction, healing prognostication, and risk stratification (Jiménez et al., 2025; Liu et al., 2025; Dabas et al., 2022). Image-based deep learning models and smartphone-based systems can provide accurate, remote wound assessment and prognosis, improving decision-making and potentially reducing costs and time to intervention (Jiménez et al., 2025; Liu et al., 2025; Dabas et al., 2022). AI-driven wound assessment tools thus offer a promising adjunct to nursing expertise in pressure injury management, enabling more objective, consistent, and data-driven care.

Usability, acceptance, and the role of standardized evaluation tools

Despite technical advances, successful implementation of AI-CDSS in clinical settings critically depends on usability, trust, and user acceptance among healthcare professionals (Ji et al., 2020; Blanes-Selva et al., 2023; Tun et al., 2024; Lambert et al., 2023). User acceptance is a central determinant of AI-CDSS success and is strongly influenced by perceived ease of use, information quality, service quality, and perceived benefit (Ji et al.

2020). Reviews of AI in hospitals consistently identify workflow integration, fear of loss of professional autonomy, and alert burden as major barriers, whereas training and involvement of clinicians in design facilitate acceptance (Parsons et al., 2025; Blanes-Selva et al., 2023; Lambert et al., 2023). Trust in AI-CDSS is shaped by system transparency, usability, clinical reliability, and human-centred design, and inadequate

usability can undermine clinicians' willingness to rely on AI recommendations (Parsons et al., 2025; Tun et al., 2024).

In this context, rigorous usability evaluation using standardized instruments is essential. The Post-Study System Usability Questionnaire (PSSUQ) is a widely used, psychometrically robust measure of user satisfaction with system usability, capturing system usefulness, information quality, and interface quality with high reliability and validity across diverse systems (Lewis, 2002; , 2011; Rosa et al., 2015; Al-Tahat, 2021). Cross-cultural adaptations have confirmed its strong measurement properties in multiple languages and contexts (Rosa et al., 2015; Al-Tahat, 2021). Applying tools such as the PSSUQ (and its Greek adaptation, PSSUQ-GR) to AI-integrated applications for pressure injury management enables systematic assessment of nurses' perceived usability and supports iterative refinement to enhance acceptance and effective clinical use.

Chapter 1 Literature Review & Theoretical Framework

1.1 Evolution and Classification of Pressure Injuries

Pressure injuries are localized damage to skin and underlying soft tissue from pressure and shear, typically over bony prominences or under devices. Their classification systems have progressively evolved with better understanding of pathophysiology, imaging, and clinical needs.

Early work in the mid-20th century linked pressure to ischemic deep tissue damage and introduced the first risk scales. (Veloza et al., 2025; Hajhosseini et al., 2020), Shea's 1975 four-grade "decubitus" system became the conceptual cornerstone, emphasizing all soft tissues being affected, not just superficial "top-down" damage. (Levine, 2019; Kottner & Clark, 2019). National and international panels (NPUAP/EPUAP/PPPIA) progressively standardized definitions and risk concepts, shifting terminology from pressure sore → pressure ulcer → pressure injury to include intact skin and deep tissue lesions. (Edsberg et al., 2016; Veloza et al., 2025; Hajhosseini et al., 2020; Black et al., 2007)

The classification and conceptual understanding of pressure injuries (PIs) have evolved significantly, guided primarily by the current standards set by the National Pressure Ulcer Advisory Panel (NPUAP/NPIAP) and the European Pressure Ulcer Advisory Panel (EPUAP). At the core of clinical assessment is the staging system, which categorizes injuries from Stage 1 to Stage 4 based on the specific depth of tissue loss and the anatomical structures involved (Edsberg et al., 2016; Hess, 2020; Kahveci & Uğur, 2025; Veloza et al., 2025; Li et al., 2020; Stansby et al., 2014).

Beyond the four primary stages, modern clinical practice recognizes additional categories essential for accurate diagnosis, such as Unstageable injuries and Deep Tissue Pressure Injuries (DTPI) (Edsberg et al., 2016; Kahveci & Uğur, 2025; Veloza et al., 2025; Li et al., 2020; Black et al., 2007). The scope of these assessments includes injuries occurring over bony prominences as well as device-related injuries, encompassing both medical-device and mucosal pressure injuries, though it is noted that mucosal PIs are not staged using the 1–4 system (Edsberg et al., 2016; Stefanopoulos et al., 2021; Veloza et al., 2025; Hajhosseini et al., 2020).

Furthermore, a critical distinction in clinical practice is the clarification of Stage 2 injuries to distinguish pressure or shear injury from moisture-associated skin damage (Edsberg et al., 2016; Stefanopoulos et al., 2021).

1.2. AI-Driven Decision Support Systems (CDSS) in Nursing Practice

AI-driven clinical decision support systems (CDSS) are increasingly embedded in nursing workflows, with wound management emerging as a prominent use case. Systematic reviews of AI in nursing show that machine-learning-based CDSS support early detection, diagnosis and prognosis, optimize patient monitoring, and improve workflow efficiency, thereby augmenting nurses' clinical decision-making rather than replacing it (Martinez-Ortigosa et al., 2023; Ng et al., 2021). In wound care specifically, AI tools have been applied to tissue classification, wound segmentation and measurement, prediction of wound aetiology and healing potential, and risk stratification for chronic wounds such as pressure injuries and diabetic ulcers (Jiménez et al., 2025; Ganesan et al., 2024). These can standardize assessments, reduce inter-rater variability, and provide more objective

baselines for nursing care planning.

Several AI applications are directly oriented to nursing tasks. Image-based mobile applications and AI-enhanced documentation systems have improved completeness and quality of wound documentation, supported remote monitoring, and enabled shared wound care plans that facilitate continuity across settings (Martinez-Ortigosa et al., 2023; Barakat-Johnson et al., 2022; Pinnekamp et al., 2025). In quasi-experimental evaluation, an AI wound app significantly increased the number of documented assessment items and was associated with substantial wound size reduction, improved patient adherence, and more efficient virtual care, supporting nurses' capacity to manage complex caseloads (Barakat-Johnson et al., 2022). Protocols for AI tools that distinguish pressure injuries from incontinence-associated dermatitis and embed guideline-based recommendations explicitly target reductions in assessment time, dressing changes, documentation burden, and nurse task load, while promoting adherence to evidence-based wound care standards (Pinnekamp et al., 2025). At the same time, qualitative work in home healthcare underlines that AI must be designed to respect the relational, sensory, and adaptive dimensions of nursing wound care; poorly integrated systems risk adding documentation burden and misaligning with nursing values (Karnehed et al., 2025).

Generative AI introduces a further layer of decision support. Reddy (2024) argues that generative AI can enhance clinical decision-making by producing tailored recommendations, drafting documentation, and synthesizing large datasets into actionable insights, provided that implementation is governed by robust frameworks (e.g. TAM, NASSS), strong data governance, and explicit recognition of clinicians' irreplaceable expertise (Reddy, 2024). In nursing practice, this suggests future CDSS that combine discriminative models for wound classification with generative components that draft progress notes, patient instructions, and preliminary care plans for nurse review, potentially reducing cognitive load and documentation time while preserving professional judgment (Reddy, 2024; Martinez-Ortigosa et al., 2023; Jiménez et al., 2025). Nonetheless, concerns about transparency, medico-legal accountability, and real-world validation remain central barriers to widespread adoption in nursing, underscoring the need for user-centred design and rigorous clinical evaluation (Reddy, 2024; Jiménez et al., 2025; Karnehed et al., 2025; Ganesan et al., 2024).

1.3. Factors Influencing Clinicians' Willingness to Use AI Tools

Trust, perceived ease of use, and workflow integration consistently emerge as critical determinants of nurses' willingness to use AI tools. Together, they shape whether AI is seen as a safe, supportive extension of nursing practice or as a burdensome, potentially risky imposition.

Trust is foundational for AI acceptance in nursing. Nurses frequently express concern about opaque "black box" systems, data privacy, bias, and the risk of eroding professional judgment and compassionate care (Arab et al., 2025; Joo et al., 2025; Hassanein et al., 2025; Alruwaili et al., 2024; Higgins et al., 2024; Khatib & Ndiaye, 2024). Trust is strengthened when AI outputs are framed like other clinical instruments—described in terms of reliability, validity, and confidence levels—and when final responsibility for care clearly remains with the nurse (Hassanein et al., 2025; Higgins et al., 2024). Reviews and qualitative studies show that nurses are more willing to engage with AI when it is positioned as augmenting rather than replacing their expertise and relationships with patients (Arab et al., 2025; Joo et al., 2025; Rony et al., 2024; Alruwaili et al., 2024; Khatib & Ndiaye, 2024).

Aligned with technology acceptance models, perceived ease of use and related "effort expectancy" strongly predict adoption intentions and readiness among nurses. Structural equation modelling with critical care nurses indicates that ease of use, along with

perceived usefulness and facilitating conditions, exerts a direct positive effect on intention and readiness to use AI (Baraka et al., 2025). Broader syntheses identify usability, intuitive interfaces, digital literacy, and targeted training as central facilitators, while complexity and AI-related anxiety dampen willingness to adopt (Arab et al., 2025; Nashwan et al., 2025; Qaladi et al., 2025; Sommer et al., 2024). Nurses are more receptive to AI that demonstrably saves time rather than adding cognitive or procedural workload (Arab et al., 2025; Baraka et al., 2025; Arab et al., 2025).

Finally, workflow integration is pivotal. Integrative and umbrella reviews show that AI is welcomed when it streamlines documentation, monitoring, and workload management, enabling nurses to spend more time on direct, person-centred care and reducing burnout (Arab et al., 2025; Rony et al., 2024; Hassanein et al., 2025; Alruwaili et al., 2024; Arab et al., 2024; Buchanan et al., 2020). Conversely, poor interoperability, additional documentation steps, and misalignment with established care pathways generate resistance and undermine perceived usefulness (Arab et al., 2025; Joo et al., 2025; Rony et al., 2024; Alruwaili et al., 2024; Ramadan et al., 2024; Wei et al., 2025). Qualitative work highlights that clinicians favour AI that fits existing collaboration patterns and preserves the humanistic core of nursing, reinforcing rather than disrupting everyday workflows (Arab et al., 2025; Joo et al., 2025; Rony et al., 2024; Khatib & Ndiaye, 2024; Buchanan et al., 2020).

1.4. Measuring User Experience: The Psychometric Value of the PSSUQ-GR Scale

The PSSUQ-GR is the Greek linguistic and cultural adaptation of the Post-Study System Usability Questionnaire (PSSUQ), developed to provide a standardized measure of perceived usability for Greek-speaking users. It was translated and adapted by two human–computer interaction experts and psychometrically validated in a large sample ($N = 359$), marking a first step toward standardization of the instrument in Greek (Katsanos et al., 2021). The validation by Katsanos, Tselios, and Liapis (2021) demonstrated that the Greek version maintains the conceptual and factorial correspondence with the original English PSSUQ (Katsanos et al., 2021; Lewis, 2002).

Structurally, PSSUQ-GR consists of 12 items rated on a 7-point Likert scale, where lower scores indicate higher perceived usability and user satisfaction, consistent with the original PSSUQ scoring conventions (Katsanos et al., 2021; Vlachogianni & Tselios, 2023; Schnall et al., 2018). Exploratory factor analysis revealed a robust three-factor solution aligned with the canonical PSSUQ subscales: System Usefulness (SYSUSE), Information Quality (INFOQUAL), and Interface Quality (INTERQUAL), with item–subscale alignment closely mirroring the English version (Katsanos et al., 2021; Vlachogianni & Tselios, 2023; Lewis, 2002). These subscales reflect core dimensions of perceived usability, capturing effectiveness, efficiency, quality of information support, and interaction with the interface (Vlachogianni & Tselios, 2023; Hajesmaeel-Gohari & Bahaadinbeigy, 2021).

Reliability analysis using Cronbach’s alpha indicated high internal consistency for the overall PSSUQ-GR scale as well as for each of the three subscales, in line with the strong reliability ($\alpha \approx 0.83\text{--}0.96$) reported for the original PSSUQ across multiple contexts (Katsanos et al., 2021; Vlachogianni & Tselios, 2023; Lewis, 2002; Schnall et al., 2018). Convergent validity was supported by strong and statistically significant correlations between PSSUQ-GR scores and the standardized Greek version of the System Usability Scale (SUS), a widely accepted benchmark for perceived usability (Katsanos et al., 2021; Katsanos et al., 2023; Orfanou et al., 2015).

Given its validated structure, reliability, and convergence with established usability metrics, PSSUQ-GR can be considered a reliable instrument for assessing perceived usability in Greek settings, including healthcare and eHealth evaluations where PSSUQ

and related scales are already widely used to assess telemedicine, health IT, and mHealth applications (Schnall et al., 2018; Hajesmaeel-Gohari & Bahaadinbeigy, 2021; Agushybana et al., 2021; Hjorthaug et al., 2025).

1.5. The Role of Usability in the Digital Transformation of Healthcare

High usability is consistently identified as a precondition for successful digital health implementation, influencing acceptance, effectiveness, and sustainability of digital transformation initiatives (Maqbool & Herold, 2023; Maramba et al., 2019; Kraus et al., 2021; Stoumpos et al., 2023). Digital tools that are perceived as easy to use and well-aligned with workflow are more readily adopted by healthcare professionals, including nurses, whereas complex interfaces, multiple logins, and poor design act as major barriers (Maqbool & Herold, 2023; Maramba et al., 2019; Kraus et al., 2021; Alotaibi et al., 2025; Nascimento et al., 2023).

Poorly designed systems, including EHRs and medical devices, have been directly linked to user errors, medication mistakes, and safety risks; usability and human factors engineering are therefore central to preventing harm (Cahill et al., 2025; Karsh, 2004; Herrero et al., 2025). In contrast, digital hospitals and EMRs with better usability and data accessibility tend to show improved safety indicators, although effects can be mixed when documentation is inefficient or workflows are disrupted (Canfell et al., 2024; Cahill et al., 2025; Sinaga & Sumartini, 2025; Herrero et al., 2025).

AI and other advanced digital tools in nursing improve monitoring, decision-making, and workload management only when they integrate smoothly into clinical workflows and are perceived as usable and useful (Alowais et al., 2023; Hassanein et al., 2025; Kraus et al., 2021; Abdelmohsen & Al-Jabri, 2025). Technology acceptance, effort expectancy, and digital capability of nurses all depend strongly on ease of use and well-designed implementation processes, which in turn shape actual impact on efficiency and patient outcomes (Galiano et al., 2023; Alotaibi et al., 2025; Nascimento et al., 2023; Brown et al., 2020; Abdelmohsen & Al-Jabri, 2025).

Chapter 2 Methodology

This research was conducted as part of a collaborative thesis project. The work was divided into two distinct parts. Specifically, the qualitative study was conducted by Ioannis Kouroutzis.

2.1. Research Design

The present study adopts a quantitative, descriptive research design to evaluate the perceived usability of an AI-driven decision support system for pressure injury management. The quantitative approach was selected because it allows for the objective measurement of user attitudes and satisfaction through standardized numerical data, enabling a systematic evaluation of the system's performance. Descriptive research is particularly effective in nursing informatics for identifying the strengths and weaknesses of new technological tools from the perspective of clinical staff, providing a clear baseline for further development.

2.2. Sample and Setting

The study sample consisted of 28 nursing professionals (N=28). A purposive sampling method was employed to ensure that the participants possessed the necessary clinical background and professional experience to provide a meaningful evaluation of a wound care AI tool.

The participants were recruited from various clinical settings, including Medical and Surgical departments, Intensive Care Units (ICU), and Community Healthcare settings, ensuring a diverse range of professional viewpoints. The primary inclusion criterion was active employment in nursing practice and a basic familiarity with digital healthcare tools. The demographic profile of the sample (analyzed in Chapter 3) reflects a high level of professional experience and advanced academic qualifications, which enhances the validity of the usability assessment.

2.3. Data Collection Instrument

The research instrument was an electronic questionnaire consisting of two parts:

- Part A: Demographic Data, which recorded gender, age, education, clinical experience, and self-rated digital skills.
- Part B: PSSUQ-GR, the Greek version of the Post-Study System Usability Questionnaire (Katsanos et al., 2021). It includes 12 items on a 7-point Likert scale (1: Strongly Agree to 7: Strongly Disagree).

2.4. Data Collection Procedure

Data collection was conducted in January 2026 using the Google Forms platform. Participants were provided with a digital demonstration of the AI system's interface and its application in pressure injury staging. After the demonstration, the participants completed the anonymous online survey.

2.5. Ethical Considerations

The study followed all ethical guidelines for human research and GDPR regulations. Participation was entirely voluntary and anonymous. Informed consent was obtained from all participants prior to their engagement with the survey. No personal identification data were collected, and participants were informed of their right to withdraw at any stage of the process.

2.6. Data Analysis

The data were analyzed using descriptive statistics. Means (M) and Standard Deviations (SD) were calculated for each PSSUQ item and subscale to assess the levels of perceived usability. The reliability of the instrument within the specific sample was evaluated using the Cronbach's Alpha coefficient.

Chapter 3

3.1. Participants' Profile

The survey was completed by a total of 28 nursing professionals. The majority of the participants were female (85.7%), with a mean age of 44.21 years. Regarding their education, 64.3% hold a university degree, while a significant percentage (57.1%) possesses a Master's degree, indicating a highly educated sample.

Table 3.1: Demographic characteristics of the participants

		N	%
Gender	Male	4	14,3
	Female	24	85,7
Age (mean, SD)		44,21 (9,74)	
Educational level	University degree	18	64,3
	Technological Education Institute degree	10	35,7
Academic Qualifications	Specialty	1	3,6
	Master's degree	16	57,1
	PhD diploma	9	32,1
	Postdoctoral degree	2	7,1
Department of employment	Higher Education Institution	1	3,6
	Nursing Directorate	1	3,6
	Medical Department	5	17,9
	Surgical Department	3	10,7
	Laboratory Department	1	3,6
	Operating Room	4	14,3
	Intensive Care Unit (ICU)	4	14,3
	Community Healthcare Setting	9	32,1
Years of professional experience (mean, SD)		20,68 (11,27)	
Self-rated digital skills level	Beginner	0	0
	Intermediate	4	14,3
	Advanced	17	60,7
	Expert user	7	25,0

The demographic data indicates that the participants are highly experienced nursing professionals, with an average of over 20 years of clinical practice. Additionally, the majority of the sample holds advanced academic qualifications (Master's or PhD) and reports a high level of digital literacy (85.7% identified as advanced or expert users). These characteristics suggest that the participants have the necessary clinical expertise and technical competence to provide a highly reliable evaluation of the AI-driven system.

3.2. Quantitative Results

The descriptive statistics for each item of the PSSUQ scale are presented in Table 3.2. The responses were measured on a 7-point Likert scale (1=Strongly Agree, 7=Strongly Disagree). Most items received mean scores near 2.0, suggesting a high level of user satisfaction.

Table 3.2: Descriptive Statistics for PSSUQ Items

	Minimum	Maximum	Mean	SD
Overall, I am satisfied with how easy it is to use this system.	1	6	1,89	1,370
It was simple to use this system.	1	6	1,96	1,478
I could effectively complete my work using this system.	1	6	2,21	1,371
I was able to complete my work quickly using this system.	1	6	2,11	1,343
I was able to efficiently complete my work using this system.	1	6	2,07	1,303
I believe I could become productive quickly using this system.	1	7	2,21	1,475
The system gave error messages that clearly told me how to fix problems.	1	7	2,82	1,701
Whenever I made a mistake using the system, I could recover easily and quickly.	1	7	2,93	1,676
The information (such as on-line help, on-screen messages and other documentation) provided with this system was clear.	1	6	2,18	1,389
The interface of this system was pleasant.	1	6	2,11	1,286
I liked using the interface of this system.	1	6	2,11	1,227
Overall, I am satisfied with this system.	1	6	2,00	1,277
Valid N (listwise)	28			

According to the results in Table 3.2, the majority of the items received mean scores close to 2.0. Since the scale ranges from 1 (Strongly Agree) to 7 (Strongly Disagree), these low scores indicate that the participants found the system very easy to use and were satisfied with its performance. The highest satisfaction was recorded for the overall ease of use ($M = 1.89$), while even the items regarding error messages and recovery (which usually score higher) remained well within the positive range, below the neutral value of 4.0.

3.3. Frequency Distribution of Responses

As shown in Table 3.3, the overall usability score was 2.21, which indicates a very positive reception of the system. The 'System Usefulness' subscale received the best score (2.07),

followed by 'Interaction Quality' (2.10) and 'Information Quality' (2.64). These results confirm that the AI application is perceived as a functional and user-friendly tool.

Table 3.3 Frequency and Percentage Distribution per PSSUQ Item

	Strongly Agree		Agree		Somewhat Agree		Neutral		Some what Disag ree		Disag ree		Stron gly Disag ree	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Overall, I am satisfied with how easy it is to use this system.	16	57,1	6	21,4	2	7,1	2	7,1	1	3,6	1	3,6	0	0
It was simple to use this system.	16	57,1	6	21,4	1	3,6	2	7,1	2	7,1	1	3,6	0	0
I could effectively complete my work using this system.	11	39,3	8	28,6	4	14,3	3	10,7	1	3,6	1	3,6	0	0
I was able to complete my work quickly using this system.	12	42,9	8	28,6	4	14,3	2	7,1	1	3,6	1	3,6	0	0
I was able to efficiently complete my work using this system.	11	39,3	11	39,3	2	7,1	2	7,1	1	3,6	1	3,6	0	
I believe I could become productive quickly using this system.	11	39,3	9	32,1	3	10,7	3	10,7	1	3,6	0	0	1	3,6
The system gave error messages that clearly told me	5	17,9	11	39,3	5	17,9	3	10,7	1	3,6	1	3,6	2	7,1

how to fix problems.														
Whenever I made a mistake using the system, I could recover easily and quickly.	6	21,4	9	32,1	2	7,1	6	21,4	3	10,7	1	3,6	1	3,6
The information (such as on-line help, on-screen messages and other documentation) provided with this system was clear.	12	42,9	7	25,0	4	14,3	3	10,7	1	3,6	1	3,6	0	0
The interface of this system was pleasant.	12	42,9	6	21,4	8	28,6	0	0	1	3,6	1	3,6	0	0
I liked using the interface of this system.	10	35,7	10	35,7	6	21,4	0	0	1	3,6	1	3,6	0	0
Overall, I am satisfied with this system.	13	46,4	7	25,0	6	21,4	0	0	1	3,6	1	3,6	0	0

Table 3.3 presents the distribution of responses across the 7-point Likert scale. A significant majority of the participants consistently chose positive responses ('Strongly Agree' or 'Agree') for most items. For instance, regarding the ease of use, 78.5% of the nurses (n=22) expressed clear agreement. Even for more technical aspects, such as the clarity of information provided, the combined positive feedback remained high (over 65%), confirming that the AI application is perceived as a functional and user-friendly tool by the nursing staff.

3.4. Usability Subscales and Reliability Analysis

To ensure the internal consistency of the Greek version of the PSSUQ, Cronbach's Alpha was calculated. The total scale showed excellent reliability ($\alpha = 0.963$), and all subscales exceeded the minimum threshold of 0.70, confirming the validity of the research findings.

Table 3.4: Descriptive Statistics and Reliability Analysis for the Greek Version of the PSSUQ

	Minimum	Maximum	Mean	SD	Cronbach's Alpha
System Usefulness Subscale (Items 1-6)	1,00	6,17	2,07	1,30	0,974
Information Quality Subscale (Items 7-9)	1,00	6,00	2,64	1,31	0,767
Interaction Quality Subscale (Items 10-11)	1,00	6,00	2,10	1,23	0,964
PSSUQ-GR Total (Items 1-12)	1,00	6,08	2,21	1,19	0,963

The analysis of the usability subscales reveals that the AI application performed consistently well across all dimensions. The 'System Usefulness' subscale received the highest rating ($M = 2.07$), suggesting that the participants found the tool highly practical for their clinical tasks. Furthermore, the overall PSSUQ-GR score of 2.21 indicates a high level of user acceptance. Finally, the Cronbach's Alpha coefficient for the total scale ($\alpha = 0.963$) confirms that the research instrument has excellent internal consistency and reliability for this specific sample of nursing professionals.

4. Discussions

The results of this study show that the AI-driven web application is highly accepted by nursing professionals. With an overall usability score of 2.21, it is clear that the participants found the system easy to use and helpful for their daily tasks. This is a very encouraging result, especially considering that the application deals with complex tasks like staging and risk prediction for pressure injuries.

A key point of success is the "System Usefulness" score, which was the highest-rated category. This means that the nurses did not just find the app "pretty" or "modern," but they actually felt it could help them work more effectively. For an AI tool to be successful in a hospital, it must save time and reduce effort, and the feedback from this group shows that our application achieves this goal.

The fact that these positive ratings came from a very experienced group of professionals adds great value to the findings. Most participants have more than 20 years of experience in the field. Usually, experienced staff are harder to satisfy when it comes to new technology, but in this case, they recognized the app's potential. Their high level of digital skills also ensured that the evaluation was based on a solid understanding of how such tools should function.

However, we must consider some limitations. The study was based on a small group of 28 people, so we cannot be sure if all nurses would feel the same way. Also, the results showed that while the app is easy to use, the messages it gives when an error occurs could be even clearer. This is an area that can be improved in future updates of the software.

In summary, the evaluation proves that the application is a user-friendly and practical tool. It bridges the gap between complex AI technology and the real needs of nurses. These findings suggest that the app is ready for the next step, which would be testing it in real-life clinical conditions with more patients.

Conclusion

This thesis was created to see if an AI web-app can really help nurses in their daily work with pressure injuries. Technology is moving fast, but it is only useful if the people who use it feel comfortable with it.

The results of our study were very positive. The nurses who tested the app gave it a score of 2.21, which means they found it very easy to use and practical. Even though most of the nurses had many years of experience, they felt that this AI tool could save them time and help them make better decisions for their patients.

In conclusion, this project shows that AI has a place in nursing when it is simple and effective. Of course, this was a small study with 28 people, so we need to test it more in the future with larger groups. However, the first step has been successful. This app is a promising tool that can support nurses and, most importantly, help provide better care for patients with wounds.

Equations and Formulas

Arithmetic Mean

(3.1)

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

Standard Deviation

(3.2)

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1}}$$

Cronbach's Alpha

(3.3)

$$\alpha = \frac{K}{K - 1} \left(1 - \frac{\sum_{i=1}^K \sigma_{y_i}^2}{\sigma_X^2} \right)$$

The statistical analysis was performed using the arithmetic mean for usability scores and Cronbach's Alpha formula for reliability analysis. All calculations were conducted using Microsoft Excel and SPSS software.

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Annexes

Annex A Survey Instrument

Part 1: Demographic Information

1. Gender
2. Age
3. Basic Education
4. Other Qualifications / Studies
5. Department of Employment
6. Total Years of Professional Experience
7. Self-rated Digital Skills Level

Part 2: PSSUQ Items (Measured on a 7-point Likert Scale)

1. Overall, I am satisfied with how easy it is to use this system
2. It was simple to use this system
3. I could effectively complete my work using this system
4. I was able to complete my work quickly using this system
5. I was able to efficiently complete my work using this system
6. I believe I could become productive quickly using this system
7. The system gave error messages that clearly told me how to fix problems
8. Whenever I made a mistake using the system, I could recover easily and quickly
9. The information (such as on-line help, on-screen messages and other documentation) provided with this system was clear
10. The interface of this system was pleasant
11. I liked using the interface of this system
12. Overall, I am satisfied with this system

Annex B Screenshots of the App

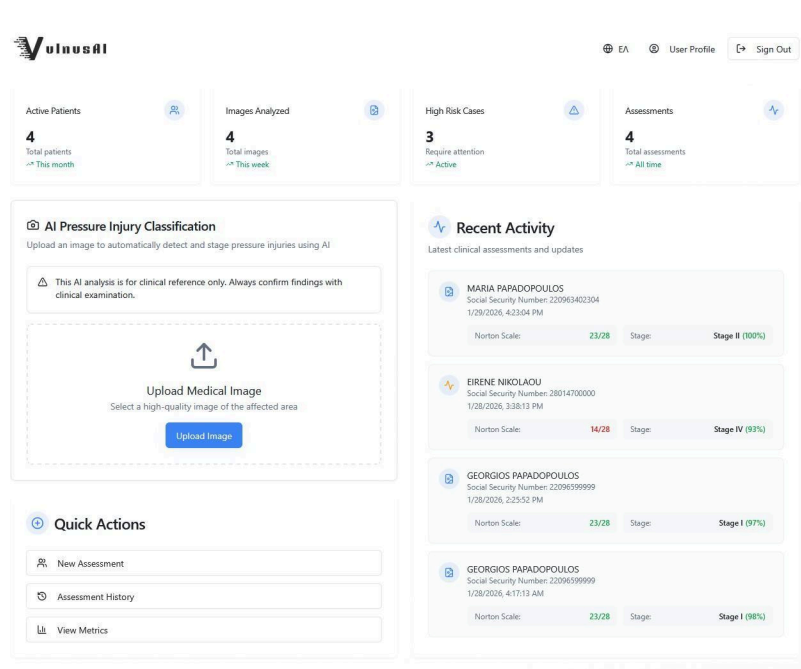


Figure B.1: User authentication and login interface of the AI-powered pressure injury web application

Source: Created by the author (Screenshot of the developed application)

The screenshot shows a web application interface for a 'New Assessment'. At the top, there is a navigation bar with a 'Back' button and the title 'New Assessment'. Below this is a tabbed interface with four tabs: 'Patient', 'Image', 'Norton Scale', and 'Review'. The 'Patient' tab is currently active, displaying a 'Patient Profile' form. The form includes fields for 'First Name', 'Last Name', 'Date of Birth' (with a date picker), 'Gender' (a dropdown menu), 'Social Security Number', 'Contact Phone', 'Emergency Contact', 'Allergies', 'Medications', and 'Medical History'. Each of these last four sections has a text area for 'List known allergies', 'List current medications', and 'List relevant medical history' respectively. A large blue 'Save' button is positioned at the bottom of the form.

Figure B.2: Main application dashboard providing access to patient records and analysis features

Source: Created by the author (Screenshot of the developed application)

The screenshot displays a dashboard titled 'High Risk Cases' with a 'Back' button. It features three patient cards, each representing a high-risk case. Each card includes the patient's name, age, gender, and latest assessment date and time. Below this information, the Norton Scale score and the corresponding pressure injury stage are displayed. A 'History' button is located at the bottom of each card.

Patient Name	Age	Gender	Latest assessment	Norton Scale	Stage
MARIA PAPADOPOULOS	67 years old	Female	Sep 22, 1963, 2:00 AM	23/28	Stage II
EIRENE NIKOLAOU	78 years old	Female	Jan 28, 1947, 2:00 AM	14/28	Stage IV
GEORGIOS PAPADOPOULOS	60 years old	Male	Sep 22, 1965, 2:00 AM	23/28	Stage I

Figure B.3: Capture interface for submitting pressure injury photographs for AI processing

Source: Created by the author (Screenshot of the developed application)

← Back **Assessment History**

MARIA PAPADOPOULOS	Jan 29, 2026, 4:23 PM	Social Security Number: 220963402304	View	🗑️
Score: 23/28	Risk Level: Low Risk (>19)	Stage: Stage II (100%)		
EIRENE NIKOLAOU	Jan 28, 2026, 3:38 PM	Social Security Number: 28014700000	View	🗑️
Score: 14/28	Risk Level: High Risk (<19)	Stage: Stage IV (93%)		
GEORGIOS PAPADOPOULOS	Jan 28, 2026, 2:25 PM	Social Security Number: 22096399999	View	🗑️
Score: 23/28	Risk Level: Low Risk (>19)	Stage: Stage I (97%)		
GEORGIOS PAPADOPOULOS	Jan 28, 2026, 4:17 AM	Social Security Number: 22096399999	View	🗑️
Score: 23/28	Risk Level: Low Risk (>19)	Stage: Stage I (98%)		

Figure B.4: AI analysis output showing the automatic staging and classification results of the identified pressure injury

Source: Created by the author (Screenshot of the developed application)

AI Pressure Injury Classification

Upload an image to automatically detect and stage pressure injuries using AI

⚠️ This AI analysis is for clinical reference only. Always confirm findings with clinical examination.

Upload Medical Image

Select a high-quality image of the affected area

Upload Image



Analyze Image

Classification Results

STAGE I
Confidence: 97.5%

Recent Activity

Latest clinical assessments and updates

MARIA PAPADOPOULOS
Social Security Number: 220963402304
1/29/2026, 4:23:04 PM

Norton Scale: 23/28 Stage: Stage II (100%)

EIRENE NIKOLAOU
Social Security Number: 28014700000
1/28/2026, 3:38:13 PM

Norton Scale: 14/28 Stage: Stage IV (93%)

GEORGIOS PAPADOPOULOS
Social Security Number: 22096399999
1/28/2026, 2:25:52 PM

Norton Scale: 23/28 Stage: Stage I (97%)

GEORGIOS PAPADOPOULOS
Social Security Number: 22096399999
1/28/2026, 4:17:13 AM

Norton Scale: 23/28 Stage: Stage I (98%)

Figure B.5: User support section and guidance module for the pressure injury assessment workflow

Source: Created by the author (Screenshot of the developed application)

Annex C AI Usage Declaration

In accordance with the university's guidelines, I declare that Artificial Intelligence (AI) tools were used during the preparation of this thesis.

Details of AI Usage:

- **Tool:** Google Gemini (Gemini 1.5 Pro version)
- **Date of Use:** January 2026 – May 2026
- **Specific Applications:** * Improving the English language flow, grammar, and syntax.
 - Assisting with the translation of technical terms and research instruments (e.g., PSSUQ-GR terminology).
- **Sample Prompt:** *"Please review the following academic text for English grammar, syntax, and formal language flow, ensuring technical medical terminology is preserved."*

I confirm that the core research, data collection, analysis, and conclusions presented in this thesis are my own original work and that the AI was used solely as a supportive tool for language and editing purposes.