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PHYSICAL THERAPY FOR MOBILIZATION OF A PATIENT WITH A
PROLONGED INTENSIVE CARE UNIT STAY: A CASE REPORT

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ABSTRACT

BACKGROUND AND PURPOSE: Recent literature has shown that early mobility in the intensive care unit (ICU) is safe and effective. Early mobilization reduces a patient's risk for experiencing sequelae such as muscular weakness, bone demineralization, contracture, skin breakdown, pneumonia, insulin resistance, thromboembolic disease and psychological issues, such as anxiety and depression. Some patients are unable to participate in early mobilization due to the complexity of their medical stay, putting them at risk for functional limitations that may last long past discharge from the hospital and limit their quality of life. The aim of this case report was to depict the manifestations of probable intensive care unit acquired weakness in a patient who experienced prolonged bed rest and ventilator dependence and describe the interventions used to improve her functional mobility.

CASE DESCRIPTION: The patient was a 58 year old woman admitted to the ICU with acute respiratory failure secondary to a ST elevated myocardial infarction. Physical therapy was initiated on the 13th day of her hospital stay and she was found to have general limitations in strength and ROM in both lower extremities and was dependent for all mobility and transfers. At the time of evaluation the patient still required mechanical ventilation and was restrained at the wrist due to agitation and anxiety leading the patient to pull at her lines and tubes.

INTERVENTION: Physical therapy interventions, including transfer training, therapeutic exercise and gait training with tactile and verbal cues were provided to address identified impairments and restore functional mobility.

OUTCOMES: Prior to physical therapy intervention the patient was dependent for all functional mobility and unable to lift her lower extremities through full range of motion without assist. After 6 sessions of physical therapy intervention the patient was discharged to a transitional care unit requiring minimal assist for supine to sit transfers, contact guard to stand by assist for sit to stand transfers and contact guard assist to ambulate 50 feet with a front wheeled walker.

DISCUSSION: This case report describes the manifestations of prolonged bed rest in a patient with probable ICU acquired weakness and outlines the physical therapy interventions that were utilized during the patient's recovery of functional mobility. Further research is needed to investigate physical therapy interventions to reduce the risk of developing ICUAW in patients who are unable to participate in an early mobilization program.

RESEARCH ADVISOR FINAL APPROVAL FORM

The undersigned certify that they have read, and recommended approval of the research project entitled...

PHYSICAL THERAPY FOR MOBILIZATION OF A PATIENT WITH A
PROLONGED INTENSIVE CARE UNIT STAY: A CASE REPORT

submitted by
Jennifer Pulscher

in partial fulfillment of the requirements for the Doctor of Physical Therapy Program

Primary Advisor *Crista A. Smith* Date 4/7/2015

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CHAPTER 1: BACKGROUND AND PURPOSE

In the past, usual care in hospital Intensive Care Units (ICU) was bed rest. Interventions were based solely on patient survival; on average, it was common for a patient to be sedated for 89% of their stay in the ICU.^{1,2} Sedatives were used often and, arguably too frequently, in order to calm agitation or reduce a patient's energy expenditure.³ Passive turning was often the only therapeutic activity a patient received; with the thought that patients were too ill to tolerate more and doing so would compromise their healing.² Fortunately, care of the critically ill is evolving as research has shown that the practice of prolonged bed rest in the ICU puts patients at risk for prolonged weakness and disability.²

ICU acquired weakness (ICUAW) is a common complication of a stay in the ICU, affecting between 30 and 90% of ICU patients after discharge from the ICU.⁴ Clinical diagnosis of ICUAW requires use of the Medical Research Council (MRC) scale for grading muscle strength and a score of less than 48 confirms the diagnosis.⁵ Six muscle groups are tested bilaterally, 3 in the upper extremity, 3 in the lower; commonly tested muscles are shoulder abductors, elbow flexors, wrist extensors, hip flexors, knee extensors and foot dorsiflexors. The scale ranges from 0 to 5 with the highest score possible being 60.⁵ Muscle weakness seen in patients with ICUAW is greater than what might be expected with prolonged bed rest for reasons other than critical illness. Patients are at a higher risk for developing ICUAW if they are mechanically ventilated for greater than 48 hours or experience multiple organ failure.⁴ Rapid loss of strength is seen especially in the large LE muscles when

extremities are not moved against gravity; up to a 3% loss in strength can be observed per day.^{6,7} ICUAW is characterized by a rapid loss in strength, but clinical manifestations of prolonged bed rest are not limited to muscular weakness and include bone demineralization, contracture, skin breakdown, pneumonia, insulin resistance, thromboembolic disease and psychological issues, such as anxiety and depression.⁶

A systematic review conducted by Adler et al³ revealed that ICU patients experience some of these side effects even five years after discharge. Persistence of the negative sequelae well beyond the hospital setting is a component of post intensive care syndrome (PICS). PICS is defined as a constellation of symptoms and complications due to prolonged bed rest in the ICU that persist well past the patient's stay in the ICU.¹ The effects can be physical, psychological or cognitive in nature.^{1,8} PICS resolves slowly despite rehab interventions implemented after discharge from the hospital.¹ If a patient is unable to participate in an early mobilization program, it is likely that they are at a higher risk of developing ICUAW and subsequently PICS. Van der schaff et al⁸ surveyed 255 subjects aged between 18 and 85, a year after they had been discharged from the hospital with at least a 48 hour stay in the ICU. The primary outcome measure utilized was the Sickness Impact Profile 68 (SIP-68) which evaluates health-related functional status by assessing the behavioral impact of sickness. This scale is scored between 0 and 100 with 0 indicating no functional restrictions and 100 indicating severe functional limitations. Other outcome measures included the Short Form 36 Health Survey (SF-36), Hospital Anxiety and Depression scale and Impact of Events Scale (IES) which looks for post-traumatic stress disorder (PTSD) related symptoms. Results of the study revealed that

46% of the patients scored between 0-10 on the SIP-68, which classified them as doing well in daily life; 22% had mild dysfunction scores between 11 and 20 and 32% had scores greater than 20, which indicates a poor functional status. Of the patients classified as having poor functional status, 50% had received physical therapy services within the last year. The Hospital Anxiety and Depression Scale scores showed 14% of the subjects had symptoms of anxiety and depression and of these 34 subjects, 25 had poor functional status. Scores from the IES suggested that 18% of the responders had symptoms of PTSD; and 50% of these had poor functional status. The authors concluded that patients who survive critical illness deserve attention from rehabilitation specialists along the continuum of care with consideration given to the high prevalence of psychological distress in this population.⁸

Advancements in medical care, technology and research have led to an increasing amount of people surviving the critical stage of their condition in the ICU; it is becoming apparent that reductions in prior level of functional mobility resolve slowly after a stay in the ICU.¹ This remains true even when ICU patients participate in some type of rehabilitation intervention at a follow up clinic after discharge; functional mobility remains below baseline and quality of life is lower as a result.^{1,9,10} Recently there has been a push for changing the health care delivery system in the ICU setting. New research is supporting the use of early mobilization programs to improve care in the ICU. In 2010 the Society of Critical Care Medicine invited groups closely involved in the care of critically ill patients to help identify strategies to decrease negative consequences of a stay in an ICU. The APTA was one of the groups invited. This large focus group

identified that physical therapists should be a part of the ICU care team and that early mobilization is a tool that physical therapists should implement in the care of critically ill patients.¹

Benefits of early mobilization include a decrease in: dependence on mechanical ventilation, immobility, complications, length of stay, readmissions and deaths and increases in: functional mobility , strength and activity tolerance .^{3,11} The hospital will also benefit from reduced costs for these patients as a result.^{11,12} When patients require mechanical ventilation, immobility risks and costs increase; these patients utilize a large portion of the ICUs resources.¹³ With only usual care, the sequelae of a mechanically ventilated patient is largely detrimental to quality of life. Van der Schaff et al⁸ reported that of a population of critically ill patients who received mechanical ventilation for a period of 2 days, 68% still had functional limitations in performing daily activities one year later, and only 50% had returned to work.^{1, 8} Research has shown that early mobilization is feasible, safe and beneficial, even for patients who are mechanically ventilated.¹³

Despite recent emphasis on the implementation of early mobilization programs there are circumstances in which a patient is not able to participate. Current literature gives the following list as barriers to early mobilization: severe weakness, multiple central catheters and life supporting monitors or artificial airways, patient orientation, the inability to follow commands, and instability of hemodynamic and respiratory parameters (heart rate, blood pressure, mean arterial pressure, positive end-expiratory pressure, respiratory rate, pulse oximetry).^{3, 6, 1} The aim of this case report was to depict the

manifestations of probable intensive care unit acquired weakness in a patient who experienced prolonged bed rest and ventilator dependence and describe the interventions used to improve her functional mobility.

CHAPTER II: CASE DESCRIPTION

Patient History and Systems Review

The patient described in this case report was a 58 year old African American woman of Nigerian decent. She was brought to the hospital emergency department by her daughter, with complaints of shortness of breath and a cough that had been ongoing for the past 2-3 days and worsening in the past 24 hours. On the previous day the patient, a nursing aide, was working and had an onset of body aches, coughing and fatigue. Her daughter reported that the patient had recently been diagnosed with and treated for pneumonia, but her condition was worsening. The patient's past medical history was significant for diabetes mellitus and hypertension; she denied a history of smoking or alcohol use beyond occasional social drinking. Prior to her hospitalization the patient was not taking any anti-hypertensive medications and was controlling her diabetes with insulin.

The patient had a chest x-ray, which revealed bilateral pulmonary edema. Her vitals showed an elevated blood pressure, heart rate and respiratory rate and an oxygen saturation level of 88%. Due to her abnormal vitals the emergency room medical doctor suspected pneumonia or a submassive pulmonary embolism and sent the patient to the catheterization (cath) lab. She was found to be having an acute ST elevated myocardial infarction (STEMI). Medical personal attempted intervention in the cath lab, however the patient was unable to tolerate lying flat. She was sedated and intubated for controlled mechanical ventilation due to florid pulmonary edema, allowing for angioplasty and stent

placement. She also had nasogastric tube placement, central line placement, and arterial line placement in her right (R) radial artery and was admitted into the ICU.

She was diagnosed with ischemic cardio myopathy with an ejection fraction of 20-25%, acute proximal circulation occlusion, chronic right coronary artery occlusion with left to right collaterals and severe stenosis to the proximal, middle and distal left anterior descending artery. The patient continued to receive medical treatment for secondary complications of her heart attack and critical illness including heart failure, lung failure, liver shock, acute nontraumatic kidney injury, altered hemodynamic status and a traveling blood clot to her leg. On the 13th day of her hospital stay she was taken off sedation and given orders for a physical therapy consult for evaluation and treatment for weakness and deconditioning.

The patient was still intubated during the evaluation, causing her to be difficult to understand; she was also on Dilaudid, causing her to be very sleepy. Nursing reported that the patient became agitated at times and attempted to pull out her lines and tubes; therefore, she was restrained at her wrists. For the purposes of the evaluation the restraints were removed during the session. It was unspecified in the evaluation documentation whether the patient presented with agitation while she was being assessed. The evaluating therapist (not the author of this report) determined that the patient lived with her children and was independent with all functional mobility prior to the current hospitalization. The patient was oriented to person only. She could follow 25-50% of single step commands throughout the evaluation.

Physical Examination

ROM and Strength: Evaluation information was taken from the patient's electronic medical chart, which lacked specifics. The patient was examined in supine and "general limitations" in strength and ROM were noted, secondary to prolonged bed rest. The patient was unable to move her lower or upper extremities through full ROM against gravity without assist. She also demonstrated a weak grip. Occupational therapy was responsible for more formal evaluation of ROM and strength of the upper extremities in this setting.

Transfers: As the patient was unable to move her extremities in a functional manner she was dependent for all bed mobility and for transfers, requiring use of the ceiling lift and 3 person assist (A) to transfer to the cardiac converter chair. If bed mobility or independence in maintaining positions (sitting EOB) was assessed further by the evaluating therapist it was not recorded in the patient's chart.

Clinical Impression

As the patient was independent with all functional mobility prior to her hospitalization it was determined that the patient had significant deconditioning, involving her cardiopulmonary and musculoskeletal system, due to her cardiac event and prolonged ICU hospitalization. She was found to have significant weakness, decreased activity tolerance, was dependent on the mechanical ventilator, and for all functional mobility. The evaluating physical therapist determined that the patient would benefit from skilled physical therapy intervention involving bed mobility training, transfer training, strengthening, stretching and range of motion activities to address her

impairments. The physical therapist stated the patient would be assessed further as she progressed; that her prognosis for return to her previous level of activity and independence at home was guarded due to her limited ability to participate in therapy at the time and complicated medical condition. The evaluating therapist listed 4 goals to be completed within the next 7 days during daily PT sessions. Goals were listed as follows:

1. Patient (pt) will perform roll side to side with rail with mod A or less,
2. Pt will follow and complete 4 LE ex x 10 reps each with min A or less
3. Pt will perform supine to sit on EOB with mod A x 2
4. Pt will maintain sitting balance with min A x 1-2 on EOB with feet planted and UE support.

At the time of the evaluation the discharge recommendations were to a transitional care unit (TCU) or long term acute care hospital (LTACH) depending on patient progress towards goals during her daily sessions of physical therapy. Recommended frequency was once per day with a duration of 7 days.

CHAPTER III: INTERVENTION

Hospital Day (HD) 13, PT Session 1:

The evaluating physical therapist completed the evaluation and initiated treatment on the same day. Due to the patient's fatigue and significant weakness she was dependent for transfers, requiring utilization of the ceiling lift, lift sheet and assistance of three staff to transfer her from supine in bed to a fully reclined converter chair. In order to relieve pressure areas of the skin from lying supine the patient was brought into supported sitting with the converter chair. Prior to transfer training the patient completed supine strengthening exercises in bed while the therapist waited for assistance. Though she was very sleepy, the patient was able to complete ten minutes of lower extremity exercises in total with minimal participation and with assist from the physical therapist. She followed commands 25-50% of the time. In supine she attempted ankle pumps (AP); she could complete one bilaterally and then stopped. Five heel slides (HS) were completed on the right with assist, the therapist decided to stop this exercise as the patient was not able to maintain a functional position for this exercise; her hip tended to roll into internal rotation and adduction when stimulated. When seated in the chair the therapist supported the patient under her feet and she was able to complete some active assistive range of motion (AAROM) of the hip with marching (time and/or repetitions were not specifically recorded in the chart). Demonstrating better muscular control on the right, she completed long arc quadriceps (LAQ) exercises bilaterally with assist; the number she completed was not recorded in the chart. The patient was cued to attempt APs again, but was unable against gravity or did not respond to this direction. With assist, she completed bilateral

adduction (ADD) and abduction (ABD) exercises. She became too sleepy to continue and the session was ended. The patient remained in the converter chair at the end of the session, it was not recorded how long she tolerated being upright.

Hospital Day 14, PT Session 2:

The patient had one more therapy session in the ICU. She was seen early in the morning and was on a bilevel positive airway pressure machine (BiPAP). The patient's nurse declared the patient was appropriate for therapy when consulted before the session and informed the PT that she would be in the room shortly to check on the patient's condition while therapy was initiated. The patient was sleeping on PT arrival, but she awakened to tactile stimulation. She was slow to come to full alertness and the BiPAP made it difficult for her to communicate. In supine the patient, after verbal and tactile cues, completed 10 repetitions of APs and HS bilaterally, which she was able to complete actively through a small range of motion (ROM) due to weakness. At this time the nurse came into the room to aide in transferring the patient to the converter chair. It was discovered that the patient had become incontinent of her bowel and the PT facilitated patient rolling right and left with maximal assist (MaxA) and cuing to hold the bed rail while the nurse performed care on the patient. The patient was then transferred to the converter chair as previously mentioned, with the same level of assist. In sitting the patient became more agitated, communicating that she was too hungry to participate in therapy. She was informed that she could not eat until a swallow test was performed by the speech therapist later that morning. Two of the patient's daughters arrived and helped to encourage her to participate. Family was then asked to step into the hall and the

television was turned off, as it was distracting to the patient. Once the patient was focused she was able to follow commands 100% of the time. In sitting the patient completed lower extremity strengthening exercises. A more detailed description of the exercises is provided in Table 1.

Hospital Day 15

The following day the patient was transferred to the cardiac ICU (CICU) shortly before her physical therapy session. Nursing reported that the patient was medically stable enough to participate in therapy, but would likely decline as patients are typically fatigued from transferring units. On PT arrival there were multiple relatives in the room and the patient denied therapy due to fatigue, despite encouragement from family members.

Hospital Day 16

Prior to her physical therapy session the following day, the patient had occupational therapy (OT). Her electronic medical record indicated that she reported dizziness with static standing during this session. Later, nursing staff attempted to transfer the patient from her bed to a reclining chair. A walker was not utilized for this transfer. The attempt failed with an assist of two and the patient was transferred to the chair with the ceiling lift. The patient was in the chair on PT arrival. She was informed that the goal of the session was to stand and initiate gait activities, as well as to continue with strengthening exercises. Despite strong encouragement from the physical therapist the patient declined any upright mobility, stating that she was afraid to fall. The physical therapist was not aware at the time that the patient experienced a failed transfer earlier in

the day, and the patient did not list this as a reason for her fear. She was given an explanation about the safety measures taken to prevent falls and that two therapists (one PT and one student PT) would assist her. The patient again reported being too fearful, and sought to dismiss therapy by declining seated strengthening as well. Her nursing staff was informed of her refusal to participate.

Hospital Day 17

On the patient's third day in the CICU nursing staff reported that the patient had heightened anxiety; no specific cause was recorded in her electronic medical chart. Her oxygen saturation fell to 81% on 3 liters of oxygen with a nasal cannula, hovered at 89-90% on 8L with a face mask and was finally placed on BiPAP where her oxygen saturation stabilized to 95%. This occurred before her scheduled physical therapy session. Nursing approved the patient for participation in physical therapy, but the patient was with echocardiography at the time of the scheduled session. A later note in her chart entered by her cardiac physician stated that she had developed acute pulmonary edema, causing shortness of breath (SOB). She received no therapies on this date.

Hospital Day 18, PT Session 3:

Patients are commonly transferred between therapists' schedules in the hospital setting due to both patient and therapist schedules. Information about the PT session on the 4th day in the CICU was taken from the patient's electronic medical record, as the author of this report did not direct the session. The therapist followed the previously set plan of care for the patient's session, initiating gait activities. During her OT session earlier that day, the patient had tolerated 15 minutes of sitting at the edge of the bed

(EOB), but refused to stand; it was not stated if the patient gave a reason. During PT the patient participated in LE strengthening exercises in sitting and standing, initiated gait through part practice and completed stand pivot transfers; details about this session are listed in Table 1. Although the chart did not explicitly state that the patient expressed feelings of fear, the author interprets her described actions as cautious. She was slow to extend during standing, as she was hesitant to complete an anterior weight shift.

Hospital Day 19, PT Session 4:

On PT arrival to the patient's room, the patient did not immediately seek to dismiss the therapist as she had done in the past. The patient was very fatigued, but willing to transfer from her bed to the chair. She ambulated 4 feet from the bed to the chair with a hand hold assist (HHA) to minimum assist (MinA) x2. Her gait deviations, recorded in Table 1, prompted a trial of FWW use during gait to be put into her plan of care. Once in the chair the patient completed seated LE strengthening exercises; vital signs were stable throughout this session. Shortly after, she was transferred to the cardiac unit (CSC).

Hospital Day 20, PT Session 5:

A FWW was brought to the patient's room prior to her first session in the CSC. OT initiated gait with the FWW in their session with the patient, ambulating to the bathroom and back to bed. At the start of her PT session the patient was seated comfortably in her recliner. Her demeanor was more pleasant toward the therapist than it had been in the past, though she was never rude before she had been less willing to comply with what was asked of her. Though visibly fatigued, she demonstrated an

increased tolerance for functional mobility, ambulating 50 feet out of the room with a FWW and CGA of one. She requested a seated rest break post gait training, but returned to standing to participate in LE strengthening. As humans are upright beings, strengthening exercises done in standing are more functional and correlate better with the muscle contractions needed for functional mobility or ambulation. Standing exercises also incorporate balance, requiring activation of stabilizing muscles, and coordination of cross body musculature important to upright mobility and performance of activities of daily living.¹⁵ As her performance with seated exercises was improving, a trial of standing exercises was chosen to challenge her systems. The patient was unable to complete heel raises, complaining of pain, but was able to complete 10 repetitions of bilateral marching before declaring she was too fatigued to continue standing and requested to recline back in chair.

Upon treating the patient in the cardiac unit (CSC), the recommendation for discharge changed to transitional care unit (TCU), new goals were added and anticipated discharge from therapy was extended from 7 to 11 days. Her new goals were listed as follows:

5. Pt will complete sit\leftrightarrowstand transfers with CGA or less, from various surfaces
6. Pt will ambulate 50 ft with use of WW and Min A or less, no LOB with mild balance challenges.

Hospital Day 21, PT Session 6:

On the day the patient was discharged she was placed on a physical therapist assistant's (PTA) schedule. The PTA was educated on the patient's status by the author.

In the session with the PTA the patient ambulated 50 feet in the hall and 10 feet to the bathroom with a FWW and CGA. She also participated in seated strengthening exercises, progressing to 15 repetitions as tolerated. Later in the afternoon the patient was discharged to a TCU and a discharge note was written by the author of this report. Prior to her discharge the patient signed a consent form giving the authors permission to write about her case.

Table 1

Hospital Day/Session	Transfer Training	Therapeutic Exercise	Gait	Assessment
13/1	10 min-dependent transfer with ceiling lift bed>converter chair Ax3	10 min supine, attempts AP, HSx5 w/A; seated AAROM marching, LAQ w/A; hip ADD/ABD w/A		Patient very sleepy, responds to 25-50% of commands; minimal participation
14/2	5 min-Rolling R/L with MaxA, dependent transfer with ceiling lift Ax2 bed>converter chair	10 min-supine APs, HS; seated in chair x10 LAQ, marching, manually resisted ABD and ADD		Patient very fatigued, distracted throughout session, minimal participation; c/o hunger
15-17/NA	*			
18/3	25 min-Reviewed sit<>stand mechanics/need for anterior weight shift. Pt completed sit<>stand w/CGA ⁺ x2, 3x from recliner chair 1x from BSC ⁺ ; patient dependent for pericare	8 min-seated exercises with focus on posture and breathing; heel lifts/toe lifts, LAQ, marching, hip ABD, ADD x12 **	8 min-Pregait activities in standing: weight shift L<>R, A<>P w/CGAx2 and B hand hold of PT and PT aide; seated rest; 1 min march and 3 fwd/bkwd stepsx2; 4 steps, cues for sequencing	Patient moving quite well, vital signs stable throughout treatment; fatigue noted with gait

Table 1 (cont.)

Hospital Day/Session	Transfer Training	Therapeutic Exercise	Gait	Assessment
19/4	3 min-Supine<>sit minA w/verbal cues for safety and LE management, sit<>stand minA with cues for safety	8 min-seated LE B exercises: APs, LAQ, marching, ADD, ABD with vocal cues for pacing	2 min-pt ambulated 4 ft from bed to chair w/ HHA/ minAx2; small steps, decreased cadence, increased time in double stance, decreased step/stride length	Fatigue noted, patient demonstrated increased tolerance for exercises, vital signs remained stable
20/5		6 min-standing strengthening, pt unable to complete heel raise through full ROM with UE support on FWW, marching x10 B LE	10 min-pt ambulated 50 feet with FWW CGA with decreased step length and slow swing through gait pattern	Increasing activity tolerance, decrease in gait deviations progressing to swing through gait pattern with FWW use.
21/6	5 min-Sit<>stand w/FWW CGA with verbal cues for hand placement, on/off toilet with CGA and use of grab bar	8 min-seated B LE exercises: heel/toe raises, marching, LAQ, hip ADD/ABD 10-15x	Pt ambulated 50 feetx1 and 10 feetx1 with FWW and CGA	Pt on room air, maintaining O ₂ sats ⁺ at 96%, no negative symptoms reported, pt is slow, but stable

*Patient unable to participate or declines therapy on these dates, nursing informed. ⁺ contact guard assist, bedside commode, oxygen saturation**Inconsistency in patient note vs. flow sheet: exercises done in standing unknown.

CHAPTER IV: OUTCOMES

On the day of discharge the patient had met all of her physical therapy goals. A timeline of her goals and their completed dates are listed in Table 2. She required minimal assistance or less with bed mobility and contact guard assist with all transfers. On room air, the patient maintained her oxygen saturation above 96% while ambulating a distance of 50 feet with a front wheeled walker, requiring contact guard assist. Throughout her stay she showed a

Goal	Met
Pt will maintain sitting balance with min A x 1-2 on EOB with feet planted and UE support.	Session 3
Pt will follow and complete 4 LE ex x 10 reps each with min A or less.	Session 3
Pt will perform supine to sit on EOB with mod A x 2	Session 4
Pt will perform roll side to side with rail with mod A or less.	Session 4
**Session 5: Goals Reviewed and updated to reflect progress, date extended.	
Pt will complete sit<>stand transfers with CGA or less, from various surfaces.	Session 6
Pt will ambulate 50 ft with use of WW and Min A or less, no LOB with mild balance challenges.	Session 6

decrease in anxiety toward physical activity and an increase in activity tolerance without adverse cardiac signs or symptoms. While this patient made significant progress during her hospital stay, her progress was difficult and limited by her complicated medical status and hospital course, requiring prolonged bed rest and sedation. She was discharged to a TCU as she was still far from her prior level of independence with functional mobility and would not have the activity tolerance to return to work as a nursing aide. Her time spent in the ICU was 14 days and total length of stay was 3 weeks.

CHAPTER V: DISCUSSION

Unfortunately, even when an early mobilization program has been implemented in an ICU, not all patients are medically stable enough to benefit from it. Such is the circumstance with the subject of this case report. The details of her hospital stay revealed a complicated course of events in the ICU, which created barriers for mobilization. In the setting where our subject received care the physician decided when to place the orders, but nursing often requested therapies for their patients. Each morning an occupational therapist (OT) would complete rounds on the patients with current therapy orders. During rounds, the OT would speak to the patient's nurses to determine if a patient is appropriate for participation in therapy that day. If the patient was not able to follow commands, heavily sedated or currently too sick they would be scheduled out a few days or removed from the schedule, depending on the severity of their status. Also, if the patient was too fatigued or had some procedure scheduled for the day they may be deemed inappropriate. In this case, the patient did not begin therapies until her 13th day in the ICU.

Though the MRC scale was not used to assess this case patient, researchers suggest that the term ICUAW can be used in cases where clinically detected weakness is found in a patient and there is no plausible cause other than being critically ill, such as both heart and lung failure seen in this patient.^{5,7} The patient also was dependent on mechanical ventilation for 14 days, which would increase her risk of developing ICUAW. Development of ICUAW is also a risk factor for an increased duration of mechanical ventilator weaning. This patient started the weaning process on her 4th day in the ICU and was not able to wean off completely until her 14th day. The patient also experienced the

complication of a blood clot, a manifestation of immobility, in her right lower extremity. As a result of her immobility and myocardial infarction the patient had limited tolerance for activity. Interventions were structured to provide the patient with an appropriate challenge to promote achievement of functional goals. Submaximal strength training with body weight resistance or light manual resistance was utilized as tolerated to prevent further atrophy and improve endurance of the lower extremity musculature.¹⁴ Initially the patient had trouble focusing during sessions in the ICU because of the busy environment. Removing distractions improved the patient's focus and allowed for increased productivity during the session. After a failed transfer with nursing the patient was afraid of falling, but following education by the physical therapist on sit to stand mechanics and safety, the patient was able complete repetitions of sit to stand transfers and participate in pre-gait activities, breaking functional gait into parts, in order to build her confidence in upright functional mobility. Once she was comfortable with being upright the patient was progressed to gait training and standing strengthening exercises to promote isometric contractions of postural muscles of the trunk and lower extremities.¹⁴ Due to lower extremity weakness the patient was given a FWW to utilize for mobility. Use of a FWW allowed the patient to walk further distances, functionally strengthening her lower extremities and increasing oxygen uptake and cardiac output.¹⁵ The hospital setting of this case patient utilizes OTs for their cardiac rehabilitation. The case patient was not referred cardiac rehabilitation during her stay in the hospital, but all interventions were performed within the recommended 1-3.5 metabolic equivalent of energy expenditure

range.¹⁵ Patients with ICUAW are slow to recover functional independence; it takes much longer to recover strength and aerobic capacity than it does to lose it.¹⁴

Specific reasons why this case patient did not receive early mobilization or PT intervention sooner are unknown. Reasons may have been related to an unstable hemodynamic status and a prolonged need for sedation. However, the patient did have periods where sedation was lifted for the purpose of weaning off mechanical ventilation. It may have been beneficial for this patient to receive therapy services during this time. PT can be beneficial for respirator weaning as there are many interventions available to normalize an independent breathing pattern. Biofeedback is also a helpful tool that can be used promote relaxation in an anxious patient and increase tidal lung volume. Manual hand placement and breathing exercises including resistance training have been shown to increase the success of weaning, increasing strength and endurance of respiratory musculature. Furthermore, a PT can also be a helpful presence during the process of extubation for positioning, relaxation and breathing exercises.¹⁵ While the patient in this study was off mechanical ventilation by her second session of physical therapy, she was still experiencing difficulty with independent respiration, as indicated by her initial need for the BiPAP machine. Communication between respiratory therapy and physical therapy could have enhanced this patients care as respiratory training may have been a useful tool during her therapy sessions and collaborations between these two fields has proven to enhance the ventilator weaning success rate.¹⁶ It is likely though, since the patient was also being followed by respiratory therapy, that the evaluating PT made the decision to focus her physical therapy sessions on mobility training. The patient had been

bed ridden since her admit, besides dependent transfers to a supported sitting position in the cardiac converter chair.

As mentioned previously there are negative psychological symptoms associated with ICUAW, including anxiety. With the exception of last few days of her hospital stay this patient frequently expressed feelings of agitation and anxiety throughout her medical treatment and rehabilitation services. At least 7 recordings of agitated behaviors due to anxiety, including moaning and pulling at lines and tubes, were recorded in the patient's chart by nursing. The patient also expressed anxiety during therapy sessions by refusing upright activities due to her fear of falling. The author hypothesized that the hospital setting and the patient's psychological state had a significant effect on her progression toward her goals.

In a study done by Russel,¹⁷ patients were retrospectively questioned about their memories concerning their stay in the ICU. Patients revealed that some experiences in the ICU hindered their recovery, both psychologically and physically. Commonly listed issues included poor communication and fear. This study demonstrated that fear is a common experience of patients in the ICU and that it can affect their recovery process. Proper communication and patient education were possible solutions given by the study to alleviate negative experiences in the hospital.¹⁷ Considering this, a lack of proper communication may have contributed to the case patient's fearful experience of the failed transfer. Until that day, the patient had been transferred dependently, using safe patient handling equipment; the nursing staff may not have communicated their expectations to the patient clearly, or her weakness was underestimated. Regardless, the task was too

challenging for the patient; it may have been beneficial for a PT to initiate functional mobility with this patient.

Limitations of this case report are related to the environment of the ICU and acute care setting. The therapist providing the majority of treatment did not perform the evaluation of this patient and as mentioned previously, evaluation data recorded in the chart was limited and lacked detail. The patient was not chosen for this case report until her final therapy sessions and therefore was not consistently seen by the author of this report. Access to data and information concerning the patient's medical treatment and status was also limited thus prohibiting a comprehensive understanding of the complexity of the patient's care and factors that may have affected her participation in therapy sessions. The patient's utilization of provided therapy services was limited due to her decreased activity tolerance, time constraints of 30 minute therapy sessions and conflicts with other medical procedures. Also, no formal outcome measures were used to record this patient's progress.

Case reports do not allow for cause-effect relationships to be determined, as there are many confounding factors, especially in the ICU setting where many other interventions occur simultaneously that effect patient outcomes. Retrospectively, it would have been beneficial to gather objective data on the patient's level of anxiety and fear. An outcome measure such as the Hospital Anxiety and Depression scale, which is a self-report measure, can be utilized to assess anxiety and depression in non-psychiatric patients. The anxiety subscale has been shown to have excellent reliability and the measure has adequate validity overall.¹⁸ Data collected from this scale could have guided

the therapy sessions to include relaxation techniques to reduce patient anxiety. Also, it may have been beneficial for therapy to initiate functional mobility/transfers with the use of safe patient handling equipment, such as lift pants and the overhead ceiling lift and/or earlier use of a FWW for patient safety.

Further research should examine methods for overcoming barriers to early mobilization. This would include increasing awareness of ICUAW and PICS. Awareness could allow for a more comprehensive interdisciplinary treatment approach including increased utilization of rehabilitation. There are also patient specific barriers to participating in these programs, as they typically consist of transfer training, isotonic strengthening and ambulation interventions. For the patients who are affected by ICUAW or PICS, like this case patient, further research should examine the efficacy of physical therapy interventions in inpatient and outpatient settings for improving functional mobility after discharge from a hospital or TCU.

CHAPTER VI: CONCLUSION

This case report described a patient unable to participate in an early ICU mobilization program due to her complicated medical status. She demonstrated negative sequelae associated with prolonged bed rest, including probable ICU acquired weakness. After receiving inpatient rehabilitation interventions, including transfer training, therapeutic exercise and gait training the patient showed increased independence in bed mobility, functional transfers and ambulation and was discharged to a TCU where she continued to receive physical therapy services. Despite these continued services this patient will likely experience negative consequences associated with her critical illness for several years as she is at risk for developing PICS, which is slow to resolve despite continued therapy services. Future research should focus on reducing barriers to early mobilization and improving physical therapy intervention for patients who are less medically stable both during and after their ICU stay in order to improve function and reduce the impact of PICS on this population.

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