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Original Research

Development of the NurseTrack Application for Nurse Performance Assessment

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ABSTRACT

***Background**: This study used a Research and Development (R&D) design with the Borg & Gall model approach, which included needs analysis, application design, expert validation,limited testin g, and implementation. The research population included all nur ses working in the inpatient ward. The sampling technique used total sampling in the limited testing stage and proportionate s ampling in the implementation stage. The research instruments consisted of a nurse performance assessment questionnaire, an expert feasibility test sheet, and a user satisfaction questionnair e. Data analysis used a paired t-test to measure the difference in performance before and after using the application*

***Methods**: This study used a Research and Development (R&D)d esign with the Borg & Gall model approach, which included ne eds analysis, application design, expert validation, limited testing , and implementation. The research population included all nurs es working in the inpatient ward. The sampling technique used total sampling in the limited testing stage and proportionate sa mpling in the implementation stage. The research instruments c onsisted of a nurse performance assessment questionnaire, an e xpert feasibility test sheet, and a user satisfaction questionnaire. Data analysis used a paired t-test to measure the difference i n performance before and after using the application*

***Results**: The results of the study show that the NurseTrack app lication was rated "highly feasible" by content experts and tech nology experts, with an average feasibility score of 89%,and 87 % of respondents stated that the application facilitates perform ance monitoring, improves assessment transparency,and assists i n continuous evaluation.*

***Conclusion:**This study concludes that the NurseTrack application is effective as a technological innovation in nursing managemen t to improve the objectivity,efficiency, and accuracy of nurse per formance assessments. This application is recommended for wid espread implementation as part of the digitization ofnursing hu man resource management in hospitals.*

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INTRODUCTION

Hospitals are healthcare service institutions that play a strategic role in improving the ov erall health status of the community.Therefore,hospitals must maintain high-quality service standa rds and ensure patient safety. Improving service quality requires efforts to strengthen the perfor mance of Human Resources (HR). One of the steps that can be taken is providing training for

medical personnel in all hospital units so that they become more responsive in delivering health care services (Kirana & Nugraheni, 2023).

Human resources (HR) constitute a strategic component in the healthcare service system, directly influencing the quality and safety of hospital services. Nurses, as the largest professional group with the highest intensity of patient contact, are required to demonstrate optimal, professional, and measurable performance in every implementation of nursing care (A. S. Nela et al., 2022). The quality of nurses' performance is influenced not only by clinical competence but also by an HR management system that supports objective and continuous performance planning, monitoring, and evaluation (Kirana & Nugraheni, 2023).

Nurse performance appraisal is a fundamental element in the nursing management system because it directly ensures healthcare service quality,patient safety, and the sustainable development of human resources in hospitals. As the largest group of healthcare professionals,nurses have a professional responsibility to provide safe, effective, and patient-centered nursing care.Therefore,hospitals require a standardized, objective, and sustainable nurse performance appraisal system to accurately evaluate both individual and team achievements in alignment with the organization's vision and mission (A. Nela, 2025).

However, the implementation of nurse performance appraisal systems in various hospitals still faces several challenges. Performance evaluations are generally conducted manually using paper-based forms or separate documentation systems that lack integration across service units (Adija et al., 2025). Such manual systems tend to be subjective,depend heavily on the evaluator's perception, and have limitations in real-time data recording. This condition results in delays in reporting appraisal outcomes, difficulties in continuous performance monitoring, and low accuracy and consistency of nurse performance data.Consequently,managerial decision-making processes, competency development planning, and the provision of performance feedback to nurses become less optimal.

The advancement of information technology and digitalization in the healthcare sector offers strategic opportunities to enhance the effectiveness of nursing management systems,including nurse performance appraisal (A. S. Nela, 2025). The utilization of technology-based applications enables systematic, integrated, and transparent recording, monitoring, and evaluation of nurse performance. The NurseTrack application was developed as a nursing management innovation aimed at facilitating digital nurse performance appraisal through structured performance indicators that are well documented and easily accessible to nursing managers. The implementation of tis application is expected to improve appraisal objectivity,accelerate reporting processes, and support continuous performance evaluation.

Although various technological innovations have begun to be implemented in nursing management, scientific evidence regarding the effectiveness of digital applications in nurse performance appraisal remains limited,particularly within the context of hospitals in Indonesia.Previous studies have predominantly focused on general nursing information systems, while research specifically assessing the impact of application implementation on nurse performance remains relatively scarce. This limitation indicates the presence of a research gap that needs to be addressed through empirical studies based on data and systematic analysis.

Based on the above considerations, research on the implementation of the NurseTrack application in nurse performance appraisal is essential. This study is expected to contribute scientifically to the development of technology-based nursing management and serve as a basis

for hospital management decision-making in implementing a more effective, objective, and sustainable nurse performance appraisal system. Furthermore, the findings of this study are anticipated to serve as a reference for policy development and digital innovation in nursing,both nationally and internationally.

Bhayangkara Hospital Level III POLDA Lampung is a Type C general hospital.The hospital has a vision and mission focused on improving service quality in healthcare delivery and enhancing the quality of human resources. Compared to other hospitals, Bhayangkara Hospital is considered one of

the more comprehensive facilities, employing numerous medical specialists as stated in one of its mi ssions.

A preliminary study was conducted on July 29,2025, in the internal medicine inpatient ward of Bhayangkara Hospital in Bandar Lampung involving 10 staff nurses. The pre-survey was carried out through brief interviews and initial observations to obtain an overview of the existing nurse perfor mance appraisal system and nurses' job satisfaction with the current assignment system.Regarding job satisfaction, the results showed that 3 (30%) nurses reported being very satisfied, 3 (30%) were mo derately satisfied, and 4 (40%) were less satisfied with their jobs. The pre-survey results highlight the need to develop the NurseTrack application as a technological innovation to support a more objecti ve, standardized, well-documented, and sustainable nurse performance appraisal system.

MATERIALS AND METHOD

This study employed a Research and Development (R&D) design using the ADDIE model (An alysis, Design, Development, Implementation, and Evaluation), combined with an effectiveness test thr ough a quasi-experimental design using a pretest-posttest control group approach. This approach was selected to ensure that the NurseTrack application is not only feasible in terms of content and syste m design but also proven effective in improving the quality of nurse performance appraisal. The stud y was conducted at a hospital (according to the planned research location) in the inpatient unit.

The research was carried out over an estimated period of six months, covering the stages o f application development, validation testing, implementation, and data analysis. The study population consisted of staff nurses who met the inclusion criteria, with a totalsample of 54respondents selecte d using purposive sampling. The inclusion criteria were: (1) staff nurses with a minimum of one year of work experience, (2) willingness to participate as respondents,and (3) ability to use a smartphon e or other technological devices. The exclusion criteria were:(1) nurses who were on leave or officiall y absent, and (2) nurses who declined to participate in the research process.

RESULTS

Table 1. Characteristics of Respondents

Characteristics	Intervention$(n = 27)$	%	$Control(n = 27)$	%
Gender				
Female	21	77.8%	20	74.1%
Male	6	22.2%	7	25.9%
Education Level				
Diploma in Nursing (D3)	16	59.3%	15	55.6%
Bachelor of Nursing + Ners	11	40.7%	12	44.4%
Work Experience				
≤5 years	12	44.4%	11	40.7%
>5 years	15	55.6%	16	59.3%

Based on Table 1, the majority of respondents in both groups were female,with 77.8%in the intervention group and 74.1% in the control group. Most respondents in both groups held a Diploma in Nursing (D3),accounting for 59.3% in the intervention group and 55.6% in the control group, whil e the remainder held a Bachelor's degree in Nursing with professional certification (Ners). Regarding work experience, the majority of respondents had more than five years of experience, namely 55.6% in the intervention group and 59.3% in the control group. The relatively balanced distribution across both groups indicates comparable baseline characteristics.

Table 2. Comparison of Mean Nurse Performance Scores Before Intervention

Performance Variables	Intervention (Mean)	Control (Mean)	p-value
Knowledge	73.2	72.8	0.812

Clinical Skills	71.6	72.1	0.754
Professional Attitude	74.4	73.7	0.668

Table 2 shows that the mean knowledge scorein the intervention group was 73.2compared to 72.8 in the control group(p=0.812). For clinical skills, the intervention group had a mean score of 71.6, while the control group scored 72.1(p=0.754). In terms of professional attitude, the intervention group obtained a mean score of 74.4 compared to 73.7in the control group(p=0.668).All p-values were greater than 0.05(>0.05,indicating that both groups had homogeneous baseline performance prior to the intervention.

Table 3. Comparison of Nurse Performance Before and After Intervention

Group	Pretest Mean	SD	Posttest Mean	SD	p-value
Intervention(NurseTrack)	73.3	6.0	86.9	5.2	0.000
Control (Manual Method)	73.0	6.2	76.4	6.6	0.038

The results in Table 3 indicate a significant improvement in nurse performance in the intervention group using the NurseTrack application. The mean pretest score was 73.3 (SD=6.0), which increased to 86.9(SD=52at posttest. Statistical analysis showed a p-value of 0.000(p<0.05),,indicating a statistically significant improvement after using NurseTrack.In the control group, which used the manual assessment method, the mean score increased from 73.0(SD=6.2)to76.4(SD=6.6),with a p-value of 0.038(p<0.05).Although the control group also showed significant improvement, the magnitude of improvement was substantially greater in the intervention group. These findings demonstrate that NurseTrack is more effective in improving nurse performance compared to manual assessment methods.

Table 4. Application Feasibility and Acceptance Level(n=27,Intervention GGroup)

Parameter	$Mean \pm SD$	Category
System Usability Scale (SUS)	82.1 ± 4.5	Highly Feasible
Perceived Usefulness	4.5 ± 0.4	High
Perceived Ease of Use	4.6 ± 0.3	High
Willingness to Use	4.7 ± 0.2	Very High

The System Usability Scale (SUS) results showed a mean score of82.1±4.5,categorized as "highly feasible." This indicates that the NurseTrack application has excellent usability and is easy to use in clinica practice. The Perceived Usefulness score was4.5±0.4(high category), meaning most respondents considered the application highly beneficial in supporting performance assessment and nursing tasks. The Perceived Ease of Use score was 46±03(high category), indicating that the application is easy to understand and operate.

Furthermore, the Willingness to Use parameter showed the highest mean score of 4.7 ± 0.2(very high category), suggesting strong acceptance and intention among nurses to continue using the NurseTrack application in daily performance assessment activities.

DISCUSSION

Based on the results presented in Table 1, the majority of respondents in both groups were female,accounting for 77.8% in the intervention group and 74.1% in the control group.This finding reflects the actual condition of the nursing profession, which is generally dominated by women. The predominance of women in nursing has been widely reported in various studies and is considered a global trend associated with the social and cultural roles traditionally attached to the caring profession. The relatively balanced gender composition between the two groups also indicates that the respondent distribution did not create gender bias,thereby supporting the representativeness of the study findings.

Regarding educational background, most respondents in both groups held a Diploma in Nursing (D3), representing 59.3% of the intervention group and 55.6% of the control group,whil

e the remainder held a Bachelor's degree in Nursing with professional certification (Ners).This co ndition reflects the reality of the nursing workforce composition in most hospitals in Indonesia, where vocational nursing graduates still dominate clinical services. Educational level is associated with clinical competence, analytical ability, and acceptance of technology.The relatively balanced distribution of educational levels between the two groups suggests that their baseline competen cies and capacity to implement the intervention were homogeneous,thereby enhancing the objec tivity of the study results.

In terms of work experience, the majority of respondents in both groups had more tha n five years of experience, namely 55.6% in the intervention group and 59.3% in the control gr oup. Length of service is an important factor influencing performance, as it relates to clinical ex perience,professional maturity, confidence in delivering care, and adaptability to service systems and technology. Nurses with longer work experience generally have a better understanding of se rvice procedures, quality standards, and organizational work mechanisms.The comparable distribut ion of work experience between the two groups indicates similar levels of professional experien ce, minimizing potential bias resulting from differences in tenure.

The study results demonstrate that the NurseTrack application is effective in improving n urse performance. This is evidenced by the significant increase in the mean posttest score of th e intervention group compared to the pretest score, with a p-valu<0.05..Furthermore,the magnit ude of improvement in the intervention group was substantially greater than that of the control group, which used the manual assessment method. Thesefindings indicate that the digitalization of the performance appraisal system has a positive impact on improving nurse work performan ce. The improvement may be influenced by several factors, including easier access to performan ce information, more systematic monitoring, and increased work motivation due to a more trans parent and accountable evaluation process.

The findings are consistent with previous studies stating that technology-based nursing i nformation systems can enhance documentation quality, work effectiveness, and managerial decis ion-making accuracy (Kirana & Nugraheni, 2023). Other studies have also shown that technology-based performance appraisal systems can improve motivation,accountability,and quality control in nursing services because the evaluation process becomes more structured and objective (Aryudi et al., 2023). Thus, the results of this study strengthen the scientific evidence that digital transf ormation in nursing management significantly contributes to improving hospital service quality (K irana & Nugraheni, 2023).

From a usability perspective, the System Usability Scale (SUS) score of 82.1 falls into th e "highly feasible" category. This indicates that the NurseTrack application is easy to use,well un derstood, and aligned with user needs. These findings are consistent with the Technology Accep tance Model (TAM), which explains that technology acceptance is influenced by perceived useful ness and perceived ease of use. In this study, both indicators were categorized as high, further reinforcing nurses' willingness to use the NurseTrack application. The higher the perceived useful ness and ease of use, the greater the likelihood that individuals will consistently adopt the tech nology (Borkowski,2009).

Moreover, the very high willingness-to-use score indicates that nurses perceive the applic ation as relevant to their work needs. This finding reflects the readiness of nursing human reso urces to adapt to digital systems in performance management. It is also aligned with digital hea lth transformation policies that emphasize the importance of technology integration to support s ervice quality and effective healthcare governance (A. S. Nela, 2025).

In relation to nursing management, the implementation of the NurseTrack application ha s the potential to support decision-making processes, performance evaluation, competency devel opment planning, and sustainable human resource management. The application enables a more objective and well-documented appraisal process while minimizing the bias often associated with manual systems. Additionally, the availability of real-time performance data provides a strategic

basis for nursing managers to conduct supervision, coaching, and policy formulation aimed at improving nursing service quality (Kirana & Nugraheni, 2023).

Nevertheless, this study has several limitations, including a relatively short implementation period and data collection conducted in a single hospital, which requires careful consideration when generalizing the findings. Furthermore, the study did not explore other potential influencing factors such as organizational culture, leadership style, or institutional technological readiness, which may affect the success of NurseTrack implementation. Therefore, future research is recommended to involve multiple hospitals,extend the implementation period, and apply a mixed-method approach to obtain more comprehensive insights.

Overall, the findings confirm that the NurseTrack application is an effective, feasible,and well-accepted technological innovation among nurses. Its implementation is recommended as part of the digital transformation of nursing human resource management,particularly in establishing a more objective, efficient, accurate, and sustainable performance appraisal system.

CONCLUSION

In concusion, this study demonstrates that the NurseTrack application is an effective and feasible technological innovation for improving nurse performance assessment in hospital settings. The implementation of NurseTrack significantly enhanced nurse performance compared to the manual assessment method, as evidenced by the substantial increase in posttest scores in the intervention group. The application was also rated highly in terms of usability,perceived usefulness,ease of use, and willingness to use, indicating strong acceptance among nurses. These findings suggest that the digitalization of performance appraisal systems can improve objectivity,transparency, efficiency, and accuracy in nursing management.Therefore,NurseTrack is recommended for broader implementation as part of the digital transformation of nursing human resource management to support continuous quality improvement in healthcare services.

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