Safety of Mobilizing Hospitalized Adults
Review of the Literature

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This article examines literature that provides evidence about the safety of mobilizing hospitalized adults. A search of electronic databases and hand searches yielded 24 studies that were included in the review. Evidence of mobilization safety was found in 4 clinical settings (medical, surgical, cardiac procedure, and intensive care), and the findings from these studies suggest that early mobilization of hospitalized adults is safe. Key words: ambulation, hospitalization, integrative review, mobilization, nursing care, safety

Ambulation of patients was identified as the most frequently missed element of inpatient nursing care in several studies of missed nursing care. Ambulation was missed 76.1% to 88.7% of the time. Other researchers have also found the mobilization of inpatients to be inadequate in the acute care inpatient setting. An observational study of hallway ambulation on 3 medical units found that 19% of patients walked once, 5% walked twice, 3% walked more than twice, and 73% did not walk at all during the study period. Another observational study of 45 hospitalized medical patients indicated that, on average, 83% of the hospital stay was spent lying in bed. The proportion of time spent standing or walking ranged from 0.2% to 21%. These results suggest that ambulation of hospitalized adults is regularly missed, and many patients are mostly immobile throughout their hospital stay.

Inpatient immobility negatively affects the cardiovascular, respiratory, gastrointestinal, integumentary, musculoskeletal, renal, endocrine, and nervous systems. Lack of inpatient mobility can be especially devastating to older adults in whom the aging process contributes to more rapid functional decline such as impaired walking ability. This new walking dependence among the elderly population may lead to discharge to a nursing home and has been found to result in continued walking dependence 3 months after discharge in 27% of elderly patients. However, barriers to ambulating inpatients, including having too few staff to provide assistance, lack of resources, and inadequate teamwork, have been identified. In addition, safety concerns may prevent the mobilization of patients following surgical procedures or patients with acute medical illness. One researcher found that one of the ways nurses decide whether to ambulate hospitalized older adults is by risk assessment. The risk is determined by the likelihood of the mobilization resulting in injury either to the patient or to the nurse.
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concern are safety issues with mobilization of intensive care unit (ICU) patients. The long established standard of practice has been to not ambulate ICU patients because of the risk of adverse events. The mobilization of ICU patients has included a long-established belief in the need for bed rest during critical illness. Thus, ICU nurses are typically concerned that early mobility could increase the risk of a patient incurring an adverse event.

To prevent the negative effects of immobility, the mobilization of patients should be encouraged. However, a review of current empirical evidence on the safety of mobilizing hospitalized adults is needed to provide a summarized report for care providers that will assist in the decision process when determining when and how to mobilize hospitalized adults. Therefore, the goal of this study was to analyze current evidence available in the literature on the safety of mobilizing hospitalized adults in the acute care setting.

METHODS

A systematic literature review of peer-reviewed empirical research was undertaken. Electronic databases including MEDLINE (Ovid), CINAHL, and PubMed were searched using the keyword “inpatients” or “hospitalization” or “hospitalized patients” and “ambulation” or “early ambulation” or “mobilization” or “early mobilization” or “mobility” and “safety.” The articles retrieved were examined to determine whether they met the inclusion criteria: (1) primary research involving hospitalized adults and the safety of mobilization; (2) inpatient setting of adult medical, surgical, or intensive care; (3) studied the mobilization types of walking, standing, or sitting in a chair with or without assistance; (4) published in English; and (5) published between 1999 and 2011 (to retrieve the most up-to-date evidence). Studies were excluded if they were (1) in non–acute health care settings (eg, outpatient clinics, nursing homes, patient homes); (2) in other inpatient settings such as rehabilitation or psychiatric units; and (3) mobilization types other than those in the inclusion criteria, such as weight training, bicycling, and other exercise modalities.

Potentially relevant studies included 90 records identified in CINAHL, 2202 records identified in PubMed, and 667 records identified in MEDLINE (Ovid) for a total of 2959. After duplicates were removed, 2794 remained. At this point, the titles of the articles were reviewed to determine whether they met the inclusion criteria and the subject matter was appropriate. Those articles that did not meet the inclusion criteria or were inappropriate were excluded at this stage. The next step involved independent screening of the abstracts of the articles by 2 of the authors. The review of titles and abstracts resulted in the elimination of 2629 articles. The remaining 165 articles were then reviewed by 2 authors independently. Nine additional studies were added from reference lists of retrieved articles and hand searching, leaving 174 articles for full-text review. After independent review by the 2 authors, 150 of these were further excluded because they did not meet the inclusion criteria. The evaluation process consisted of a full-text review of the article followed by group discussion at which article inclusion was agreed on by all 3 authors. The final selection included 24 studies (Table, see Supplemental Digital Content, available at http://links.lww.com/JNCQ/A1).

These articles also were assessed for methodological quality on the basis of their study design, adequacy of sample size, measurements used for key variables, and appropriateness of statistical analyses. Criteria to guide scoring these 4 areas were developed by the authors on the basis of published criteria and their research experience. A total of 12 possible points could be assigned to an article. Study design was scored as 3 (randomized controlled trial), 2 (quasi-experimental study), or 1 (observational study). Sample size was scored as 3 (adequate sample sizes), 2 (small sample size), or 1 (pilot study). Measurement was scored as 3 (adequate reliability and validity of measures), 2 (mixed reliability and validity of measures), or 1 (inadequate reliability and validity). Statistical analysis was scored as

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3 (completely adequate analysis), 2 (partially adequate analysis), or 1 (inadequate analysis). Quality assessment decisions were made during group discussions among the 3 authors.

RESULTS

Safety of mobilizing medical patients

Four studies assessed the safety of mobilizing medical patients.\textsuperscript{15-18} These studies included patients with the diagnoses of deep vein thrombosis (DVT), pulmonary embolism (PE), and stroke. They compared incidence of adverse events such as falls, serious events, or development of complications between mobile and immobile patients. Findings indicated that there was no increased safety risk of mobilizing patients with these diagnoses.

Jünger et al\textsuperscript{15} compared outcomes of patients with DVT who were prescribed strict bed rest for at least 5 days with those instructed to ambulate around the unit during the same 5 days. The researchers evaluated the outcomes of PE, progression of thrombosis, nosocomial infections, serious events, and death and found no significant differences between the 2 groups.\textsuperscript{15} Patients with diagnoses of acute DVT and PE were studied to explore whether ambulation posed increased risk of developing new events of PE. No significant differences were found in the development of new PE, fatal PE, or bleeding complications between patients on bed rest and those allowed to ambulate.\textsuperscript{16}

Langhorne et al\textsuperscript{17} conducted an observer-blinded, randomized controlled trial of patients who had a diagnosis of stroke and were within 36 hours of symptom onset. Patients in the early mobilization group had no significant increase in falls, fatigue, or stroke progression compared with the control group, indicating the safety of early mobilization of patients after acute stroke.\textsuperscript{17} Bernhardt et al\textsuperscript{18} also found no difference in safety measures when comparing the standard care group and the early mobilization group among patients following a stroke.\textsuperscript{18} These studies suggest that early ambulation of hospitalized patients with a diagnosis of DVT and stroke is safe.

The quality scores of the 4 studies on the mobilization of patients with medical conditions ranged from 9 to 11, indicating they were moderate to strong studies. The research designs included 1 observational study and 3 randomized controlled trials, one of which was a pilot study. The sample sizes ranged from 32 to 2650 participants. Only 2 key variables were explored in more than 1 of these research studies. These included the development of PE and patient death. The diversity of diagnoses studied may have contributed to the low incidence of common outcomes.

Safety of mobilizing patients following cardiac procedures

The safety of mobilizing patients following cardiac procedures was the most frequently studied patient population with 13 studies.\textsuperscript{19-31} Specifically, the safety of early ambulation after coronary catheterization procedures has received attention. These studies assessed the safety and efficacy of early ambulation compared with standard protocols, based on the presence of complications such as bleeding, hematoma, and pseudoaneurysm. A prospective study assessed the safety of ambulating after 90 minutes of bed rest following coronary angiography and found the 90-minute protocol was safe for patients.\textsuperscript{25} Another study compared complications following femoral arterial sheath removal after mobilization at 3, 4, and 6 hours and found no significant effects on bleeding at the groin puncture site among the 3 different mobilization lengths.\textsuperscript{29} Several other studies found similar results, with no additional risk of complication rates for early ambulation.\textsuperscript{19, 20, 23, 27, 28, 30}

Other studies of patients who underwent different types of cardiac procedures also suggested the feasibility and safety of early ambulation. A study of patients after transfemoral angiography assessed the incidence of hematoma formation, pseudoaneurysm development, and other groin complications between patients who ambulated at either 3 or 6 hours after catheter or sheath removal and
found no significant differences. Dowling et al also found no difference in hematoma formation among patients ambulated 3 hours after angiography. In a study by Miracapillo and colleagues, there were no statistical differences in hematoma rates, lead displacement, or high-pacing thresholds between patients mobilized 3 hours after pacemaker implantation compared with those mobilized after 24 hours. However, a study found that 10% of its patients who had undergone angioplasty required more prolonged bed rest at 4 hours.

Quality assessment scores of the 13 studies on the safety of mobilizing patients after cardiac procedures ranged from 7 to 11, with the majority scoring 10 or higher. Sample sizes ranged from 32 to 1650 participants, with the majority demonstrating adequate power. Key variables examined included development of hematoma, bleeding at the access site, pseudoaneurysm, and pain. The critical conclusion from these studies is that early mobilization of patients after cardiac procedures is safe without the need for extended bed rest after the procedure.

Safety of mobilizing surgical patients

Four studies assessed the safety of mobilizing patients following surgical procedures. The populations studied included patients who had undergone knee arthroplasty, total hip replacement, lobectomy, and tendon transfer surgery for foot drop. These studies compared outcomes, such as the amount of drainage, rates of heart load during walking, pain scores, falls, wound healing, and transient neurologic symptoms, and provided information on the safety of early mobilization.

Kaneda et al examined mobilization of patients after lobectomy for the treatment of lung cancer. A group of 36 patients were encouraged to walk at least 4 hours after surgery as a more aggressive way to proceed with early mobilization. These patients were compared with 50 patients who did not walk on the day of surgery but were ambulated the following day. There were no significant differences in the amount of drainage, rates of heart load during walking, pain scores, or falls, indicating that early mobilization at 4 hours was feasible.

Examination of the safety of mobilizing patients following total hip replacement indicated that the physical activity did not reduce tissue oxygenation or wound healing. In patients following knee arthroscopy, early ambulation was not found to be a risk factor for transient neurologic symptoms after spinal anesthesia. In patients with foot drop who had undergone tendon transfer surgery, Rath et al explored whether the early active mobilization group would have similar rates of tendon insertion pullout compared with the immobilization group. They observed no cases of tendon pullout in either group, supporting the safety of early mobilization.

The quality assessment scores of the studies on the mobilization of patients following surgical procedures ranged from 8 to 11. Sample sizes ranged from 36 to 120 patients. Power analysis was provided by 3 of the 4 studies, indicating adequate sample size. The other study had a sample size of 36 but did not provide power analysis information to indicate whether that was adequate. The studies examined varying procedures including knee arthroscopy, total hip replacement, lobectomy, and tendon transfer surgery for foot drop. Of the varied patient populations, however, pain was the only shared variable. Although replication of these studies is needed, these investigations provide evidence that it seems safe to ambulate patients following the types of surgery specified.

Safety of mobilizing intensive care patients

Three studies assessed the safety of mobilizing ICU patients. These included ICU patients who had been on mechanical ventilation for at least 2 days. Although several contraindications, such as sedation, shock, renal support, persistent respiratory failure, and confusion, were identified, all 3 studies suggested that early ambulation of ICU patients is feasible and safe.
Bailey et al. explored whether early activity is safe and feasible for patients with a diagnosis of respiratory failure. Their population consisted of ICU patients who had required mechanical ventilation for more than 4 days. These researchers concluded that early activity was both safe and feasible, with a less than 1% occurrence of activity-related adverse events. In another study, Bourdin and associates examined the outcomes of early mobilization of patients who had been in the ICU for 7 or more days and had been on mechanical ventilation for 2 or more days. The early mobilization intervention consisted of chair sitting, tilting up, and walking. The researchers concluded that early rehabilitation is feasible and safe for this population, based on physiologic variables. However, there were contraindications to the intervention, which included sedation, shock, renal support, persistent respiratory failure, and confusion.

Stiller et al. studied 31 patients in an ICU who were deemed suitable for mobilization, including sitting or walking, and measured the effects of mobilization on their heart rate, systolic and diastolic blood pressure, percutaneous saturation of oxygen, and any deterioration in clinical status and intervention required for it. They found that although mobilization resulted in significant increases in heart rate and blood pressure and a nonsignificant decrease in percutaneous oxygen saturation, the patients deemed suitable for mobilization could be safely mobilized.

The quality scores of the studies of mobilization of ICU patients ranged from 9 to 11. Sample sizes ranged from 20 to 160 participants. No power analyses were provided to determine whether sample sizes were adequate. Blood pressure, oxygenation, ventilator-free days, and heart rate were common variables among the 3 studies. Researchers tend to have similar desired outcomes for ICU patients such as oxygenation and hemodynamic stability, making it easier for common outcome variables to be studied.

**DISCUSSION**

The safety of mobilizing hospitalized adults has been examined by comparing the incidence of adverse events of mobilized patients compared with patients receiving standard inpatient care. The studies explored the safety of mobilizing hospitalized adults in several settings of medical, surgical, and intensive care and among patients receiving cardiac procedures. The results of this review indicate that the mobilization of hospitalized adults in the acute care setting is safe, with the exception of some contraindications found for ICU patients including sedation, shock, renal support, persistent respiratory failure, and confusion. The evidence also suggests that early mobilization is safe in a variety of patient populations, with no significant increase in the risk of complications compared with patients receiving standard care. However, the time frames of what is considered as early ambulation and early mobilization were found to be condition specific and dependent on the type of surgery, procedure, and illness, thus suggesting there should be guidelines for nurses to consider when assessing appropriate early mobilization for patients. For example, for patients after cardiac catheterization, early mobility was considered 3 to 4 hours after the procedure, whereas for patients having had a stroke, early mobilization was considered within 24 hours after the onset of stroke symptoms.

The findings of this literature review have provided some insight to nurses about the safety of inpatient mobilization of medical patients with DVT, PE, and stroke; patients following cardiac procedures; patients who have undergone surgical lobectomy, hip replacement, knee arthroscopy, and tendon transfer for foot drop; and ICU patients. However, only a limited representation of surgery types and diagnoses has been examined by researchers for mobilization safety. Moreover, there is limited research exploring common outcome variables. The substantive findings of this review, however, add to the evidence base that the mobilization of inpatients is a vital nursing...
action, which should not be neglected in patients in acute care settings where the safety of mobilization has been indicated. Nurses may use the information gathered in this review in the creation of inpatient mobilization guidelines in collaboration with other team members such as physicians and physical therapists. In addition, inpatient mobilization goals based on empirical evidence should be established by unit-based nursing management and staff.

Nurse managers, in the process of ensuring patient safety, patient satisfaction, and optimal patient outcomes on their inpatient units, should provide the proper resources needed to reach inpatient mobilization goals. Doherty-King\(^1\) noted that in addition to evaluating the risk of ambulating a patient, nurses should assess the availability of resources needed to safely mobilize the patient, such as staff assistance and equipment. The provision of adequate staffing and equipment such as lifts and walkers is a nursing management responsibility essential to encourage a culture in which patient mobility is completed routinely for all able patients.

**Limitations**

This review of the literature has several limitations. Although this review has provided insight into the safety of inpatient mobilization of patients with certain medical diagnoses and procedures, other types of inpatient populations were not represented. There is also a possibility that publication bias may exist. The findings of this literature review were based on published literature, and it is possible that important and relevant findings from key primary data articles were omitted. In addition, several of the studies included small patient populations without indicating the results of power analysis, which may threaten the generalizability and reliability of findings.

**Implications for future research**

The findings provide information on the safety of inpatient mobilization but have limits on generalizability. Further research is needed in all 4 clinical areas (medical, surgical, cardiac procedure, and intensive care) to strengthen the results on the safety of mobilizing these patient populations and explore other inpatient care situations and patient populations for evaluation of inpatient mobilization safety. Studies using common outcome measurements are also required to strengthen the evidence. Repeat studies of larger patient populations with randomization are needed to establish the reliability of these findings.

Research is also needed to assist nurses in the evaluation of patient mobility safety at the bedside. Development of a mobility safety evaluation tool that could be used for multiple patient types or based on diagnosis or surgical procedure would be beneficial for the determination of how and when patients can and should be safely mobilized.

**REFERENCES**


