

Utility of Mobility in Post Open-Heart Surgery Patients: A Pilot Trial

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ABSTRACT

Background: As the role of the clinical exercise physiologist expands, early mobility is an area of potential focus. A rural Midwestern intensive care unit began a mobility program alongside its open-heart surgery program. The mobility specialist, who was trained as a clinical exercise physiologist, was tasked to ambulate the open-heart surgery patients. The purpose of this pilot study was to determine the effectiveness of a mobility specialist on ambulation frequency and distance on post open-heart surgery patients.

Methods: Data were collected retrospectively for 1 month on ambulation frequency and distance to determine the mobility specialist's impact on the variables.

Results: Data was collected on 18 patients (15 male, 3 female) over the month. Overall, when the mobility specialist was present, patients ambulated further ($M = 421$ feet versus 189 feet, $P = 0.039$) and more often ($M = 3.32$ versus 1.43 ambulations per day, $P < 0.001$).

Conclusion: In this study, having a mobility specialist with a background in exercise physiology led to more frequent and distant ambulation. Therefore, a mobility specialist should be considered an integral member of a multidisciplinary clinical team in rural intensive care units. *Journal of Clinical Exercise Physiology*. 2019;8(2):82–85.

INTRODUCTION

Early mobility in an intensive care unit (ICU) has been deemed to be effective and safe in acutely ill patients (1). Risks associated with extended bed rest include decreased bone density, muscle wasting, pressure ulcers, and overall deconditioning (2,3). Generally, mobility specialists follow a phased protocol whereby medically stable patients begin with passive range of motion and progress to unassisted ambulation (4). The purpose of intervening with mobility is to decrease length of stay, pressure ulcers, delirium, and deep venous thrombosis (5,6). Notwithstanding the evidence, there are commonly reported barriers such as lack of time and dedicated staff (7,8). Progressive mobilization requires a dedicated team of specialists, including a physical therapist, respiratory therapist, nurse, and/or nursing assistant (9); however, the use of a mobility specialist with a background in clinical exercise physiology could be warranted.

According to the US Census Bureau, roughly 1 in 5 Americans live in rural areas (10). If the need for hospitalization arises, 60% of rural residents are hospitalized in rural hospitals (11). In addition, rural hospitals are likely at a further disadvantage due to lack of resources and medical specialists (12–14). Due to the findings of the benefits elicited from mobility programs at larger institutions (mostly urban and academic) (15), a mobility program was initiated at a rural Midwestern hospital. The program was to focus on passive and active range of motion on ventilated patients; however, the hospital also has an open-heart surgery program, whereby postsurgical patients require ambulation. The mobility specialist was further tasked to assist in ambulating open-heart patients to combat concerns of a lack of time and staff.

The mobility specialist in the present study has a bachelor's degree in exercise science from an institution using the American College of Sports Medicine (ACSM) materials as the foundation for its curriculum. The mobility specialist

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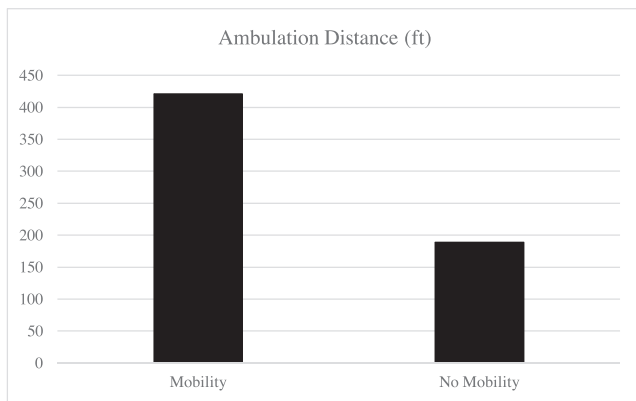


FIGURE 1. Ambulation distance with (mobility) or without (no mobility) mobility specialist present.

trained with inpatient cardiac rehabilitation staff (ACSM registered clinical exercise physiologist and certified clinical exercise physiologist) with regard to best practices (e.g., frequency, intensity, time, and type) for the ambulation of post open-heart surgery patients. The mobility specialist in the present study used the phased protocol by Perme (4) for nonopen-heart surgery patients (not included in this study), while using the recommendations of the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) and ACSM for inpatient cardiac rehabilitation for open-heart surgery patients (16). A foundation in exercise science was required for the mobility specialist in the present study to ensure adherence to AACVPR and ACSM guidelines, as well as possession of the competencies (e.g., patient assessment) for safe clinical ambulation. The purpose of this study was to determine the effectiveness of a mobility specialist on ambulation frequency and distance on post open-heart surgery patients.

METHODS

Data were collected retrospectively for 1 month regarding the frequency, distance, day of the week, and personnel present during ambulation on post open-heart surgery patients from a rural Midwestern hospital's cardiovascular ICU. Personnel present during ambulation were grouped dichotomously (i.e., mobility specialist present versus no mobility specialist present) to determine the mobility specialist's impact on dependent variables. Each ambulation was used as a data point where distance and personnel present were recorded. Demographic data including age and sex were also collected. During the data collection period, the days of the week the mobility specialist did not work were used as control measures (i.e., 4 days on, 3 days off). On days when the mobility specialist did not work, ambulation distance was charted by the patient's nurse, nursing assistant, cardiac rehabilitation clinical exercise physiologist, or physical therapist (i.e., whomever conducted the ambulation). Data were not recorded if patients were deemed inappropriate for ambulation (e.g., ventilated, uncontrolled arrhythmia), and data collection ceased when the patient moved to the step-down unit. Patients were monitored via telemetry, arterial

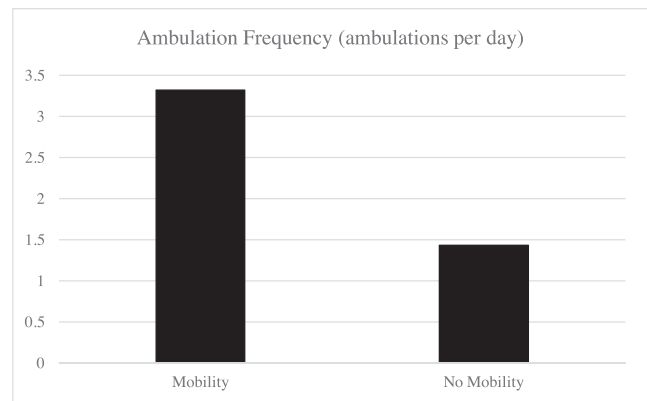


FIGURE 2. Ambulation frequency with (mobility) or without (no mobility) specialist present.

line blood pressure, and perceived exertion during ambulation. All methodology was approved by the Southern Illinois Healthcare Institutional Review Board.

Statistical Analysis

A 1-way analysis of variance was first completed on ambulation distance and frequency as compared to day of the week (e.g., Monday–Sunday). The assumption of homogeneity of variance was not violated; therefore, a Tukey HSD post hoc test was completed on distance and frequency of ambulation, with regard to day of the week. When personnel present were grouped dichotomously (e.g., mobility specialist present or not), an independent samples *t* test was performed to determine group differences. All data were analyzed using SPSS (Version 25; IBM Corp., Armonk, New York).

RESULTS

There were 18 open-heart surgery patients (3 female, 15 male) with an average age of 66 ± 6.9 years during the month of data collection. Ambulation distance ($P < 0.001$) and frequency ($P < 0.001$) were both found to be significantly greater when the mobility specialist was present compared to when the mobility specialist was not present. The post hoc analyses revealed significant differences in distance on 2 of the 3 days the mobility specialist was not present (i.e., patients walked lesser distances on Saturday and Sunday compared to other days). The post hoc analysis for ambulations per day revealed 1 of the 3 days the mobility specialist was not present to be significant (i.e., less frequent walks on Saturdays compared to other days). Ambulation distance was significantly greater when the mobility specialist was present (421 ± 242 feet) compared to nonmobility personnel (189 ± 233 feet), $P = 0.039$ (Figure 1).

Ambulation frequency was significantly greater when the mobility specialist was present (3.32 ambulations per day ± 1.25) compared to nonmobility personnel (1.43 ambulations per day ± 1.12), $P < 0.001$ (Figure 2).

DISCUSSION

This paper presents a process evaluation of using an exercise science trained mobility specialist over 1 month in a small

hospital ICU. The findings of this analysis demonstrate the importance of a mobility specialist in ambulation distance and frequency in an ICU. Similar to the Pack et al. (17) findings with an ambulation orderly, the mobility specialist increased ambulation distance. A multidisciplinary approach to patient care is always recommended, and individuals with a clinical exercise physiology background can be included on the team. A staff member with training, expertise, and a focus on mobility elicited more frequent and distant ambulation among open-heart surgery patients.

The post hoc analysis findings can be explained by taking note of standard procedures of the data collection site. One possible explanation for the post hoc finding of similar distance on Fridays (i.e., when mobility specialist was not present) is that inpatient cardiac rehabilitation staff ambulates open-heart patients. Cardiac rehabilitation staff and mobility specialists purposefully progress the open-heart surgery patients' distance for every postoperative day. For example, patients walk further distances for every postoperative day to build their endurance prior to returning home to ensure the patient can perform activities of daily living such as cooking and showering. Therefore, it is beneficial to have ancillary staff, such as mobility specialists, available to focus on activities of daily living. In our setting, if not for the mobility specialist, the burden would be placed exclusively on the nursing staff at a time when this is an important barrier for nursing (7,8). A possible explanation for similarly frequent walks on Fridays and Sundays is the previously mentioned presence of cardiac rehabilitation (on Fridays) and the presence of physical therapy (on Sundays). Physical therapy travels to 3 hospitals on weekends, arriving at the data collection site's ICU on Sundays. In our setting, cardiac rehabilitation practitioners and physical therapists are not as available compared to the mobility specialist.

In the current study, it is relevant to note the standard of care may differ compared to larger institutions. For example,

in the data collection site (i.e., small rural hospital), post open-heart surgery patients tended to stay in the ICU longer due to a lack of availability of staff or open beds in the step-down unit. In fact, in this setting, it is not rare to discharge a patient to home directly from the ICU. The lack of resources (e.g., staff, beds) in rural hospitals is well documented (11–14); therefore, the intention of the present study was to determine the effects of a mobility specialist on the impact of ambulation distance and frequency in rural post open-heart surgery patients.

The present study has limitations. First, the study design was cross-sectional; therefore, no causal inferences can be made from the findings. Second, we did not collect any specific surgical procedure information. The patients were deemed open-heart surgery patients when a full sternotomy was performed followed by a cardiac surgery (e.g., coronary artery bypass grafting, aortic valve replacement, or a combination of these). Additionally, the sample size was small and did not allow for adequate power for proper statistical analysis. Future studies should allow for longer data collection periods, a control group for comparison, and a larger sample size to adequately address this report's question. Finally, it is possible for nursing staff to have changed their behavior if they were aware of data collection (i.e., Hawthorne effect); however, given the retrospective design of the present study, this limitation was unlikely.

CONCLUSION

A mobility specialist with a clinical exercise physiology background practicing in a small hospital ICU with limited resources may provide the impetus for more frequent and longer distance ambulation of post open-heart surgery patients. Mobility specialists with an exercise physiology background might be considered for positions in small hospital ICUs to enhance ambulation and reduce other staff burden.

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