Feature Article

Outcomes of a COVID Mobility Team

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The detrimental effects of immobility are well documented in the literature, yet immobility still plagues the hospitalized adult. As the influx of COVID-19 patients began, patient mobility was further compromised. The purpose of this quality improvement project was to assess the impact of COVID mobility teams, composed of deployed coworkers, on COVID-19–positive and person under investigation patient outcomes. Using mobility teams improved mobility in COVID-positive and person under investigation patients. Increasing patient mobility results in improved patient outcomes by preventing hospital-acquired functional decline, preventing intensive care unit transfers, and decreasing length of stay.

KEY WORDS:
coronavirus, COVID, COVID-19, mobility, progressive mobility, progressive upright mobility

The detrimental effects of immobility are well documented in the literature, yet immobility still plagues the hospitalized adult. Immobility affects every body system and leads to costly hospital-acquired complications, including delirium, pneumonia, venous thromboembolism, pressure injury, and falls.[1–5] In addition to the hospital-acquired complications, immobility leads to functional decline, especially in the older adult.[1–8] During a single hospital admission, bed rest can lead to functional decline as quickly as 72 hours from admission because of muscle atrophy in a healthy adult.[9] Within 10 days, a substantial loss of muscle mass and strength occurs.[9] This hospital-acquired functional decline results in postacute needs at hospital discharge, which decreases the ability to discharge home and contributes to an increased length of stay.[2,6,8,10–12]

In the intensive care unit (ICU) setting, research has long demonstrated the benefits and safety of early mobilization for the critically ill patient.[13–23] Early ICU mobility prevents functional decline, decreases ventilator days, decreases ICU length of stay, decreases hospital length of stay, increases discharges to home, and improves quality of life.[9–12,14,16,19,24–26] Nurse-driven ICU mobility protocols alleviate the negative effects of immobility and improve patient outcomes by empowering nurses to initiate and progress mobility as appropriate for each patient without having to wait for physician orders.[2,5,9,16,21,24,27] In 2010, our facility implemented its first ICU progressive upright mobility (PUM) protocol, created by a team of nurses.

The original PUM protocol had 11 levels of mobility, starting with turning and progressing through to ambulation. The protocol was intended to use on any patient who did not have a bed rest order. Despite the attempt to implement progressive mobility in the ICU, patients still remained immobile for extended periods, while in the ICU. In 2013, the PUM protocol was revisited and simplified to 6 levels of mobility that still progressed from turning to ambulation. Progressive upright mobility documentation was added to the electronic medical record (EMR), and PUM became part of the ICU culture. Unfortunately, nurse-driven progression of mobility did not occur once patients transferred out of the ICU to the acute care floors. Patient mobility on the acute care floors was dependent on physician orders.

In 2017, the PUM protocol was reduced to 5 levels of mobility and adapted, with permission from Bassett et al[15] (2012), into what is currently being used at our facility (Figure 1). Once finalized, this protocol was implemented in the ICUs as well as all of the acute care floors. Now, patients are assessed within 8 hours of admission for exclusion criteria and assigned a mobility level based on predefined clinical criteria. Once the patient reaches the goal for that level, he/she is progressed to the next level. Levels 1 and 2 are for patients who are unable to get out of bed because of hemodynamic instability or other reasons. In level 1, patients receive every 2-hour turns (or continuous lateral rotation) as well as range-of-motion exercises with the goal being tolerance of full turning. In level 2, patient head of bed is progressively increased, and legs are

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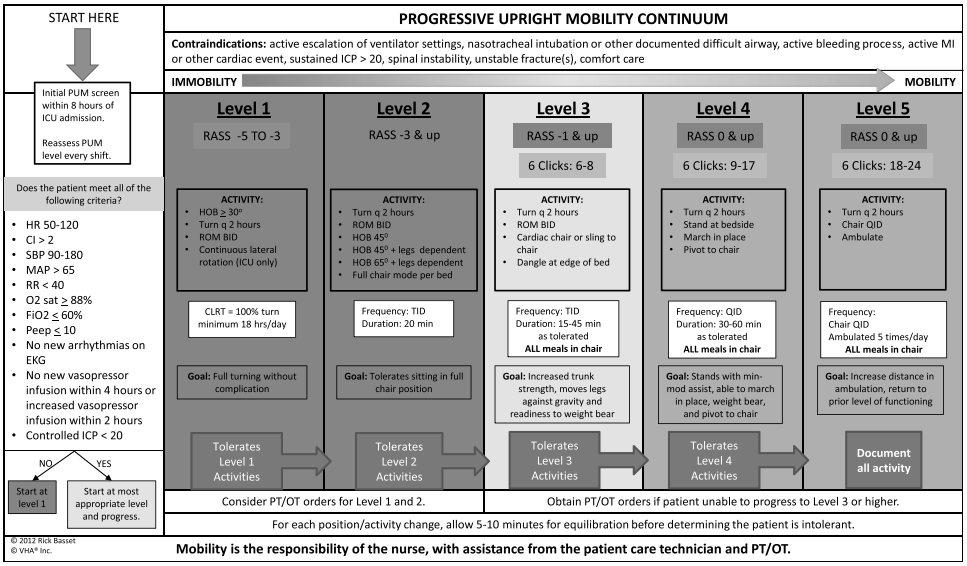


FIGURE 1. Progressive upright mobility continuum.

placed dependent until the patient tolerates sitting in the full chair position (in the bed). Level 3 patients are able to hold themselves in an upright sitting position, so they are dangled at the edge of the bed or placed in the bedside chair using the mechanical lift/sling. The goal is for these patients to increase trunk strength and move their legs against gravity. In level 4, patients are able to weight-bear on their feet, so they stand, march in place, and pivot to the bedside chair. In level 5, patients ambulate starting with short distances and progressing to longer distances until they reach their baseline level of function.

Patients' baseline functional level is also recorded in the EMR on admission. This is captured by documenting whether the patient is independent, wheelchair bound, or nonambulatory, or walks with an assistive device. The goal is to return patients to their baseline functional level as soon as possible, but there are challenges to effectively mobilizing patients. The main challenges include lack of personnel and competing nursing priorities, which are consistent with those found in the literature.[2,5] In addition, the acute care floors have fewer patients in the lower PUM levels (levels 1-3), because these are usually sicker patients who are in the ICUs, so the acute care nurses have less experience with the lower PUM levels. Therefore, when there is a patient on the acute care floor, who is in a lower PUM level, the acute care nurses feel uncomfortable mobilizing the patient.[2] These patients require even more time and resources to mobilize, which creates further challenges. Furthermore, significant patient deconditioning can cause unplanned transfers to the ICU as a result of respiratory deterioration.[28,29]

When the coronavirus pandemic began, a new challenge emerged. As the influx of COVID-19 patients began, patient mobility was further compromised. The acute care floors had sicker patients because of limited ICU beds, and nurses had to spend valuable time donning and doffing personal protective equipment for each patient. An early study found a mortality rate of 97% for COVID-19 patients requiring intubation.[30] Thus, prevention of ICU transfer and intubation became a common goal. The COVID-19 patients who were intubated experienced prolonged bed rest in the ICU, resulting in an approximately 40% decrease in muscle strength.[26,31] If patients survived and transferred out of the ICU, this level of deconditioning put patients on the acute care floors with lower PUM levels. This further inhibited mobility because of the need for more resources and time. Furthermore, the challenge of mobility in the deconditioned patient led to delays in disposition as patients required skilled care at discharge and placement was difficult due to their COVID-19 status.

There is research to demonstrate the benefits of using dedicated mobility teams to facilitate mobility in the ICU and progressive care settings.[20,32–34] However, mobility teams had not been used at this facility. On the basis of this evidence, the clinical nurse specialist (CNS) recommended using deployed coworkers to help facilitate nursing mobility on the acute care floors. A concurrent audit, completed by the CNS, found that only 38% of the patients on the acute care COVID floors were being mobilized. Therefore, a proposal was submitted to the facility's Incident Command Center with a summary of the evidence and the audit data. Approval was granted to implement COVID mobility teams. These teams focused on providing PUM to the COVID-positive and person under investigation (PUI) patients to improve patient outcomes. The purpose of this quality improvement (QI) project was to assess the impact of the COVID mobility team on patient outcomes for COVID-19–positive and PUI patients.

METHODS

Intervention

The facility implemented COVID mobility teams in April 2020 using redeployed coworkers. Each team was composed of a physical or occupational therapist as the team leader, 1 physical therapist assistant, and 1 patient care technician. The mobility teams were scheduled in two 8-hour shifts (6 AM to 2 PM and 1-9 PM) during the week and one 12-hour shift (8 AM to 8 PM) on the weekends. The mobility teams completed 2 hours of orientation with the inpatient therapy educator before starting their first shift. Orientation included training on the facility's PUM protocol, personal protective equipment donning and doffing procedures, safe patient handling, and documentation.

The CNS initiated and developed the mobility team process. Before each mobility team shift, the CNS reviewed the patient census to identify the COVID-19 and PUI patients. Once the patients were identified, charts were reviewed, by the CNS, to determine which patients met criteria for PUM. Patients who met criteria for PUM were placed on a shared patient list in the EMR. The shared patient list included the patient's current activity orders, current PUM level, current oxygen device/flow rate, and the last documented oxygen saturation. The CNS then developed a plan of care for each patient that included the appropriate PUM level to start in and the mobility progression goal for the day. If a patient had a bed rest order, the CNS evaluated the patient and worked with the bedside nurse and physician to get a PUM order, if appropriate. At the start of their shift, the mobility team and the CNS did a brief huddle to discuss the plan of care for each patient on the shared patient list.

After the morning huddle, the mobility team touch based with the therapy team to determine any inpatient therapy recommendations. Before performing mobility sessions, the mobility team would check with the nurse to make sure the patient was still appropriate for the mobility session. The CNS rounded on all of the mobility team patients, and their nurses, throughout the day. If the patient's needs were complex and the nurse did not feel that the patient should be mobilized, the CNS was contacted. The CNS consulted on these complex patients. Many times, these patients were appropriate for mobility, and the nurse was provided at-the-elbow coaching by the CNS to help them understand the PUM protocol. The nurses were encouraged to participate in the mobility team sessions, as much as possible, to help them become more comfortable with mobilization of complex patients. Once the mobility team was fully functional, the CNS provided ongoing oversight.

The goal was for the team to achieve 3 nursing mobility sessions per day with progression through the PUM levels, as appropriate. Once a mobility session was completed, the mobility team documented the session and communicated the patient's progress and any concerns with the bedside nurse. All patient mobility sessions were documented in the EMR and recorded on a PUM Checklist by the mobility team. The PUM Checklist (Figure 2) served as a data collection tool for ongoing auditing of the project. The CNS compiled and analyzed the data and provided a weekly summary of the outcomes to the mobility team and the acute care units.

Study of the Intervention

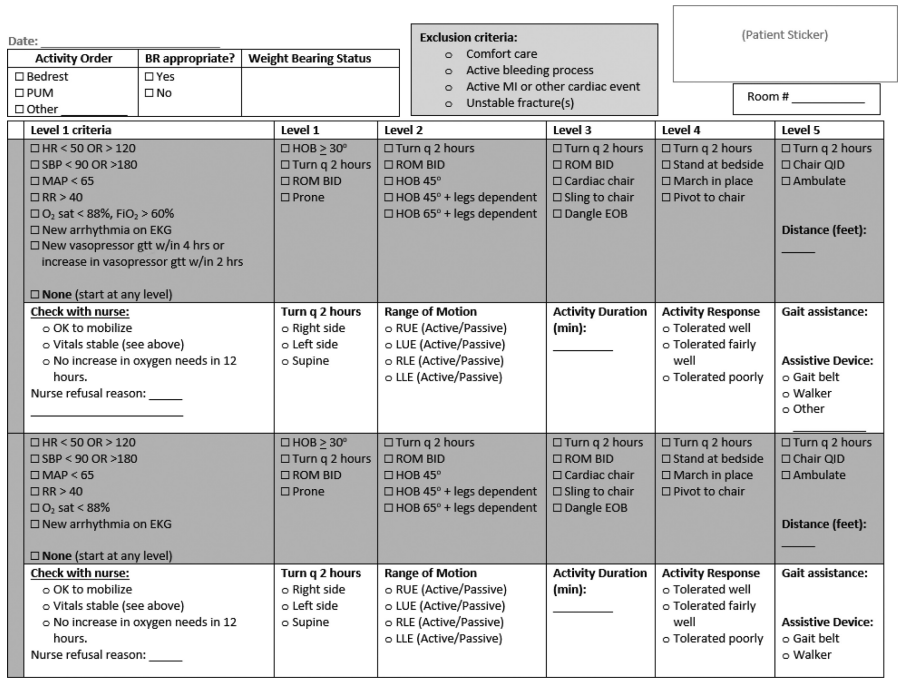
This was a QI project that received exemption from the facility's institutional review board. The QI project occurred at a 440-bed, nonacademic, Magnet-designated facility. The facility services a 100-mile radius, which is mostly rural. The mobility teams were assigned to the 2 COVID-designated medical units, which each had 36 beds. Patients were included in the QI project if they were 18 years or older with a diagnosis of COVID-19 or suspected COVID-19. Patients were excluded if they were younger than 18 years or did not have a diagnosis of COVID-19 or suspected COVID-19. A total of 155 patients were included in the QI project. The No Mobility Team group was identified consisting of patients in the same units admitted (March 1, 2020, to April 11, 2020) before the implementation of the mobility team. The No Mobility Team group consisted of 80 patients. The Mobility Team group consisted of 75 patients, admitted between April 12, 2020, and May 31, 2020, who received at least 1 mobility session provided by the mobility team.

Analysis

The PUM Checklists were collected, and the data were entered into an Excel spreadsheet. The following data points were collected from the PUM Checklists: PUM level, PUM progression, and number of nursing mobility sessions. These data points were then verified in the EMR. If there was a discrepancy between the PUM Checklist and the EMR documentation, the EMR documentation was used. The remaining data points were abstracted from the EMR: age, gender, body mass index (BMI), COVID status, baseline functional status, physical therapy (PT) mobility sessions, hospital/ICU length of stay, ventilator days, discharge disposition, and discharge functional status. Analysis included independent samples *t* tests for the continuous variables and χ^2 tests for the categorical variables. A *P* value of less than .05 was used to determine statistical significance.

RESULTS

A total of 155 patients were enrolled in the QI study. The No Mobility Team group was mostly female with a mean age of 63.2 years and a mean BMI of 30.0. Likewise, the Mobility Team group was mostly female with a mean age of 62.2 years and a mean BMI of 31.3. There were no significant differences between the groups for gender, age, or



Date: _____

Activity Order	BR appropriate?	Weight Bearing Status
☐ Bedrest ☐ PUM ☐ Other _____	☐ Yes ☐ No	

Exclusion criteria:
- Comfort care
- Active bleeding process
- Active MI or other cardiac event
- Unstable fracture(s)

(Patient Sticker)

Room # _____

Level 1 criteria	Level 1	Level 2	Level 3	Level 4	Level 5
☐ HR < 50 OR > 120 ☐ SBP < 90 OR >180 ☐ MAP < 65 ☐ RR > 40 ☐ O_2 sat < 88%, FiO_2 > 60% ☐ New arrhythmia on EKG ☐ New vasopressor gtt w/in 4 hrs or increase in vasopressor gtt w/in 2 hrs ☐ **None** (start at any level)	☐ HOB ≥ 30° ☐ Turn q 2 hours ☐ ROM BID ☐ Prone	☐ Turn q 2 hours ☐ ROM BID ☐ HOB 45° ☐ HOB 45° + legs dependent ☐ HOB 65° + legs dependent	☐ Turn q 2 hours ☐ ROM BID ☐ Cardiac chair ☐ Sling to chair ☐ Dangle EOB	☐ Turn q 2 hours ☐ Stand at bedside ☐ March in place ☐ Pivot to chair	☐ Turn q 2 hours ☐ Chair QID ☐ Ambulate **Distance (feet):** _____
Check with nurse: ○ OK to mobilize ○ Vitals stable (see above) ○ No increase in oxygen needs in 12 hours. Nurse refusal reason: _____ _____	**Turn q 2 hours** ○ Right side ○ Left side ○ Supine	**Range of Motion** ○ RUE (Active/Passive) ○ LUE (Active/Passive) ○ RLE (Active/Passive) ○ LLE (Active/Passive)	**Activity Duration (min):** _____	**Activity Response** ○ Tolerated well ○ Tolerated fairly well ○ Tolerated poorly	**Gait assistance:** **Assistive Device:** ○ Gait belt ○ Walker ○ Other _____
☐ HR < 50 OR > 120 ☐ SBP < 90 OR >180 ☐ MAP < 65 ☐ RR > 40 ☐ O_2 sat < 88% ☐ New arrhythmia on EKG ☐ **None** (start at any level)	☐ HOB ≥ 30° ☐ Turn q 2 hours ☐ ROM BID ☐ Prone	☐ Turn q 2 hours ☐ ROM BID ☐ HOB 45° ☐ HOB 45° + legs dependent ☐ HOB 65° + legs dependent	☐ Turn q 2 hours ☐ ROM BID ☐ Cardiac chair ☐ Sling to chair ☐ Dangle EOB	☐ Turn q 2 hours ☐ Stand at bedside ☐ March in place ☐ Pivot to chair	☐ Turn q 2 hours ☐ Chair QID ☐ Ambulate **Distance (feet):** _____
Check with nurse: ○ OK to mobilize ○ Vitals stable (see above) ○ No increase in oxygen needs in 12 hours. Nurse refusal reason: _____	**Turn q 2 hours** ○ Right side ○ Left side ○ Supine	**Range of Motion** ○ RUE (Active/Passive) ○ LUE (Active/Passive) ○ RLE (Active/Passive) ○ LLE (Active/Passive)	**Activity Duration (min):** _____	**Activity Response** ○ Tolerated well ○ Tolerated fairly well ○ Tolerated poorly	**Gait assistance:** **Assistive Device:** ○ Gait belt ○ Walker

FIGURE 2. PUM checklist.

BMI. There were a total of 48 COVID-positive patients, 19 in the No Mobility Team group and 29 in the Mobility Team group. This was a statistically significant difference ($P = .04$). Among the COVID-positive patients, there were no differences between the groups for age, gender, and BMI. Demographic characteristics of the 2 groups are shown in Tables 1 and 2.

There was an increase in total mobility sessions per day in the Mobility Team group when compared with the No Mobility Team group (Table 3). Physical therapy mobility sessions per day in all patients had a statistically significant increase from 0.26 in the No Mobility Team group to 0.50 in the Mobility Team group ($P = .001$). Progressive upright mobility progression for all patients was improved to 78.4% in the Mobility Team group compared with 23.8% in the No Mobility Team group. All patients had a decrease in days without mobility in the Mobility Team group versus the No Mobility Team group (0.09 vs 0.85, respectively). In the COVID-positive patients, there was a statistically significant increase in PUM progression ($P = .001$) and a statistically significant decrease in days without mobility ($P = .001$).

The outcome variables are presented in Table 4. The length of stay for all patients in the No Mobility Team group was 6.8 and increased to 7.25 days in the Mobility Team group ($P = .68$). Conversely, length of stay decreased from 11.2 days in the No Mobility Team group to 10.1 days in the Mobility Team group for COVID-positive patients ($P = .35$). Baseline function at discharge improved in the Mobility Team group for all patients and COVID-positive patients but did not reach statistical significance. There was a statistically significant increase in patients discharging to home in the Mobility Team group (72%) compared with the No Mobility Team group (66%; $P = .01$). However, there was a nonsignificant decrease in discharges to home in the Mobility group for COVID-positive patients ($P = .94$).

Transfers to the ICU decreased in the Mobility Team group for all patients and COVID-positive patients (Table 5). For all patients who transferred to the ICU, ICU length of stay was 6.17 days in the Mobility Team group and 9.31 days in the

Table 1. Patient Characteristics by Group

	No Mobility Team (n = 80)	Mobility Team (n = 75)	P
Age, mean (SD), y	63.2 (13.1)	62.2 (16.8)	.66
Gender, female, n (%)	43 (53.7)	40 (53.3)	.96
Body mass index, mean (SD)	30.0 (7.6)	31.3 (8.5)	.27
COVID status, positive, n (%)	19 (23.8)	29 (38.7)	.04

Table 2. COVID-Positive Patient Characteristics by Group

	No Mobility Team (n = 19)	Mobility Team (n = 29)	P
Age, mean (SD), y	64.5 (1.9)	59.1 (13.7)	.12
Gender, female, n (%)	8 (42.1)	14 (48.3)	.67
Body mass index, mean (SD)	31.4 (6.7)	34.1 (6.7)	.10

No Mobility Team group ($P = .15$). Intensive care unit length of stay for COVID-positive patients decreased from 13.57 days in the No Mobility Team group to 8.38 days in the Mobility Team group ($P = .14$). There was a decrease in unplanned intubations for all patients (64.7% to 33.3%) and COVID-positive patients (28.6% and 12.5%) in the Mobility Team group ($P = .10$ and .44, respectively). For those patients with unplanned intubations, there was a slight decrease in ventilator days for all patients in the Mobility Team group from 9.09 days to 9.00 days ($P = .49$). Among the COVID-positive patients, 2 patients in the No Mobility Team group were intubated (28.6%) and 1 patient in the Mobility Team group was intubated (12.5%), and there was a 1-day decrease in ventilator days in the Mobility Team group ($P = .44$).

DISCUSSION

Using a dedicated mobility team increased mobility frequency in COVID-positive and PUI patients. Although not significant, the average number of mobility sessions per day doubled in the Mobility Team group, and we came close to our goal of mobilizing patients at least 3 times per day. At this time, patients were not allowed to have visitors, and the mobility teams found that many patients enjoyed having someone to talk to. The mobility teams were encouraged to take the time to talk to the patients and assist with activities of daily living (oral care, feeding) as needed. We believe that we would have reached our goal of 3 mobility sessions per day if the mobility teams had strictly performed mobility and nothing else. Having designated staff autonomously mobilizing patients created better continuity of care, which was also found by Jones et al[2] and Wood et al.[5] As a result, there were fewer days without mobility and increased progression of patient mobility, especially in the COVID-positive patients who had a significant decrease in days without mobility and a corresponding significant increase in mobility progression. In addition, having the Mobility Teams on the units put mobility in the forefront of everyone's minds, which helped improve the overall culture of mobility and empower nurses with the confidence to overcome mobilization challenges.[20,33]

There was a significant increase to PT mobility sessions in the Mobility Team group. This may be attributed to the makeup of the Mobility Teams. Each team included at least 1 outpatient physical therapist or an outpatient physical therapist assistant. As experts in the field of physiotherapy, they identified patients who could benefit from therapy and encouraged nursing staff to get orders for a PT evaluation. Dermody et al[34] found that patients ambulated more

Table 3. Mobility Variables

	No Mobility Team	Mobility Team	P
Total mobility sessions per day, mean (SD)			
All patients	1.09 (0.95)	2.68 (0.91)	1.0
COVID-positive patients	1.19 (1.05)	2.61 (0.85)	1.0
Nursing mobility sessions, mean (SD)			
All patients	0.83 (0.80)	2.18 (0.78)	1.0
COVID-positive patients	0.81 (0.81)	2.56 (0.90)	1.0
PT mobility sessions, mean (SD)			
All patients	0.26 (0.47)	0.50 (0.55)	.001
COVID-positive patients	0.38 (0.60)	0.60 (0.64)	.11
PUM progression, n (%)			
All patients	19 (23.8)	58 (78.4)	1.0
COVID-positive patients	5 (26.3)	20 (74.0)	.001
Days without mobility, mean (SD)			
All patients	0.85 (1.21)	0.09 (0.29)	1.0
COVID-positive patients	0.89 (1.37)	0.07 (0.26)	.001

Abbreviations: PT, physical therapy; PUM, progressive upright mobility.

Table 4. Outcome Variables

	No Mobility Team	Mobility Team	P
Length of stay, mean (SD),d			
All patients	6.8 (7.1)	7.25 (6.1)	.68
COVID-positive patients	11.2 (11.7)	10.1 (8.5)	.35
Baseline function at discharge, n (%)			
All patients	53 (80.3)	61 (84.7)	.49
COVID-positive patients	10 (66.7)	17 (68.0)	.93
Discharge home, n (%)			
All patients	66 (82.5)	72 (96.0)	.01
COVID-positive patients	12 (63.2)	18 (62.1)	.94

frequently when PT was on their care team. This highlights a potential gap in appropriate therapy orders at our facility that may need to be further explored. In a review of mobility programs for older adults, Smart et al[8] found multidisciplinary approaches to mobility to be more effective at improving outcomes than either nurse-led or PT-led approaches. Our teams were composed of therapists with clinical oversight by a CNS. Although there were no nurses on the teams, the teams communicated with nursing staff early and often, making this truly a multidisciplinary approach to mobility.[35]

The Mobility Team group had a 1.1-day decrease in length of stay for the COVID-positive patients. Overall, there was an increase in patients who were at their baseline level of function at discharge, which most likely contributed to the statistically significant increase in patients who were discharged home.[4] Improved discharge disposition positively impacts length of stay because delays in disposition, such as referrals and precertifications, can be avoided.[32] Length of stay was slightly increased in the Mobility Team group for all patients. This is attributed to the prioritization of COVID-positive and PUI patients and seeing patients with negative COVID results, if able. Wood et al[5] reported an increased length of stay due to an increased case-mix index, and Johnson et al[1] contribute an increased length of stay to failure to control for confounding variables.

In their retrospective review, Hashmi et al[36] found that approximately 20% of COVID-positive patients would require ICU transfer for respiratory decline. In our QI project, implementation of the mobility team led to a decrease in transfers to the ICU from 36.8% to 27.6%. At a time when ICU beds were a scarce resource, decreasing ICU transfers proved valuable. For those who did transfer, ICU length of

Table 5. ICU-Specific Outcomes

	No Mobility Team	Mobility Team	P
Transfer to ICU, n (%)			
All patients	17 (21.2)	12 (16)	.40
COVID-positive patients	7 (36.8)	8 (27.6)	.50
ICU length of stay, mean (SD), d			
All patients who transferred to the ICU	9.31 (8.32)	6.17 (7.42)	.15
COVID-positive patients who transferred to the ICU	13.57 (9.73)	8.38 (8.30)	.14
Unplanned intubations, n (%)			
All patients	11 (64.7)	4 (33.3)	.10
COVID-positive patients	2 (28.6)	1 (12.5)	.44
Ventilator days, mean (SD)			
All patients	9.09 (7.87)	9.0 (9.76)	.49
COVID-positive patients	12.67 (9.03)	11.67 (10.02)	.44

Abbreviation: ICU, intensive care unit.

stay was reduced by 3.14 days for all patients and 5.19 days for COVID-positive patients. We believe that improved mobility aided in preventing functional decline, which contributed to the reduction in ICU length of stay for these patients. Reducing ICU length of stay freed up ICU beds, reduced the risk of common ICU-acquired conditions, and possibly decreased cost.

Limitations

Because of the nature of this QI project, we collected limited data about the patients, so although our 2 groups were equal, we did not compare the groups with regard to secondary diagnoses or comorbidities. In addition, the medical management of COVID rapidly changed throughout the duration of this project, which could have confounded the results. Finally, we did not collect data on hospital-acquired complications or mortality, which could have given us more insight on the use of a mobility team to improve patient outcomes. These are all opportunities for further research.

CONCLUSIONS

Using a dedicated mobility team improved mobility in COVID-positive and PUI patients. Increasing patient mobility results in improved patient outcomes by preventing hospital-acquired functional decline, preventing ICU transfers and decreasing length of stay. This further supports the need to make nursing mobility a patient priority on all patient care units, and the CNS is in the perfect position to drive the change.

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