Short Communication

DEVELOPMENT OF A VIRTUAL ASSISTANT TO SUPPORT NURSES IN MANAGING WORK TASKS

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Abstract

Background: Increasing administrative burdens on nurses call for innovative digital solutions.

Aim: This paper presents a virtual assistant designed to support nurses by streamlining routine tasks and improving workflow efficiency.

Materials and Methods: A modular system was developed using natural language processing and dialogue management techniques implemented in Python. Synthetic data were used to simulate nursing workflows. The evaluation included both quantitative measures (task completion time, error rates, and usability via the System Usability Scale (SUS) and qualitative feedback from volunteer nurses in a controlled laboratory setting.

Results: The virtual assistant significantly reduced task completion times and error rates compared with traditional methods. An average SUS score of 82 indicated excellent usability. Qualitative feedback highlighted improvements in task prioritization and reduced cognitive load.

Conclusion: The study demonstrates that integrating a virtual assistant into nursing workflows can effectively reduce administrative burdens, enabling nurses to dedicate more time to patient care. This promising digital intervention paves the way for further research and real-world application in healthcare settings.

Keywords: Virtual Assistant, Nursing, Task Management, Healthcare Technology

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Introduction

Nurses balance direct patient care with administrative coordination, documentation, and handovers, which fragment attention and increase cognitive load. Conversational agents have been increasingly studied in health contexts and can support information access, education, and task orchestration[1,2]. Prior work with virtual nurse agents shows acceptability and benefits for patients with limited health literacy, reinforcing the potential of conversational interfaces in care workflows[3].

Early-phase assessments of digital health tools are appropriately conducted in simulated settings that protect patients while enabling controlled measurement[4]. Usability is commonly quantified with the 10-item System Usability Scale (SUS), which demonstrates strong psychometric properties across technologies[5]. Adoption, in turn, is influenced by perceived usefulness and ease of use, as described in the Technology Acceptance Model (TAM)[6].

As AI capabilities expand, maintaining a prudent scope and implementing human-in-the-loop safeguards are essential. Evidence points to workflow improvements alongside risks such as bias and opacity[7,8]. Against this backdrop, we developed a nurse-centric assistant focused on administrative and coordination tasks (not diagnosis or therapy) and evaluated its effects on efficiency, errors, and usability.

Materials and Methods

Study Design and Setting

A randomized, parallel-group, simula-tion-based evaluation was conducted in a skills-lab environment at [Institution] during [Month–Month, Year]. No patient or record data were used; all materials consisted of synthetic or de-identified scenarios created for educational and quality-improvement purposes.

Participants and Sample Size

Eligible participants were registered nurses with at least one year of ward experience. A convenience sample of n = 30 nurses participated and were randomized 1:1 to intervention or control (n = 15 per arm). An *a priori* power analysis targeting a between-group difference of ≥3.5 minutes (SD ≈ 2.5), $\alpha = 0.05$, and power = 0.80 suggested a minimum of ~14 participants per arm; our final sample met this threshold.

Intervention and Control

An intervention included a browser-based conversational assistant (typed or voice-to-text input) for creating, prioritizing, and scheduling tasks, as well as gener ating shift checklists and handover summaries.

A control was the usual approach to matched scenarios (paper or electronic lists without the assistant).

System Architecture, Data, and Training

The system comprised (i) an intent/slot NLP layer, (ii) a rule-guided dialogue manager with fallback classification, and (iii) a task engine for prioritization and reminders. Development was carried out in Python using open-source NLP libraries. Training corpora consisted of synthetic utterances and task transcripts generated from template families (orders, reminders, handover cues) grounded in published nursing workflow descriptions. Validation employed a held-out synthetic test set and human adjudication by two clinicians on 100 randomly sampled dialogues, targeting ≥90% intent accuracy and ≥85% entity-extraction F1.

Outcomes and Task Scenarios

Primary outcome was the time to complete a predefined bundle of administrative tasks. Secondary outcomes were task-classification error rate (misinterpretations per task) and usability via the 10-item System Usability Scale (SUS).

Scenarios included: (1) shift-start checklist; (2) timed medication reminders; (3) arranging a lab pickup; (4) documenting a

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wound-care follow-up reminder; and (5) preparing a structured handover outline.

System Usability Scale (SUS)

The SUS is a reliable 10-item questionnaire with five-point Likert responses, transformed to a 0–100 score. Scores above 80 typically reflect excellent usability[5].

Qualitative Data Collection and Analysis

Semi-structured interviews (~15–20 minutes) explored perceived benefits, challenges, workflow fit, and safety considerations. Sessions were audio-recorded, transcribed, and de-identified. Two researchers independently coded transcripts using the Framework Method; discrepancies were resolved by consensus, and inter-coder agreement (Cohen's κ) was reported[9].

Statistical Analysis

Continuous variables were summarized as mean ± SD, and categorical variables as counts (%). Between-group comparisons used independent-samples *t*-tests (two-sided). We reported 95% confidence intervals and effect sizes (Cohen's *d*). Analyses were performed in Python (pandas, SciPy), with $\alpha = 0.05$.

Ethics

This project involved educational and quality-improvement simulations with staff volunteers and synthetic scenarios, without patient involvement or identifiable data. Under applicable regulations and institutional guidance, it did not constitute human-subjects research; therefore, formal ethics committee approval was not required. All participants provided informed agreement to take part in the simulations.

Results

Participants

A total of n=30 nurses completed simulations (73% female; mean experience 7.4±3.1 years). Groups were comparable at baseline.

Mean task completion time decreased significantly when using the assistant compared to the control ($p<0.001$) (Table 1).

Table 1. Task completion times when using the assistant compared to control (minutes; Mean±SD)

Variable	Control	Assistant	Reduction (95% CI)	p
Completion time	12.8±2.3	8.4±1.9	4.4 (5.9–2.9)	< 0.001

The classification error rate decreased significantly when using the assistant compared to the control ($p<0.001$) (Table 2).

Table 2. Error rates when using the assistant compared to control (No. per task; Mean±SD))

Variable	Control	Assistant	Reduction (95% CI)	P
Error rate	0.16±0.05	0.06±0.02	0.1 (0.13–0.07)	< 0.001

System Usability Scale (SUS) averaged 82±5 (95% CI 79.5–84.5), indicating excellent usability. Participants described the interface as intuitive and supportive of task prioritization.

Discussion

In controlled simulations, a nurse-centric conversational assistant shortened task times and reduced classification errors while achieving excellent usability. These findings align with prior work on health conversational agents and virtual nurse interfaces that demonstrate acceptability and utility in communication and education[1-3].

Simulation was an appropriate early-phase strategy that enabled safe, repeatable measurement of workflow impact before clinical deployment[4]. SUS results above 80 are consistent with the high perceived usability reported across technologies[5,6].

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From a systems perspective, assistants that externalize memory (e.g., reminders, checklists) and structure handovers may reduce cognitive load and opportunities for error. As health AI matures, robust guardrails are needed to address bias, explainability, and data stewardship[7,8]. Our results align with broader evidence that digital tools integrated with EHR data streams can enhance workflow when carefully designed and validated [9,10].

Unlike clinical decision support (CDS) systems, the tool does not provide diagnostic or therapeutic recommendations; rather, it orchestrates administrative and coordination tasks. This approach mitigates specific safety risks while retaining operational benefits (structured handovers, time-boxed reminders with confirmations).

Limitations include the use of simulated data, a modest sample size, and a single-site setting; ecological validity and longitudinal adoption remain to be established. Future work should test integration with electronic health records, prospectively log near-misses, and assess effects on staff workload and well-being.

Conclusion

A task-focused virtual assistant for nurses demonstrated shorter task times, fewer classification errors, and excellent usability in simulations. These findings warrant pragmatic field trials with larger samples and integration studies.

Conflict of Interest

The author declares no conflict of interest.

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