EFFECTS OF DISCHARGE PLANNING ON LENGTH OF STAY IN PATIENTS UNDERGOING PRIMARY TOTAL KNEE ARTHROPLASTY

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Abstract

Extended hospitalizations for non-medical reasons are a contributing factor to the rising health care costs in the United States. Length of stay after elective orthopaedic surgery is highly variable and often prolonged unnecessarily due to lack of coordinated care. The project setting was a rural regional trauma center in a Midwestern state. Discharge assessment tools and early discharge planning have demonstrated promising results at optimizing organizational resources and reducing length of stay.

The purpose of this pilot, quality improvement project was to implement a discharge risk assessment tool and discharge planning, prior to admission for patients undergoing elective, primary total knee arthroplasty and evaluate the impact on hospital length of stay in the orthopaedic surgery population. The project setting was a rural regional trauma center in a Midwestern state. The organization did not use a discharge assessment tool for orthopaedic surgical patients and had inconsistent, prolonged length of stay with multiple barriers to a hospital discharge. The project implemented the Blaylock Risk Assessment Screening Score (BRASS) prior to admission, at the pre-anesthesia testing visit. The BRASS has consistently demonstrated validity and reliability of predicting patient's disposition at discharge. Patients who obtained a BRASS score greater than 20 were referred to the outpatient social worker for probable skilled nursing placement upon discharge. The collaborating outpatient social worker began discharge planning and coordination of discharge needs before and during hospital admission, guided by the BRASS results.

Data was collected on a group of 10 patients and matched to 10 control patients through a retrospective chart review. The control group was selected after the intervention to allow case-control matching and minimize confounding variables. Controls were matched based on age,

gender, and BRASS results. Data collection included: age, gender, ethnicity, co-morbidities, smoking status, attendance of pre-operative joint education class (within 30 days or longer), post-operative complications, discharge disposition, length of stay, and accuracy of BRASS prediction in the intervention group. Length of stay was compared, and resulted in over 80% of the intervention group being discharged by post-operative day two; reduced from 60% being discharged on post-operative day three in the control group. Further qualitative data provided insight to the patient population undergoing primary total knee arthroplasty in the organization. The project demonstrated a significant cost-savings strategy for the organization and enhanced patient care and coordination using a discharge assessment tool and proactive discharge planning.

Keywords: discharge planning, length of stay, discharge assessment tool, Blaylock Risk Assessment Screening Score (BRASS)

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The current American healthcare system is facing sky rocketing costs and becoming less affordable to the public (Jevsevar et al., 2016). According to The Commonwealth Fund (2015), 25% of privately insured, working-age individuals have unaffordable healthcare costs. The number increases to 53% in lower income families (Collins, Gunja, Doty, & Beutel, 2015).

As a result, an abundance of research and resources are being implemented to help control the rising costs (Jevsevar et al., 2016). The Affordable Care Act legislation attempted to contain costs through multiple modalities including: quality based reimbursement, fraud and waste elimination, health promotion/prevention, and organizational incentive based payments to name a few (Pauly, 2011). Additionally, the Affordable Care Act legislation recognized hospital readmissions and prolonged hospital lengths of stay were significant burdens to the United States healthcare spending; furthermore, hospital readmissions and length of stay became a means to measure quality outcomes in an organization (Hicyilmaz, 2013).

Consequently, various incentive based programs were developed. Patients undergoing total joint arthroplasty became a paradigm of standardizing care to reduce costs while improving patient outcomes (Siddiqi et al., 2017). Research has taken various initiatives to reduce peri-operative complications, readmissions and to reduce length of stay without jeopardizing care (Slover et al., 2017). Length of stay has been found to be a significant cost driver for which organizations can optimize care in this patient population (Molloy, Martin, Moschetti, & Jevsevar, 2017). A large quantity of research has been focused on reducing length of stay in the orthopaedic patient population (Kurtz et al., 2017).

Length of stay can be determined by many uncontrollable factors and varies widely by organizations and geographical areas; one critical and modifiable component is early discharge planning (Westert, Nieboer, & Groenewegen, 1993). A significant number of inefficiencies in

the hospital system are related to poor patient flow and coordination, not simply uncontrollable, external factors (Miani, et al., 2014). More than 30% of all hospital discharges are delayed for non-medical reasons (Evans & Hendricks, 1993). When discharge planning and hospital coordination are insufficient, a patient's length of stay can be prolonged, resulting in higher, unnecessary costs (Arana et al., 2017). By identifying patients with complex discharge needs as soon as possible, hospital length of stay and resources are optimized (Holland et al., 2017).

The use of discharge risk assessment tools, interprofessional efforts, and simplifying discharge processes can drastically reduce patient length of stay (George & Atwal, 2013). Identification of high-risk patients, prior to admission for elective cases through use of a discharge assessment tool, can result in better education, planning, and utilization of resources to achieve optimal outcomes. By preemptive planning for discharge needs, patient transitions and care are improved with length of stay optimized and not prolonged unnecessarily (Mola, Ohta, Rosenfeld & Ford, 2016).

The purpose of this paper was to describe a quality improvement project, guided by the literature for implementation of a discharge assessment tool along with early discharge planning to reduce length of stay in adult patients undergoing elective, primary total knee arthroplasty surgery. When resource misuse occurs; early discharge planning can substantially reduce cost and improve patient outcomes (Evans & Hendricks, 1993). The project purpose and variables are discussed, followed by a comprehensive literature review. Next, the synthesis of research with project implications, study methodology, data analysis, results and discussion are summarized.

Project Aim

The quality improvement project was implemented in a regional, level two trauma center in a rural community in a Midwestern state. The length of stay for elective orthopaedic surgery was inconsistent. Discharge planning was inadequate, resulting in unnecessarily prolonged

hospitalizations related to discharge coordination. Patients were admitted for elective surgical cases resulting in anticipated mobility limitations; however, discharge planning was not implemented until after admission or sometimes several days after admission.

The rural community had limited resources and could not accommodate unanticipated skilled nursing or rehabilitation admissions, especially on the weekends. Durable medical equipment (DME) stores were not open on the weekend and the hospital did not provide the equipment. Consequently, a patient would discharge without the proper medical equipment or ultimately stay in the hospital until the following business day. This lack of planning and anticipation of patients' needs resulted in unnecessary, prolonged lengths of stay. A hospitalization was regularly extended in the elective, orthopaedic patient population due to discharge coordination. The purpose of this project was to improve the discharge planning process and reduce length of stay, resulting in substantial cost savings to the organization and improvement in quality of care.

The relationship between length of stay and early discharge planning with screening tools in the organization was explored through the following question: in adult patients undergoing elective, primary total knee arthroplasty orthopaedic surgery (P), does the use of a discharge assessment tool and early discharge planning (I) compared to usual care (C), reduce average length of stay (O)? The project author focused on patients admitted for elective procedures where screening and discharge planning could begin prior to admission for the surgical procedure. Adults having elective, primary total knee arthroplasty were the initial pilot population since this cohort required the most assistance post-operatively in the orthopaedic practice of interest.

Project Variables

The American Nurses Association defines discharge planning as "part of the continuity of care process which is designed to prepare the patient for the next phase of care and to assist in

making any necessary arrangements" (Farren, 1991 p. 25). Encompassed in discharge planning are a variety of actions including: (a) acquisition of equipment required after hospitalization, (b) medication management, (c) financial barriers (such as cost of medications, rehabilitation and equipment), (d) insurance approval and financial assistance if applicable, (e) caregiver and patient education, (f) discharge disposition and coordination to after hospital care, including transportation, follow-up care, outpatient resource utilization (Holland & Harris, 2007). Discharge planning is a critical aspect in achieving desired outcomes for patients (Holland & Harris, 2007). For this project, discharge planning did not include clinical care pathways or standing orders specific to a diagnostic related code.

A discharge risk assessment tool is a questionnaire used to screen patients for needing higher levels of care upon discharge or those with complex discharge needs (Khalifa, 2017). A risk assessment tool is administered, and a patients' home environment, co-morbidities, and potential barriers to a successful discharge home are identified (Oldmeadow, McBurney & Robertson, 2003). Various discharge risk assessment tools exist and will be discussed further in the literature review. Patients identified as high risk for discharge through the tool received comprehensive discharge planning and coordination with social services, prior to arrival at the hospital.

Length of stay for the selected surgeries was compared before and after the intervention. Length of stay was determined from the time of admission to the day of discharge (example- post-operative day one, post-operative day two, etc.). Usual care included the initiation of the discharge planning process after admission for the elective surgery and lacked the use of a discharge risk assessment tool. Only the adult population was evaluated for this project since

pediatric patients were considered dependent and less likely to require higher levels of care upon discharge after an orthopaedic surgery.

Methods for Literature Review

The literature review was performed using the following databases: Medline, PubMed, Cochrane, CINAHL, and Google Scholar. The literature was reviewed for evidence regarding discharge planning with effects on length of stay, as well as types of discharge screening tools available for implementation in the project. Keywords and phrases with varying combinations for the search included: discharge planning, discharge assessment tool, complex discharge, discharge process, discharge screening, length of stay, length of stay reduction, hospitalization, risk assessment and prediction tool (RAPT), Blaylock tool, and Blaylock Risk Assessment Screening Score (BRASS).

An initial time limit of 5 years for the literature was selected, but then removed due to a lack of results. Search results revealed numerous cohort studies, expert opinions, and reviews with few randomized controlled trials. Each study identified was assessed for other related trials or articles of reference as a method for finding more literature on the topic. No language or country limitations were set, however articles in pediatrics or a non-English language were excluded. Studies that were not applicable to orthopaedics and/or specific to another type of surgery or procedure were excluded.

The literature review was organized using a matrix table to critique and identify patterns or gaps in the research. Each time a literature search was performed, the search history was saved as a file document to prevent duplication of work and to provide a reproducible literature search. This review was organized by first introducing studies that evaluated the intervention of discharge planning on length of stay, followed by studies that developed or evaluated discharge

assessment tools. The current literature was summarized for application to the quality improvement project.

Synthesis of Articles

Discharge Planning and Length of Stay

Over the years, many studies have sought to decrease length of stay through the concept of discharge planning. A study by Cable & Myers (1983) included a retrospective chart review in three separate hospitals in the mid-1970s after discharge planning was first implemented. The researchers did not use high powered statistical analysis but measured median length of stay before and after the intervention (Cable & Myers, 1983). The researchers found inconsistent results and hypothesized discharge planning may be dependent upon community resources and skilled nursing availability, skewing the results (Cable & Myers, 1983).

Nearly a decade later, a quasi-experimental study included discharge planning on the day of admission with comparison to the control group, who only received discharge planning at a physician's request (Farren, 1991). The researcher used a small, convenience sampling method for study participants (Farren, 1991). Results were significant cost savings and reduction in length of stay in the discharge planning group (Farren, 1991). The research included was a poor study design with low level evidence, but comparable to studies of that era (Farren, 1991).

A randomized controlled trial in Pennsylvania included testing of discharge planning in patients 70 and older, and determined there was no significant difference in length of stay but continuity and readmission rates were improved (Naylor et al., 1994). The study was conducted only with patients in cardiac diagnostic-related groups and lacked external validity to other patients' age groups and/or diagnostic codes. The study included only participants who were alert and oriented on admission, a potential confounding variable (Naylor et al., 1994).

Researchers of one systematic review assessed the effectiveness of discharge planning on health-related outcomes in elderly patients where the discharge intervention involved at least one nurse. Results from the researchers suggested nurse discharge planning actually increased length of hospitalization and did not reduce readmission rates. The authors admitted significant limitations of the review, for the studies lacked robust data, poorly defined 'nurse discharge planning', and recommended further research (Mabire et al., 2016).

Zhu, Liu, Hu, & Wang (2015) determined early discharge planning programs were effective in other patient populations, while length of stay reduction was not statistically significant in patients with chronic disease. Ten randomized controlled studies were reviewed by this author and only five measured length of stay. The previously mentioned study by Naylor et al. (1994) was included in this study review. The research authors recommended more robust research to assess discharge planning and length of stay implications (Zhuet al., 2015).

Except for the studies discussed, all other literature in this review found discharge planning to be statistically significant at reducing length of stay. Dai, Chang, Hsieh, & Tai (2003) performed a two year pilot study in Taiwan and the authors concluded discharge planning was an effective method especially in stroke patients, although the average length of stay was 12 days. Researchers in another randomized controlled trial study in Taiwan assessed comprehensive discharge planning within 48 hours in hip fracture patients, over the age of 65 (Huang & Liang, 2005). The authors concluded a significant reduction in length of stay when compared to the control group, but considered some of the results to be attributable to the 'extra attention' given to the experimental group (Huang & Liang, 2005).

Parfrey et al. (1994) conducted a randomized controlled trial in two separate university-hospitals in Canada. Hospital admitting personnel administered a questionnaire, predictive of

length of stay, and made appropriate early referrals for patient discharge planning. The authors concluded the intervention would reduce length of stay but had variations in the effectiveness due to staff compliance and implementation of the program (Parfrey et al., 1994).

Geroge & Atwal (2013) conducted a systematic review and evaluated randomized controlled trials that compared interventions of an 'individualized discharge plan' and concluded hospital length of stay and re-admission rates were significantly reduced. Goncalves-Bradley et al., (2016) conducted a similar systematic review and determined an 'individualized discharge plan' results in a small reduction in hospital length of stay. Both research study authors considered an individualized discharge plan to include modalities from pharmacy to specific clinical pathways such as stroke care protocols. The discharge planning was not necessarily from nursing or social services and outside of this project's definition of discharge planning. The researchers recommend further research with concrete definitions of discharge interventions to better evaluate the complex phenomena (Gerorge & Atwal, 2013; Goncalves-Bradley et al., 2016).

Many other authors in this review assessed multi-modal approaches to reduce length of stay (Ferro, Mullens, & Randall, 2014; Khalifa, 2017; Miani et al., 2014; Nesbitt, 2015; Webber-Maybank & Luton, 2009). Research authors reported success in reducing length of stay in each of the research settings, and discharge planning was included as part of the intervention (Ferro et al. , 2014; Khalifa, 2017; Miani et al., 2014; Nesbitt, 2015; Webber-Maybank & Luton, 2009). Discharge planning was only one component in these studies and not studied in isolation, leaving considerable confounding variables. The authors developed each study for a specific hospital and/or patient population with prolonged length of stays and inherent organizational problems, reducing external validity. Overall these research authors supported the use of comprehensive

discharge planning to reduce length of stay (Ferro et al., 2014; Khalifa, 2017; Miani et al., 2014; Nesbitt, 2015; Webber-Maybank & Luton, 2009).

Discharge Assessment Tools

Blaylock Risk Assessment Screening Score (BRASS).

The BRASS discharge planning tool was developed in 1992 by Ann Blaylock, RN, CS, MSN and Carolyn L Cason, RN, PhD, as a standardized method of screening patients in need of discharge planning. Researchers at that time recognized hospital inefficiencies and prolonged lengths or stay related to a lack of discharge planning, especially in the 65 and older population. The tool was intended to be used early after hospital admission and performed at the bedside with the patient. A small pilot study was conducted, and the researchers found the tool valid and reliable (Blaylock & Cason, 1992).

There are 10 items in the BRASS tool that have an associated numerical value including: (a) age, (b) living situation/social support, (c) behavior pattern, (d) functional status, (e) dependent activities, (f) cognition, (g) mobility, (h) sensory deficits, (i) number or previous hospital admissions, (j) number of medications, and (k) number of medical problems. The score is then tabulated (between 0-40) and patients are stratified into three categories; low risk (less than 10) with few discharge planning resources needed, moderate risk (10 to 19) with multiple discharge planning resources needed, and high risk (greater than 19), with a likelihood for the patient to be discharged to a nursing home, extended care, or rehabilitation facility (Blaylock & Cason, 1992).

Since the development of BRASS, multiple other researchers have reproduced the tool's validity and reliability. The study authors concluded the Blaylock Risk Assessment Screening Score accurately identifies patients at risk for prolonged hospitals stays or a discharge disposition other than to home (Mistiaen et al., 1999; Saiani et al., 2008; Dal Molin et al., 2014). Cunic et al.

(2014) determined with a retrospective cohort study, the BRASS tool was a significant predictor of length of stay specifically in an orthopaedic population following elective hip and knee arthroplasty and a valuable screening tool for discharge planning.

Risk Assessment and Prediction Tool (RAPT).

The next discharge assessment tool, RAPT, was developed in Australia in 2003. The researchers intended to predict a patient's risk of needing extended inpatient rehabilitation after hip or knee arthroplasty (Oldmeadow, McBurney, & Robertson, 2003). The researchers determined seven items were statistically significant in predicting a patient's discharge disposition. The items include: age group, gender, gait aide, walking distance, community support, living assistance. A patient's preference was considered the seventh item and one of the most statistically predictive indicators (Oldmeadow et al., 2003).

In the RAPT, the items are tabulated, and the patient's risk is stratified into three categories. The person is considered low risk with a score greater than nine and will be able to discharge to home without further assistance. A person with medium risk, a score between six and nine, would require further intervention to discharge home and those receiving a score less than six were considered high risk and would likely require discharge to extended inpatient rehabilitation. The RAPT was intended to be used prior to admission and during the pre-operative planning phase (Oldmeadow et al., 2003). Researchers in other studies have applied the RAPT tool with varying results.

Tan et al. (2014) conducted a large cohort study in Singapore, using the RAPT for patients undergoing total knee arthroplasty. The researchers determined the higher the RAPT score, the longer the length of stay. The researchers reliably predicted discharge to home by using RAPT (Tan et al., 2014), but questionable external validity was found since it was a small

study sample in a single institution. Coudeyre et al. (2014) noted the same results with a similar study design for a patient cohort in a single institution undergoing total hip arthroplasty in the Netherlands.

Hansen et al. (2015) tested the validity of RAPT in a five year long cohort and determined the tool was reliable for predicting discharge in both low and high risk categories. The researchers recommended further identification in the medium or intermediate category to increase predictive reliability. The study supported the use of screening tools to facilitate discharge planning and coordination.

Slover et al. (2017) applied the RAPT tool in a bundled payment program institution and expanded the use to include spine and cardiac patients. The researchers found RAPT had predictive reliability in total joint and spine surgery patients but not in cardiac patients. The researchers recognized potential bias as many of the patients were discharged to home, due to the bundled payment, which would not have adequately tested all of the RAPT categories (Slover et al., 2017).

Kimmel, Holland, Simpson, Edwards, & Gabbe (2014) adapted the tool to 'TRAPT', Traumatic Rehabilitation and Prediction Tool, and applied it to isolated lower extremity traumatic fractures in a facility in Melbourne, Australia The researchers included extra variables to the tool such as body mass index, frailty, and weight bearing status but were poorly defined in the study. Although the researchers found 80% reliability of predictions for discharge destination, there were considerable limitations including small sample study, and lack of external validity (Kimmel et al., 2014).

Miscellaneous discharge/screening tools.

Barsoum et al. (2010) conducted a retrospective study in Ohio that evaluated seventeen variables contributing to discharge disposition in patients undergoing primary and revision total knee and hip arthroplasty by sixteen orthopaedic surgeons at a single institution. Researchers used logistic regression and found predictable factors in this population that would determine a discharge other than to home and expedite discharge planning (Barsoum et al., 2010).

Seven variables were found to be statistically significant including: (a) type of procedure, (b) age, (c) sex, (d) heart disease, (e) diabetes, (f) chronic obstructive pulmonary disease, and (g) caregiver. Age over 85 was the strongest predictive factor of discharge to inpatient rehabilitation. Researchers also reported patients who discharged to home had a significantly shorter length of stay (Barsoum et al., 2010). Confounding variables included multiple surgeons, revision arthroplasty, and a potential for lacking external validity as data was from a single institution.

Petis, Howard, Lanting, Somerville, & Vasarhelyi (2016) conducted a controlled trial in Canada utilizing a 'TUG test' as a pre-operative measure of function and ability to predict length of stay. The 'TUG test', or timed up and go, consists of timing the patient from the seated position, arms rested, to standing and walking three meters and then re-seating (Petis et al., 2016). One hundred and twenty patients undergoing total hip arthroplasty were included in the study and researchers controlled for multiple confounding variables: surgical approach, implants, anesthesia, and peri-operative care (Petis et al., 2016). The researchers concluded the, 'TUG test' was predictive of length of stay beyond 48 hours. For every 5-second interval increase in 'TUG' time, patients were twice as likely to stay in hospital beyond 48 hours" (Petis et al., 2016 p. 1427).

Ohta, Mola, Rosenfeld, & Ford (2016) developed a pilot discharge risk assessment at a hospital in New York using an 8-item questionnaire. The risk assessment was performed pre-

admission and evaluated the predictive ability for readmission risk and length of stay in orthopaedic and cardiovascular patients. The researchers found 'self-rated health' statistically significant for increased length of stay, and 'lives alone' for readmissions. The researchers concluded pre-admission discharge risk assessment can facilitate proactive discharge planning and better hospital utilization (Ohta et al., 2016).

Literature Summary of Findings

The literature supported discharge planning to reduce length of stay, but this author's review revealed many limitations and weaknesses. Discharge planning has been poorly defined in the literature over the last 30 years (Mabire et al., 2016). There were multiple studies where discharge planning was vaguely described and included routine patient care aspects or clinical care pathways (George & Atwal, 2013; Goncalves-Bradley et al., 2016). There is a need for more rigorous research with clearly defined interventions of discharge planning that can be replicated in future studies.

There was a lack of randomized studies in which discharge planning was implemented as an isolated intervention. Multiple researchers used a multi-faceted intervention, including other variables such as education, physical therapy on day of surgery, discharge advocacy, and interdisciplinary communication (Ferro et al., 2014; Khalifa, 2017; Miani et al., 2014; Nesbitt, 2015; Webber-Maybank & Luton, 2009). The multiple interventions resulted in confounding variables, reducing the reliability of the research and did not adequately explain the relationship between discharge planning and length of stay.

The majority of research was conducted in unique institutions, which may limit the generalizability (Huang & Liang, 2005; Ferro et al., 2014; Khalifa, 2017; Miani et al., 2014; Nesbitt, 2015; Webber-Maybank & Luton, 2009). Support for the project was found in the

literature, demonstrating how a customized discharge planning intervention can be successful in a single, appropriate organization. Most of the research was conducted out of the United States, where length of stay was substantially longer. Therefore the findings of the research may not be applicable in the United States (Cunic et al., 2014; Dai et al., 2003; George & Atwal, 2013; Huang & Lang, 2005; Kimmel et al., 2014; Oldmeadow et al., 2003; Pafrey et al., 1994; Slover et al., 2017; Tan et al., 2017). The literature in this review was considerably older than expected. Lack of recent literature can skew the research implications, since length of stay has been drastically reduced over the last five years (Nesbitt, 2015).

The literature did support discharge tools could reliably predict post-operative discharge disposition in the orthopaedic patient population. These discharge tools enabled early, proactive discharge planning, hospital resource optimization, and reduction of unnecessary, prolonged length of stay (Barosum et al., 2010; Cunic et al., 2014; Hansen et al., 2015; Kimmel et al., 2014; Mola et al., 2016; Ohta et al., 2016; Oldmeadow et al., 2003; Petis et al., 2016; Slover et al., 2017; Tan et al., 2014). The Blaylock and RAPT tools have been the most rigorously studied and were deemed appropriate for this project.

Project Considerations

While multiple researchers in the literature review supported discharge planning to reduce length of stay, the evidence was low and of poor quality. Cable & Myers (1983) found inconsistent results for length of stay and considered discharge planning to be dependent upon community resources and outpatient bed availability. Discharge planning may not reduce length of stay if supportive resources are not available. This quality improvement project setting was a regional hospital in a rural town with limited community resources and outpatient facilities

which could be the major contributing cause of inconsistent, longer length of stay, rather than inappropriate discharge planning.

Another potential concern came from the study by Cunic et al. (2014) in which a higher BRASS score was found to correlate with a longer length of stay. While the researchers still supported the use of the BRASS for discharge planning prior to admission in orthopaedic surgery, they described a substantial pitfall to the use of any discharge assessment tool. The discharge tool did not predict or take into account an unanticipated decline during the hospitalization; therefore the pre-admission score may not have been accurate and failed to trigger the early discharge planning (Cunic et al., 2014). For this quality improvement project, there may have been patients who were not identified correctly pre-operatively and the intervention was not successful. The quality improvement project measured the reliability of the discharge assessment tool and ability to accurately predict patients' discharge disposition in this organization.

Methods

Project Theory and Assumptions

The Model for Improvement guided this quality improvement project (Langley et al., 2009). This model includes the PDSA cycle (plan, do, study, act) and three questions which include,

- What are we trying to accomplish?
- How will we know that a change is an improvement?
- What changes can we make that will result in improvement? (Langley et al., 2009 p. 24).

Early, comprehensive discharge planning resulting in a reduction of average length of stay in the total knee arthroplasty patient cohort was the aim. Organizational changes that could enhance these ongoing improvements included the continued use of a discharge risk assessment tool, Blaylock Risk Assessment Screening, prior to surgical intervention/admission and thorough, proactive coordination of care.

For this project, the author assumed length of stay in the total knee arthroplasty population was increased in the organization because of inadequate discharge planning. Several observations contributed to this assumption: discharge planning did not occur until one or two days after surgery; the organization did not supply durable medical equipment and the nearby stores were not open on weekends. The length of stay may have been prolonged due to other extraneous variables. Even though comprehensive discharge planning occurred in the project, length of stay may not have been improved through the project intervention alone.

The author assumed the Blaylock Risk Assessment Screening Score (BRASS) accurately identified patients with complex discharge needs and had a high predictive capability of a patients discharge disposition. The author assumed total knee arthroplasty surgical patients would require the most care coordination peri-operatively. The author acknowledged the patient's preadmission and post-surgical scores may be significantly different depending upon the hospital course and could bias the results. The author assumed early identification of patients with greater discharge needs prior to the hospitalization, would reduce length of stay through coordination of care.

The author assumed workers in the organization acknowledged the prolonged lengths of stay and desired improvement. For the project to be successful, several departments had to buy in and modify hospital practices. The organization needed to first accept that the length of stay

needed improvement. The organization needed to accept changes to workflow or significant barriers would remain (Holly, 2015). For example, if a patient with a high BRASS score was referred to the social services department and discharge planning was not started or felt to be warranted, the intervention would not be successful.

Project Design and Sample

The project was a pilot, quality improvement project design. The project coordinator used evidence-based practice to compare a change in a workflow process (Holly, 2015). The project coordinator monitored the effects on length of stay, a quality measure in the organization (Hicyilmaz, 2013).

The quality improvement project sample included the adult population undergoing total knee arthroplasty orthopaedic surgery at a rural hospital in a Midwestern state. The pediatric population was not included as they typically do not require complex discharge planning since they are dependent and rarely require arthroplasty. The sample included elective primary total knee arthroplasty patients as this population requires the most assistance at discharge given pain and mobility limitations. For the project sample, non-elective or emergent cases were excluded, as the Blaylock discharge risk assessment tool could not be administered prior to admission. Joint revisions were excluded from the quality improvement project.

The sample was selected by age of eighteen or older and elected primary total knee arthroplasty. All scheduled surgeries that included total knee arthroplasty during a three-month time frame were selected from June 1st, 2018 to August 31st, 2018. There were two orthopaedic surgeons from which the patients were sampled. There was no randomization or blinding to the intervention. No other exclusion criterion existed. The control (pre-intervention) sample selection was identified after the intervention by a retrospective chart review. Patients who had

undergone primary total knee arthroplasty, by the same two orthopaedic surgeons, in the year 2017 were matched as controls based upon age, gender, and BRASS result.

Data Collection and Analysis

Once a patient was determined eligible for sampling, the office scheduler alerted the project coordinator either by phone or email. The project coordinator received the patients contact information, surgeon, scheduled surgery dates and pre-anesthesia testing (PAT) dates. The project coordinator administered the Blaylock Risk Assessment Screening Tool, (Appendix B), to the sample participant prior to admission at the pre-anesthesia testing visit.

The BRASS tool (Appendix B) was administered consistently to all sample patients and comprehensive discharge planning began prior to admission. All sample patients were asked about available durable medical equipment (cane, walker, wheelchair, toilet seat riser, grasper, dressing supplies etc.), transportation, medication affordability, and any other equipment required at discharge. For a BRASS score of twenty or greater the participant was advised to select two or three skilled nursing or rehabilitation facilities as a possible discharge location.

The information regarding BRASS score, medical equipment, and anticipated discharge needs were forwarded to the social services department in the organization, prior to the scheduled surgical intervention. Prior to the intervention, the social services department received the project goals, data, methodology, and literature to support the intervention. The collaborating outpatient social worker began discharge planning and coordination of discharge needs before and during hospital admission.

Data collection included: (a) age, (b) gender, (c) ethnicity, (d) co-morbidities, (e) smoking status, (f) attendance of pre-operative joint education class, (g) timeframe of pre-operative class (greater or less than 30 days from surgery), (h) post-operative complications, (i)

discharge disposition, (j) length of stay and (k) accuracy of BRASS prediction of discharge disposition. Data was entered into a Microsoft Excel sheet and all patient identifying information was removed.

After 10 post-intervention patients were sampled and data entry completed, sampling for the pre-intervention (control) group occurred. A list of patient charts for primary total knee arthroplasty in the previous year was reviewed and sampled by matching of age, gender, and BRASS (Appendix B). Further data was collected through a retrospective chart review to identify ethnicity, smoking status, post-operative complications, discharge disposition, length of stay and accuracy of BRASS. The project coordinator reviewed all charts for data required to complete the Blaylock Risk Assessment Screening tool. The use of mechanical assistance, hearing, and/or visual aids was determined by the list of belongings returned upon discharge in nursing documentation. Dependency in activities of daily living was scored based upon nursing admission assessment. Cognition and behavior patterns were scored based upon the documentation of history and physical, as well as nursing notations.

Length of stay was compared in the pre (control) and post-intervention (case) group as the primary focus of the quality improvement project. Trends were also observed regarding other data points collected that may have influenced hospital length of stay such as age, gender, smoking status and co-morbidities. The data collected provided substantial qualitative information regarding the patients undergoing primary total knee arthroplasty in the hospital with the expectation to optimize quality in patient care.

Results

Intervention Group

Ten patients were included in the intervention group, seven females and three males. The oldest patient was 85 years old, the youngest 50 years old and the average age 71.9. Nine of the

intervention group were Caucasian and one was Hispanic. Two of ten patients attended the joint education class, but only one within thirty days of surgical intervention.

The average Blaylock Risk Assessment Screening Scores ranged from 2 to 14 with an average score of 6.6. Forty percent of the sample participants were former smokers but no patients were actively smoking. Forty percent of the participants had five or greater active medical problems. Refer to Tables 1 and 2 (Appendix D and E) for further descriptions.

Eighty percent of the participants were discharged to home. Two were discharged to the acute inpatient rehabilitation unit within the organization. One of two participants discharged to the acute rehabilitation unit had the highest BRASS of 14 and stayed in the acute rehabilitation unit for 25 days and then discharged to home. The other participant had the second highest BRASS score of nine and convalesced at the rehabilitation unit for 18 days and then discharged to a skilled nursing facility. The latter was the only sample participant to be re-admitted within thirty days of surgery due to a patella fracture to the contralateral knee due to a fall.

The BRASS discharge assessment tool was accurate for predicting discharge disposition in eight of the sample participants, while inaccurate for the two participants who discharged to the acute rehabilitation unit. A score of 20 or more indicated a high risk and discharge disposition other than home. The two participants discharged to the acute rehabilitation unit scored in the middle category of the BRASS tool with a risk of extended discharge planning.

Three participants were discharged on post-operative day one, five on post-operative day two, one on post-operative day number three, and one on post-operative day seven, resulting in the average length of stay 2.3 days. The patient with the longest hospital stay had post-operative complications of hyponatremia and acute kidney injury that required medical management, followed by a discharge to home.

Control Group

The control group had 10 patients, seven female and three male. The oldest patient was 85 years old and the youngest 55 years old with an average age of 70.3. The control group average ages were slightly younger than the intervention group with an average age of 71.9 years. All participants were Caucasian. Five patients had greater than five active medical problems, the other five patients had less. Three patients were former tobacco users and one was actively smoking. There were no identified re-admissions within 30 days.

The highest Blaylock score in the control group was 13 and the lowest score was three, resulting in an average score of 7.2. Seven patients discharged to home, two to a skilled nursing facility, and one to the acute rehabilitation unit. The BRASS tool had an accuracy of 70%, but was inaccurate for the three patients who did not discharge to home like the intervention group. Six of the control group patients were discharged on post-operative day three, two discharged on post-operative day two, one on post-operative day one and one on post-operative day four. The average discharge was 2.7 days and 60% of patients were discharged on the third day.

Discussion

The project coordinator sought to determine if comprehensive discharge planning and the use of a discharge assessment tool (Blaylock Risk Assessment Screening Score) prior to admission could influence length of stay in the total knee arthroplasty population. Hospital length of stay was decreased in patients who received early discharge planning compared to the matched control patients. The average length of stay was reduced from 2.7 to 2.3 in the intervention group. Eighty percent of patients were discharged by the second post-operative day in the intervention group. In the control group, the majority (60%) were discharged on post-operative day three.

One patient in the intervention group had a post-operative medical complication, which extended his hospitalization to seven days. Seven days was substantially longer than the other nine patients. The prolonged length of stay of one patient likely skewed the data in the intervention group, while the average length of stay would have been even less had this not occurred.

Application of the Blaylock Risk Assessment Score tool resulted in 100% accuracy for predicting discharge disposition when the patient was discharged to home. Inaccuracy occurred for the five patients scored with the Blaylock Risk Assessment tool who discharged to rehab or skilled nursing. A score of at least 20 was required to indicate a need for discharge to other than home. The highest score in this study was 14 and was a surprise finding given multiple patients with advanced age, severe co-morbidities, and limited social support.

Limitations

A potential contributing factor to the inaccuracy of the BRASS scores was the patient population in this study. By nature of an elective orthopaedic surgery, the patient had to be alert, oriented, appropriate and able to make decisions, leading to a low score in these categories. The Blaylock tool also quantified medical problems, rather than distinguishing severity. The medical category is scored by less than three, three to five, or greater than five medical problems. A patient with hypothyroidism, dyslipidemia, and Sjögren's syndrome would score the same as someone with diabetes mellitus, congestive heart failure, and chronic obstructive pulmonary disease. A discharge assessment tool that recognizes the severity and potential influence on surgical outcome in the orthopaedic population might be more accurate and beneficial in future studies.

Another limitation was the data collection method. The intervention group was directly asked the questions to complete the Blaylock Risk Assessment Screening score. The control patients' information was obtained by a chart review, leaving some aspects of the discharge tool to be inferred. For example, previous emergency room visits could not be identified in the control group if the patient went to another facility, whereas this was self-reported in the intervention group. Functional status was determined in the control group by the documentation on the nursing intake assessment which may not have been accurate. Sensory and mobility deficits were identified by items returned to the patient upon discharge as well as physical therapy documentation. Another consideration for the Blaylock tool was the living situation score. A 'significant other' was not an option, only spouse or family was an option. The limited options could alter the final score, dependent upon what is selected by the person administering the tool. For this project, a significant other was scored as living with family.

The quality improvement project included a very small sample and did not accurately reflect the population distribution in the region. At the time of the project, the reported population distribution of the Midwestern state was 50% female and 79% percent Caucasian (U.S. Census Bureau, 2017). Nearly all participants were Caucasian and 70% were female in the study sample. Such percentages may have been attributable to the time of the year the study was conducted; since the study setting was in a rural, farming community, many male workers are unable to undergo an elective surgical intervention in the summer months, potentially skewing the sample population.

Future considerations

An important finding from this project was the lack of participation in the joint education class. Such lack of participation has implications for future quality improvements studies

regarding a joint education class and impact on post-operative complications, re-admissions, and length of stay in this organization. Encouraging attendance or mandating the class could improve the peri-operative joint arthroplasty experience for all involved parties in the organization.

The current literature and evidence from this project strongly suggests early discharge planning can reduce length of stay (Ferro et al., 2014; Khalifa, 2017; Miani et al., 2014 & Nesbitt, 2015). The healthcare organization could achieve ongoing benefits from starting the discharge process prior to admission for elective cases and can be utilized across other specialties. Future projects and quality assessment should include a variety of discharge assessment tools or develop a customized screening tool specific to this rural organization to optimize patient care and trigger appropriate hospital/community resources. Projects and studies with larger samples and over a longer timeframe would be beneficial in providing further evidence that discharge planning can reduce hospital length of stay.

Conclusions

The literature regarding the intervention of 'discharge planning' lacks clear definition and reproducibility (Mabire et al., 2016). An indistinct definition indicates a substantial knowledge gap in understanding if and how discharge planning affects length of stay on a larger scale. Discharge assessment tools and discharge planning can have positive results in reducing length of stay in an appropriately chosen patient population as demonstrated by the literature review and this project (Ferro et al., 2014; Khalifa, 2017; Miani et al., 2014 & Nesbitt, 2015). The Blaylock Risk Assessment Screening score repeatedly demonstrated validity and reliability and had an accuracy of 75% in this small sample setting (Mistiaen et al., 1999; Saiani et al., 2008; Dal Molin et al., 2014 & Cunic et al., 2014).

While the focus of this project was a specific patient population of primary total knee arthroplasty and geographical community, it was noted that each organization faces their own contributing factors to the exorbitant healthcare costs and varying lengths of stay. This project had considerable room for improvement with regards to patient flow and discharge coordination. Use of the Blaylock discharge risk assessment tool and early discharge planning resulted in a decrease in hospital length of stay when compared to control patients from the previous year. Discharge planning is a modifiable factor that can achieve a multitude of benefits in healthcare organizations. Future projects and research should consider multiple discharge tools, a larger patient sample and longer timeframe to better understand the relationship between discharge planning and hospital length of stay.

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Appendix A

KU MEDICAL CENTER

KUMC HUMAN SUBJECTS COMMITTEE

REQUEST FOR QUALITY IMPROVEMENT / QUALITY ASSURANCE DETERMINATION

THIS FORM MUST BE TYPED

Project Leader: Dr. Carol Buller	
Department: Graduate School of Nursing	
Email: cbuller@kumc.edu	Phone: (913) 588-1021
Alternate Contact Person (e.g., Project Coordinator): Karen Wenner	
Email: kwenner@kumc.edu	Phone: (913) 515-1664

Project Title:

EFFECTS OF DISCHARGE PLANNING ON LENGTH OF STAY IN PATIENTS UNDERGOING TOTAL KNEE ARTHROPLASTY

Project Number, Version and/or Date:
DNP Project 980

1. **Briefly state the purpose of the proposed project.** ***(Attach project plan if available.)***

   Discharge assessment tools and early discharge planning have demonstrated promising results at optimizing organizational resources and reducing length of stay. The purpose of this pilot, quality improvement project is to implement a discharge risk assessment tool (Blaylock Risk Assessment Screening) and discharge planning, prior to admission for patients undergoing elective total knee arthroplasty and evaluate the impact on hospital length of stay in the orthopedic surgery population.

2. **Describe the research that has already demonstrated the effectiveness of your intervention.** ***(Cite research and/or attach documentation about the national program or standard you are implementing)***

   Over thirty percent of all hospital discharges are delayed for non-medical reasons (Evans & Hendricks, 1993). When discharge planning and hospital coordination are insufficient, a patient's length of stay can be prolonged, resulting in higher, unnecessary costs (Arana et al., 2017). Discharge risk assessment tools, interdisciplinary efforts, and simplifying discharge processes can drastically reduce patient length of stay (George & Atwal, 2013). Identifying

patients with complex discharge needs as soon as possible, hospital length of stay and resources are optimized (Holland et al., 2017). Preemptive planning for discharge needs, patient transitions and care are improved with length of stay optimized and not prolonged unnecessarily (Mola, Ohta, Rosenfeld & Ford, 2016) The Blaylock Risk Assessment Screening Score (BRASS) has consistently demonstrated validity and reliability of predicting patient's disposition at discharge (Cunic et al., 2014).

3. **What types of data are needed for the project?**
Age, gender, ethnicity, co-morbidities, smoking status, attendance of pre-operative joint education class, post-operative complications, discharge disposition, length of stay, reason for discharge delay if applicable, and accuracy of BRASS prediction in the intervention group. BRASS score will be collected which includes: age, living situation/social support, behavior pattern, functional status, dependent activities, cognition, mobility, sensory deficits, number of previous hospital admissions, number of medications, and number of medical problems.

4. **Do you need access to identifiable patient records to complete the project?**

☐ **NO**
☒ **YES**

If yes, who holds the records? [redacted]

If yes, which patient identifiers or demographics are needed for the project?
Patient demographics for a restrospective chart review for matched usual care and intervention population. The patient name or identifying information (DOB, MR number, admission/discharge date) will not be required for data analysis or result dissemination.

5. **Which descriptions best fits your project?** *Check all that apply:*

☐ Determine if a previously-implemented clinical practice improved the quality of patient care

☒ Evaluate or improve the local implementation of widely-accepted clinical or educational standards that have been proven effective at other locations

☒ Gather data on hospital or provider performance for clinical, practical or administrative uses

☐ Conduct a needs assessment to guide future changes in local health care delivery or to support other improvements at KUMC

☒ Perform an analysis to characterize our patient population/clients to improve quality of services

☐ Implement programs to enhance professional development for providers and trainees

☐ Measure local efficiency, cost or satisfaction related to standard clinical practices

☐ Develop interventions or educational strategies that improve the utilization of recognized best practices

☒ Implement strategies to improve communication within our local healthcare environment

☐ Improve tools for patients that promote education, health literacy or treatment plan compliance

6. **Does your project involve any of the following aspects?** *Check all that apply:*

☐ Randomizing participants into two or more groups
- ☐ Student/residents/trainees are randomized
- ☐ Patients are randomized
- ☐ Healthcare providers are randomized
- ☐ Units of the hospital are randomized
- ☐ Other *Specify:* _____

☐ Surveying a patient population

☐ Developing clinical practice guidelines

☐ Developing new curriculum recommendations

☐ Developing or refining a new assessment tool

☐ Implementing a novel approach to care that may improve patient outcomes

7. **Which institutions are involved in the project?**
☐ KUMC only
☒ Other institutions List [redacted]

8. **Which individuals or groups will receive the results of your project?**
☒ Internal department personnel
☐ Hospital representatives
☒ University representatives
☒ Presentation/publication*
☐ Other Specify _____

9. **How will your results be used to implement local improvements?**

The results will be used to evaluate the effect of pre-operative risk assessment and early discharge planning on length of stay in the orthopaedic total knee arthroplasty population. If successful the intervention/results can be applied to other patient populations in the organization. Ideally, early discharge planning will become a standard of care in the organization and improve patient care and resource utilization. The results will also provide knowledge regarding the total knee arthroplasty population and outcomes.

[redacted]
Signature**

5/1/2018
Date

[redacted]
Type/Print Name

*Any presentation or publication resulting from this project should explicitly state that it was undertaken as quality improvement.

**Ink signature or email from the project leader is required.

FOR OFFICE USE ONLY

Quality Improvement Determination Acknowledged. IRB review is not required.

Director, HRPP
HRPP Official

[redacted]
Signature

6/8/18
Date

Revised 10/4/16

Appendix B

FIGURE

Blaylock Discharge Planning Risk Assessment Screen

Circle all that apply and total. Refer to the Risk Factor Index.*

Age
- 0 = 55 years or less
- 1 = 56 to 64 years
- 2 = 65 to 79 years
- 3 = 80+ years

Living Situation/Social Support
- 0 = Lives only with spouse
- 1 = Lives with family
- 2 = Lives alone with family support
- 3 = Lives alone with friends' support
- 4 = Lives alone with no support
- 5 = Nursing home/residential care

Functional Status
- 0 = Independent in activities of daily living and instrumental activities of daily living

Dependent in:
- 1 = Eating/feeding
- 1 = Bathing/grooming
- 1 = Toileting
- 1 = Transferring
- 1 = Incontinent of bowel function
- 1 = Incontinent of bladder function
- 1 = Meal preparation
- 1 = Responsible for own medication administration
- 1 = Handling own finances
- 1 = Grocery shopping
- 1 = Transportation

Cognition
- 0 = Oriented
- 1 = Disoriented to some spheres† some of the time
- 2 = Disoriented to some spheres all of the time
- 3 = Disoriented to all spheres some of the time
- 4 = Disoriented to all spheres all of the time
- 5 = Comatose

Behavior Pattern
- 0 = Appropriate
- 1 = Wandering
- 1 = Agitated
- 1 = Confused
- 1 = Other

Mobility
- 0 = Ambulatory
- 1 = Ambulatory with mechanical assistance
- 2 = Ambulatory with human assistance
- 3 = Nonambulatory

Sensory Deficits
- 0 = None
- 1 = Visual or hearing deficits
- 2 = Visual and hearing deficits

Number of Previous Admissions/ Emergency Room Visits
- 0 = None in the last 3 months
- 1 = One in the last 3 months
- 2 = Two in the last 3 months
- 3 = More than two in the last 3 months

Number of Active Medical Problems
- 0 = Three medical problems
- 1 = Three to five medical problems
- 2 = More than five medical problems

Number of Drugs
- 0 = Fewer than three drugs
- 1 = Three to five drugs
- 2 = More than five drugs

Total Score:

*Risk Factor Index: Score of 10 = at risk for home care resources; score of 11 to 19 = at risk for extended discharge planning; score greater than 20 = at risk for placement other than home. If the patient's score is 10 or greater, refer the patient to the discharge planning coordinator or discharge planning team.
†Spheres = person, place, time, and self.

Appendix C

April 6, 2018

To whom it may concern:

I am writing on behalf of [redacted] Health Services to express our support for Karen Wenner's project "Effects of Discharge Planning on Length of Stay in Patients Undergoing Total Knee Arthroplasty." Patient flow is one of the top Quality Improvement projects at our facility for 2018, and we have identified multiple areas with opportunities for improvement. Our facility is committed to collaboration with our Orthopedic department on the project proposed by Karen Wenner. Our social work department has committed resources to address pre-hospital discharge planning for elective cases. I anticipate system wide effects from the project proposed.

Sincerely,

Chief Medical Officer

Appendix D

Table 1. Results for Cases

Case #	Gender	Age	Ethnicity	Joint Class Attendance </>	BRASS	Smoker	Co-morbidity	Post-complication	DC POD#	Discharge Disposition	BRASS Accuracy	30 Day re-admission
1	F	81	White	No	8	N	Glaucoma	Delayed wound healing	2	Home	Yes	No
2	F	85	White	Yes >30	14	N	Mesenteric thrombus (coumadin), obesity, GERD	Confusion r/t narcotics	2	ARU (25 days)	No	No
3	F	80	White	No	9	N	Obesity, CKD, AS, HTN, mac deg	Wound drainage, wound vac placed. Injection by rehab MD	2	ARU (18 days) to SNF	No	Yes, patella fx to contra-lateral knee
4	F	50	White	No	7	Former, quit 2018	RA, OSA, HTN, HLD, hypothy, DVT	None	1	Home	Yes	No
5	F	73	White	No	4	N	Hypothy	None	2	Home	Yes	
6	M	78	White	No	8	Former	Afib, CHF, BPH, prostate CA, DVT	None	2	Home	Yes	No
7	F	61	White	No	3	N	Asthma, GERD	None	1	Home	Yes	
8	M	68	White	No	2	Former	HLD	None	1	Home	Yes	No

9	F	77	White	No	5	N	OSA, HTN, HLD	None	3	Home	Yes
10	M	66	Hispanic	Yes <30	6	Former	OSA, HTN, HLD, vertigo, lumbar ddd	Hypo-natremia, acute renal insufficiency	7	Home	Yes
	Average	71.9			6.6				2.3		
	70% Female	85 oldest	90% W	20% attended	14 Highest	60% N	40% >5 60% <5	60% None	50%POD 2	80% Home 20% ARU	80% Accurate
	30% Male	50 young	10% H		2 Lowest	40 % F			30%POD1		
									10%POD3		
									10%POD7		

***Abbreviations: OSA-obstructive sleep apnea, HTN-hypertension, RA-rheumatoid arthritis, HLD-hyperlipidemia, DDD-degenerative disc disease, Afib-atrial fibrillation, CHF-congestive heart failure, BPH-benign prostatic hypertrophy, CA-cancer, GERD-gastro esophageal reflux disease, AS-aortic stenosis, CKD-chronic kidney disease, Mac deg-macular degeneration.

Table 2. Results for Controls

Appendix E

Control #	Gender	Age	Ethnicity	Joint Class Attendance </>	BRASS	Smoker	Co-morbidity	Post-complication	DC POD#	Discharge Disposition	BRASS Accuracy	30 Day re-admission
1	F	81	White	No	9	Former	HTN, PN-Charcot, OSA, hypothy, hydrocephalus	None	1	ARU (10 days to home)	No	No
2	F	85	White	No	13	N	Urinary incont, mac deg, colostomy, PN	P/O anemia 2 PRBC	4	SNF	No	No
3	F	81	White	No	9	N	OSA, HTN, mac deg, HLD, GERD, hypothy	None	2	Home	Yes	No
4	F	55	White	No	7	Heavy	CHF, Hep C, DM, SCI with foley, BMI 43, A/D, COPD	None	3	SNF	No	No
5	F	62	White	Yes	6	Former	OSA, Obesity (BMI 57), edema	None	3	Home	Yes	No
6	M	75	White	No	8	N	HTN, HLD, AMI-stents, BPH, renal insuff, hypothy	None	2	Home	Yes	No
7	F	55	White	Yes	3	Former	asthma, HTN, GERD	None	3	Home	Yes	No

8	M	66	White	No	4	No	afib	None	3	Home	Yes	No
9	F	77	White	No	6	N	HTN, GERD, stress incont, edema	Tachy, hospitalist consult	3	Home	Yes	No
10	M	66	White	No	7	N	Obesity (BMI 50), HTN, HLD, DM2, edema, hypothy	MUA at 2 months	3	Home	Yes	No
Average		70.3			7.2				2.7			
	70% Female	85 oldest	100% W	20% Attended	13 H	60% N 30% F 10% C	50% ≥5 50% <5	70% None	60% POD3	70% home, 20% SNF, 10% ARU	70% Yes	
	30% Male	55 young			3 L				20% POD2			
									10% POD1			
									10% POD4			

***Abbreviations: OSA-obstructive sleep apnea, HTN-hypertension, SCI-spinal cord injury, Hep C-hepatatis C, PN-peripheral neuropathy, DM-Diabetes Mellitus, BMI-body mass index, HLD-hyperlipidemia, DDD-degenerative disc disease, AMI-myocadial infarction, CHF-congestive heart failure, BPH-benign prostatic hypertrophy, A/D-anxiety depression, GERD-gastro esophageal reflux disease, AS-aortic stenosis, CKD-chronic kidney disease, Mac deg-macular degeneration.