INPLASY

The Impact of Mobile Nursing Management Systems on Patient Satisfaction: A Systematic Review and Meta-Analysis

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INTRODUCTION

Review question / Objective This systematic review and meta-analysis aims to evaluate the effect of mobile nursing information systems on patient satisfaction with nursing care across various clinical settings, compared to conventional care.

Condition being studied This study aims to explore patient satisfaction with nursing services, a key indicator of patient-reported experience (PREM) and an important measure of healthcare quality. It reflects patients' perceptions of nursing services and is influenced by factors such as communication, safety, efficiency, and interpersonal care. While patient satisfaction is not a direct measure of the quality of technical nursing care, it is closely related to important outcomes such as treatment adherence, health outcomes, and patterns of healthcare resource utilization. Understanding how mobile nursing information systems impact this outcome is crucial for healthcare institutions' evidence-based technology application and resource allocation. Non-randomized controlled trials comparing mobile nursing information systems with traditional nursing care.

METHODS

Participant or population Inpatients or outpatients/emergency patients receive nursing services in places such as infusion rooms, general wards or operating rooms.

Intervention Implement information technology-based mobile nursing management systems, including mobile infusion systems, mobile nursing workstations, mobile nursing quality indicator assessment systems, artificial intelligence-assisted closed-loop management systems, or safety management models combined with mobile nursing technologies.

Comparator Traditional nursing practices do not utilize mobile nursing information systems, including paper documents and traditional workflows, or early electronic information systems that lack mobile access or advanced decision support capabilities.

Study designs to be included Non-randomised controlled studies.

Eligibility criteria Studies were considered eligible for inclusion if they met the following criteria: (1) The study population comprised hospitalised inpatients or outpatient/emergency department patients receiving nursing services in settings such as infusion rooms, general wards, or operating rooms. Studies exclusively focusing on specific disease populations or specialised care settings were also eligible, provided they met other inclusion criteria. (2) The study design consisted of non-randomised controlled intervention studies, including historical control studies, quasi-experimental designs, or before-and-after comparative studies that evaluated differences between intervention and control groups or pre- and post-intervention periods. Although randomised controlled trials would be ideal, the pragmatic nature of health information technology implementation often necessitates quasi-experimental designs in real-world healthcare settings. (3) The intervention involved the implementation of information technology-based or mobile nursing management systems as the core component. Eligible interventions included mobile infusion systems, mobile nursing workstations, Mobile nursing quality indicator evaluation systems, artificial intelligence-assisted mobile nursing closed-loop management systems, or safety management models based on Heinrich's law integrated with mobile nursing technology. The intervention must have represented a substantive change in nursing workflow or care delivery processes rather than minor incremental improvements. (4) The studies reported patient satisfaction with nursing care as an outcome measure, either as a dichotomous outcome (satisfied vs not satisfied) or using validated satisfaction scales. For inclusion in quantitative synthesis, the studies needed to provide sufficient data to calculate or estimate relative risk ratios (RR) and 95% confidence intervals (CI).

Studies were excluded if they met any of the following criteria: (1) The publication type consisted of narrative reviews, expert opinions, conference abstracts without full manuscripts, case reports, or qualitative studies without quantitative outcome data. (2) The studies lacked a clear control or comparison group or did not explicitly describe the information technology or mobile nursing intervention components. (3) The studies failed to report patient satisfaction outcomes or provided insufficient data for effect size calculation, even after attempting to contact study authors for additional information. (4) Duplicate publications or multiple reports from the same study population were identified. In cases of duplicate reporting, only the most recent or complete publication was retained. (5) Randomized controlled trials (RCTs) were excluded to maintain methodological homogeneity within the synthesis. The primary aim was to synthesize evidence from real-world implementation studies where randomization of a complex, system-level intervention like a nursing information system is often impractical or unethical. Quasi-experimental designs (e.g., before-after, historical control) represent the predominant and most relevant study type for evaluating such interventions in routine care settings. Incorporating RCTs, which are rare in this context and differ fundamentally in design, control conditions, and setting (often more controlled), would introduce significant clinical and methodological heterogeneity, potentially obscuring the 'real-world' effect estimate of interest.

Information sources PubMed, Embase, Web of Science, Cochrane Library, CNKI, Wanfang, VIP, and CBM databases. Reference lists of included studies and relevant systematic reviews were manually screened. Search terms included 'mobile nursing', 'nursing information system', 'patient satisfaction', and equivalent Chinese terms.

Main outcome(s) Patient satisfaction with nursing services was measured using a dichotomy (satisfied vs. dissatisfied) or by using a validated satisfaction scale. Effect measures: risk ratio (RR) and its 95% confidence interval (CI), calculated based on the extracted data of the number of satisfied patients in each group and the total number of patients.

Quality assessment / Risk of bias analysis Quality was assessed using an adapted framework based on the Newcastle-Ottawa Scale, evaluating three domains: Selection (representativeness, baseline comparability), Comparability (control for confounding factors), and Outcome Assessment (validity/reliability of satisfaction measurement). Each domain was rated as 'High', 'Moderate', or 'Low' quality by two independent reviewers, with discrepancies resolved through discussion or third reviewer adjudication. Particular attention was paid to whether satisfaction instruments were validated and consistently applied.

Strategy of data synthesis Random-effects meta-analysis using DerSimonian-Laird method with Hartung-Knapp adjustment was conducted in R software (meta, metafor packages). Pooled risk ratios with 95% CIs were calculated. Heterogeneity was quantified using Cochran's Q test and I^2 statistic ($I^2 > 50\%$ indicating substantial heterogeneity). Statistical significance was set at $P < 0.05$. Results were presented in forest plots.

Subgroup analysis Pre-specified subgroup analyses were conducted by: (1) Clinical setting (outpatient infusion rooms, inpatient wards, operating rooms) to explore whether effects varied across care environments; and (2) Publication language (Chinese-language vs English-language publications) . Tests for subgroup differences were performed using Q-test for heterogeneity.

Sensitivity analysis Leave-one-out sensitivity analysis was performed by systematically excluding each study and recalculating the pooled effect estimate and heterogeneity statistics to assess whether any single study disproportionately influenced the overall results. A Baujat plot was generated to visualize each study's contribution to overall heterogeneity and influence on the pooled effect estimate. Publication bias was assessed using funnel plot visualization and Egger's regression test (though interpreted cautiously given the small number of studies).

Country(ies) involved China.

Keywords mobile nursing; nursing information system; patient satisfaction; meta-analysis; qualityimprovement.

Contributions of each author
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