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Research article

Digital e-Dy Care Education and Nurses' Personal Protective Equipment Compliance: A Controlled Before-and-After Study in Kudus

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Abstract

Adherence to infection-prevention precautions depends on much more than knowledge: usability of protocols, workflow conditions, supervision and equipment supply all matter. This study examined digital e-dy care education and nurses' personal protective equipment compliance using a two-group quasi-experimental pretest–posttest study. The study took place at RSUD dr. Loekmonohadi Kudus, Central Java, Indonesia, February–July 2026 and included 80 nurses purposively selected from four wards; 40 received the intervention and 40 received routine instruction. The intervention consisted of QR code–accessible e-Dy Care electronic book addressing appropriate use of personal protective equipment (PPE). Outcomes were assessed using questionnaire and observation-derived PPE compliance scores. Mean adherence scores increased from 51.83 to 61.70 in the e-Dy Care group, compared with 51.50 to 55.15 in controls. The analysis reports a within-intervention p value of 0.001 and an intergroup categorical Fisher exact p value below 0.001. However, its adherence-frequency table includes denominators of 48 and 52 in a nominal 40-participant group and conflicts with another table; therefore category percentages were not reproduced as participant proportions. In interpretation, a mobile-accessible educational resource can reduce the friction of retrieving instructions at the point of practice and reinforce consistent procedural knowledge. Improvement in an education-linked score does not necessarily establish correct PPE use on every clinical occasion. The design and measurement constraints mean that associations should not be represented as definitive causal effects.

INTRODUCTION

Adherence to infection-prevention precautions depends on much more than knowledge: usability of protocols, workflow conditions, supervision and equipment supply all matter. Easily accessible digital education might support nurses who must apply PPE guidance amid competing clinical demands. A before-and-after comparison can explore adoption but cannot alone determine whether education is the active mechanism.[1,2,3]

The distinction between knowledge, attitudes, immediate physiological response

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and enduring patient outcomes is essential when interpreting educational or behavioural interventions. Measures may change because of repeated testing, increased attention, changes in care environments or clinical recovery. Consequently, a comparison group and a clearly reported measurement timetable are especially important for evaluating findings of practical nursing interest.[4,5,6,7]

We assessed whether the prespecified outcomes differed during the documented observation period in the populations and services studied. We deliberately distinguish changes over time from adjusted intergroup intervention effects, and statistical significance from clinical importance. This distinction is especially relevant when a study is conducted under routine service conditions rather than using individual randomisation.

METHODS

Study design and setting

The investigation used a two-group quasi-experimental pretest–posttest study. It was conducted in RSUD dr. Loekmonohadi Kudus, Central Java, Indonesia, February–July 2026. The manuscript retains the allocation scheme described in the source and does not infer randomisation where none was reported. The study was analysed as a pragmatic evaluation of a context-specific nursing intervention, with outcomes measured over the schedule indicated in the thesis.

Participants and allocation

The study enrolled 80 nurses purposively selected from four wards; 40 received the intervention and 40 received routine instruction. Participants were enrolled from the stated healthcare services rather than a population-based sampling frame. Because assignment was not random and some study arms were formed at separate facilities or wards, observed arm differences may include differences in case mix, care delivery or baseline exposure. Participants' denominators are reported explicitly where the source provides coherent values.

Intervention and comparison care

The intervention was QR code–accessible e-Dy Care electronic book addressing appropriate use of personal protective equipment (PPE). The comparison condition was standard PPE-related educational provision in comparison wards. As an implementation package, the intervention may combine content, provider contact and changes in delivery format; its separate components cannot be attributed independent effects unless the original design included a factorial or component comparison, which it did not.

Outcome measurement

The prespecified or described measurements were questionnaire and observation-derived PPE compliance scores. Outcome direction, categories and units are retained in the Results, and no additional outcome is inferred from the intervention's intended clinical benefit. In particular, a questionnaire result is not treated as proof of a later clinical endpoint; similarly, a single-session physiological response is not equated with long-term disease control.

Statistical analysis

The documented analysis used within-group testing and Fisher's exact test for a categorical comparison in the source thesis. Two-sided statistical significance is interpreted against the study's stated 0.05 threshold. A reported $p = 0.000$ is expressed as $p < 0.001$ rather than an impossible exact probability of zero. Raw records were not supplied separately; therefore no independent confidence intervals, adjusted estimates or participant-level reanalyses were invented.

Research ethics

Hospital ethics approval 39/KEPK/RSLH/IV/2026. The ethical approval statement is limited to the record documented in the source thesis; no additional consent or registration claim is assumed.

RESULTS

Mean adherence scores increased from 51.83 to 61.70 in the e-Dy Care group, compared with 51.50 to 55.15 in controls. The analysis reports a within-intervention p value of 0.001 and an intergroup categorical Fisher exact p value below 0.001. However, its adherence-frequency table includes denominators of 48 and 52 in a nominal 40-participant group and conflicts with another table; therefore category percentages were not reproduced as participant proportions.

Table 1. Main study outcomes and changes.

Outcome	Pre-intervention	Post-intervention / change	Additional detail
PPE adherence score, intervention	51.83 ± 5.08	61.70 ± 4.22	n = 40
PPE adherence score, control	51.50 ± 5.91	55.15 ± 5.48	n = 40

A dash indicates that the specific figure was not reported or is not comparable. P values reflect the statistical results reported for this cohort.

These results are descriptive and inferential findings for the prespecified study context. The table separates pretest measurements from posttest or change measures, avoiding a reinterpretation of category denominators where the source's tabulations conflict. The direction and magnitude of each listed measure should be assessed together with its instrument and the interval between assessments.

The categorical adherence tabulations contain inconsistent counts: one table adds categories to denominators larger than the stated 40 nurses per arm, whereas an additional table uses 40 per arm. Because it is not possible to reconcile these data without the original individual-level observations, the categorical proportions are excluded from Table 1. The continuous adherence-score summary remains reproducible from the reported table.

DISCUSSION

The most informative finding was that mean adherence scores increased from 51.83 to 61.70 in the e-dy care group, compared with 51.50 to 55.15 in controls. Although this pattern is consistent with the proposed role of the intervention, the statistical result must be interpreted in terms of the design, exposure period and measurement properties. Nonrandomised comparisons and pretest–posttest observations are useful for studying feasibility and initial signals, but they remain vulnerable to confounding and concurrent changes.[8,9,10,11]

A mobile-accessible educational resource can reduce the friction of retrieving instructions at the point of practice and reinforce consistent procedural knowledge. Improvement in an education-linked score does not necessarily establish correct PPE use on every clinical occasion. This explanation is biologically or behaviourally plausible, yet the source data do not test the mechanism directly. It is therefore more appropriate to frame the explanation as a potential pathway than as a demonstrated mediator. Future work should distinguish the core educational or behavioural content from the attention, supervision and

accessibility changes that accompany the intervention.

The clinical relevance of the measured outcomes deserves separate scrutiny. A difference in test performance, confidence, adherence score, expressed emotion, pain rating or blood pressure may be worthwhile, but significance alone gives no indication of persistence, implementation cost or downstream patient benefit. Where an endpoint is an intermediate marker rather than the ultimate clinical outcome, research should include longer follow-up and objectively recorded events. Analyses should report effect estimates with uncertainty intervals in addition to p values.[12,13,14,15]

The study also has operational implications for nursing practice. Its context-specific approach can inform local training materials, patient and family communication, and service-level quality improvement. However, applying it in other populations requires adaptation to resources, literacy, staffing and cultural norms. Implementation should be accompanied by routine monitoring, attention to patient preferences and evaluation of unintended consequences rather than simple replication of the intervention as a fixed package.

Strengths and limitations

A strength is the investigation of an identifiable intervention in a healthcare setting with explicit outcomes. Nonrandom allocation by ward permits ward-level differences and contamination. The published thesis tables contain inconsistent denominators for dichotomised adherence and do not report a clearly estimable adjusted change contrast. Device access, workload and PPE availability were not controlled in the comparison. Additional limitations include the absence of independently available raw datasets for reanalysis and potential reporting variation between prose summaries and statistical tables. The present article therefore privileges directly traceable statistics and does not introduce reconstructed precision.

CONCLUSION

In this study, mean adherence scores increased from 51.83 to 61.70 in the e-dy care group, compared with 51.50 to 55.15 in controls. The findings support further evaluation of the intervention in comparable clinical or community settings but should not be extended to unmeasured patient outcomes or definitive causation. Future work should standardise outcome scoring, report participant flow and between-group adjusted changes, and assess whether observed changes persist beyond the immediate study period.

BIBLIOGRAPHY

1. Factors influencing nursing professionals' adherence to facial protective equipment usage: a comprehensive review. 2024. PubMed PMID:38657906.
2. Kim EJ, Park YH, Choi HR. Factors influencing nurses' compliance related to the use of personal protective equipment during the COVID-19 pandemic: A descriptive cross-sectional study. Nurs open. 2024 Jul;11(7):e2235
3. Marling, Irmawati, Asriawati L, Sari MR, Kurniawan F. Evaluation Of Compliance With The Use Basic Personal Protective Equipment (PPE) at X Health Center. J Pelita Sains Kesehat. 2023;3(1):1–8
4. Pangaila ME, Fatimawali, Kaunang W. Relationship Between Health Belief Model and Nurse's Compliance With PPE Use. J Kesehat Med Saintika. 2021;12(2):104–20
5. Rahmilah M, Fitri AU, Risnayanti K. Education Level and Work Period as Determinants of Personal Protective Equipment Compliance Among Nurses at Makassar Regional General Hospital. J Sci Insights. 2026;3(2):30–9
6. Salehi H, Furterer S, Mowrey C. A Systems View of Health Care Worker Personal Protective Equipment (PPE) Compliance in a Simulated Setting. J Patient Saf. 2026 Jun;
7. Lee H, Jeong IS. Effect of the personal protective equipment donning and doffing program for nurses in military hospitals. Nurs Health Sci. 89 2024;4(3):690–698
8. Lestari S. Evaluasi Peran Infection Prevention And Control Link Nurse (IPCLN) Dalam Program Pencegahan Dan Pengendalian Infeksi

Berdasarkan Peraturan Kementerian Kesehatan Di UPT RSUD Mokoyurli Buol [Internet]. Universitas Hasanuddin. 2023. Available from: http://repository.unhas.ac.id:443/id/eprint/27130

9. Andini FR, Rochmah TN, Makalew LA, Dewi MS, Bilqis N. Comparison between Milgram's and Niven's Obedience Theory on Nurses in Obedience using Personal Protective Equipment. J Aisyah J Ilmu Kesehat. 2022;8(1):1– 6. 82
10. Lima de AAB, Gusmão CMP, Lima do ESL, Rocha D de M, Menegueti MG, Silva de O e AC, et al. Effect of an educational intervention on nursing students' knowledge about COVID-19 and compliance with standard and transmission-based precautions: a quasi-experimental study. BMC Nurs [Internet]. 2025;24(1):1071. Available from: https://doi.org/10.1186/s12912-025-03672-y
11. Yeom G, Park J. Effectiveness of donning and doffing personal protective equipment education using video debriefing among Korean undergraduate nursing students. BMC Nurs [Internet]. 2024;23(1):712. Available from: https://doi.org/10.1186/s12912-024-02370-5
12. Ryu YS, Kim HJ, Lee JS. Effectiveness of game-based VR simulation on nursing students' mastery of level D PPE: A quasi-experimental design. Nurse Educ Pract. 2026 Jan;90:104643
13. Yildirim M, Seren Intepeler S, Lam SC. Multifaceted Interventions Based on Education and Recognition to Enhance Nurses' Compliance With Standard Precautions: A Quasi-Experimental Design. Nurs Health Sci. 2026 Jun;28(2):e70334
14. Seitz RM, Yaffee AQ, Peacock E, Moran TP, Pendley A, Rupp JD. Self- reported use of personal protective equipment among emergency department nurses, physicians and advanced practice providers during the 2020 covid- 19 pandemic. Int J Environ Res Public Health. 2021;18(13):4–9
15. Nurseha D. Development of Nosocomial Infection Prevention Measured by Nurses at Hospital Based on Health Belief Model. J Ners. 2020;8(1):64–71