

12-2020

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A Standardized Unit Based Process for Obtaining Heart Failure Patient Weights

Lesli E. Teed

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Abstract

Introduction: A CNL student-led process improvement project was proposed to help improve the accuracy of Heart Failure patient weights on a geriatric specialty unit. Cardiology voiced a preference for patients to be weighed using electronic standing scales rather than in-bed scales to improve accuracy. A literature review revealed that in-bed scale weights were less accurate due to inconsistencies in zeroing the bed prior to obtaining the weight, not removing excess patient care equipment and bed linens, and not ensuring that the patient was wearing a minimal amount of clothing. **Methods:** Electronic standing scales were purchased, current practice state was determined via staff practice observation, and a staff education module was developed. **Results:** The results of this project were not obtained due to COVID-19. Further action to optimize heart failure patient health, decrease heart failure readmission rates, and improve hospital reimbursement through more accurate weights is warranted. **Conclusion:** Preliminary evidence showed that in-bed scales were not as accurate as electronic standing scales. Accurate weights are necessary to optimize diuretic treatment for heart failure patients. Standardized processes for obtaining weights and auditing compliance is needed.

Introduction

Problem Significance

According to the latest national statistics, HF affects approximately 6.5 million adults in the United States, costs the nation over \$30.7 billion annually due to medical expenses and missed work, and contributed to 1 in 8 deaths in 2017 (Centers for Disease Control and Prevention [CDC], 2019). In looking at state-level statistics, Michigan rates for HF related deaths from 2014-2016 (189.5 per 100,000 deaths) were higher than the national average (168.6 per 100,000 deaths) for both genders and all races/ethnicities (Black non-Hispanic, White non-Hispanic, Hispanic, American Indian and Alaskan Native) except for Asian and Pacific Islanders (CDC, 2019). In Kent County, statistics show that HF was a contributing factor in 157.0 per 100,000 deaths from 2014-2016 (Appendix A).

The setting for this project was a geriatric specialty unit that treats patients who are sixty-five years and older. Heart Failure (HF) is a common diagnosis seen in their patient population. During fiscal year 2020, 228 patients with Acute HF were treated. The U.S Centers for Medicare and Medicaid Services (CMS) have changed how they are monitoring certain chronic health diagnoses. Changes were made specifically concerning HF to included that a percentage of reimbursement funds are withheld if a patient with HF is treated and then readmitted within thirty and ninety days of discharge (Lamsam et al., 2019).

In an effort to ensure full reimbursement for treating these patients, the standard practices for caring for these patients were scrutinized. A specific area for improvement was identified by the cardiology hospitalist group. They expressed concern that inaccurate daily weights were being charted for HF patients. Cardiologists rely on accurate patient weights to prescribe

diuretic therapy for HF patients and to evaluate if the therapy is being effective. Anecdotal examples of significant weight discrepancies charted in the electronic health record were discussed and the cardiology group voiced a preference for patients to be weighed using electronic standing scales, as opposed to electronic in-bed scales currently being utilized. The rationale for this practice change was that electronic standing scales are considered to be the clinical gold standard for obtaining HF patient daily weights (Gerl, H., Miko, A., Nelson, M., & Godaire, L., 2016). The aim of this project was to develop a process to obtain accurate weights to optimize HF patient outcomes. To add further significance to this project, choosing the best scale to use in obtaining patient weights has been correlated with patient mobility status, thus enabling this project to have an additional impact of reducing patient fall risk.

Project Purpose

The purpose of this project was to develop and implement a Clinical Nurse Leader led educational module and evaluation plan aimed at standardizing the process for obtaining accurate weights for the HF patients with minimal risk for falls.

Literature Review

In order to facilitate obtaining significant results, a PICOT question was developed prior to conducting a literature review. The question proposed was: In sixty-five year and older patients with HF, are electronic standing scales more accurate compared to in bed scales for obtaining daily weights over the average four-day inpatient stay? Using this question, PubMed and CINAHL databases were searched for relevant studies and publications.

Advanced search results were filtered to include: content from the last ten years, abstract available, full text, references available, and peer-reviewed. Search terms included heart failure, in-bed scale, standing scale, scale errors, daily weight, and fluid balance. Initial database

searches resulted in forty-one records. A search for "similar articles" resulted in an additional six records for a total number of forty-seven. One record was eliminated as a duplicate, and twenty records were eliminated due to the subject not pertaining to obtaining patient weights. One record was eliminated for being written in the French language, and two records were eliminated for being published prior to 2009. Three records were eliminated for not containing an abstract, and three records were eliminated for pertaining to non-humans. Finally, ten records were eliminated for not applying to people sixty-five years and older. The remaining seven full-text records were evaluated for eligibility and were deemed appropriate for inclusion.

There was only one study identified that compared electronic in-bed scales to electronic standing scales (Gerl, H., Miko, A., Nelson, M., & Godaire, L., 2016). The authors concluded that there was a higher risk for user error when using electronic in-bed scales compared to electronic standing scales. This sentiment was further strengthened by Byrd, Langford, Paden, Plackemeier, & Seidelman (2011) who concluded that discrepancies of in-bed weights were attributed to lack of calibration prior to obtaining initial patient weight and having excess bedding, clothing, or equipment on the bed during subsequent weights. This speaks to the importance of scale calibration and verification of bed contents with initial and subsequent in-bed weights.

Armitage, Ditsworth, & Jones (2018) discussed a performance improvement process that successfully improved nurse daily weight compliance (accuracy and timing). Improved nurse daily weight compliance was then shown to decrease HF patient Length of Stay (LOS). This was significant in that they were able to show improved patient outcomes.

An article by Groarke, et. al (2018) described an observational analysis study of patients enrolled in a Diuretic Optimization Strategy Evaluation. One of the goals was to determine

whether "weight loss" or "fluid loss" was better to use in predicting decongestion, 60-day events, and symptom relief. The study found that early weight loss, rather than fluid loss, during HF hospitalization was significantly associated with decreased congestion, reduced risk of death, rehospitalization, and hospital readmission 60 days post discharge. The article does caution that accuracy in obtaining the weight measurements was a potential source of error. This article showed that accurate daily weight measurements for HF patients can be used to optimize diuretic therapy to decrease congestion, reduce risk of death and reduce risk of rehospitalization.

In a retroactive database review, Hummel, Katrapati, Gillespie, DeFranco, & Koelling (2014) discussed the impact of prior admissions on thirty-day readmissions in Medicare HF inpatients, and how hospital reimbursement can be reduced based on HF patient readmission rates. This speaks to the importance of an improved process to standardize daily weights for HF patients in order to optimize care and decrease risk for readmission.

If patients do not comply with at home care maintenance recommendations, risk for HF exacerbation is increased. Jurgens, Shurpin, & Gumersell (2010) identified challenges and strategies for managing heart failure symptoms in older adults. They discussed how daily weight monitoring was an essential self-care maintenance activity for HF patients. They stressed that "an increase of 2 to 3 pounds in a day or 4 to 5 pounds in a week is indicative of fluid retention" and diuretic medication therapy must be adjusted in order to avoid volume overload. Nursing strategies were identified for assessing and promoting HF patient self-care practices. This article showed the importance of clinical staff reinforcing self-care practices (obtaining daily weight) for HF patients. The American College of Cardiology Foundation and the American Heart Association guidelines for the management of HF patients further highlight the importance of maintaining a standardized process for obtaining inpatient HF patient weights and for educating

patients on how to maintain these practices after discharge. Specific recommendations concerning weighing patients are to obtain the weights at the same time every day, after voiding, and prior to eating breakfast (Yancy et al., 2013).

Theoretical Model and Project Assessment

The Donabedian model is a conceptual model that provides a framework commonly used to assess clinical practice quality (Polit & Beck, 2017). The model emphasizes three concepts: Structure, Process, and Outcomes. Appendix B illustrates how the Donabedian model was applied to this process improvement project aimed at standardizing the process for obtaining HF patient weights.

Structure Assessment

There must be a working knowledge of assets (the facility, staff, equipment, leadership buy-in) available to use as tools in a process improvement project. Using the Donabedian model, the structure of the unit was assessed. The assets for this project were identified as, 1) the cardiologist group requesting the process change, 2) nursing leadership buy-in and acknowledgment of the problem, 3) time and energy for staff to address the project, 4) the measurement tool (in-bed scale), 5) and the staff members using the scale to obtaining and documenting accurate weights. The unit did not initially own an electronic standing scale. With a small grant, two standing scales were purchased for the project.

Process Assessment

After the structure was identified, the *process* of how patient care is provided was studied. During this phase, the actions involved in providing patient care were identified and compared to the desired process. This allowed for deficiencies in the process to be identified. The process assessment for this project involved identifying all aspects of how the staff members

obtained HF daily weights. The admitting registered nurse (RN) was responsible for obtaining an initial admission weight for the patient. Then, if the patient had a diagnosis of acute or chronic HF, the patient's admitting physician was responsible for placing a daily weight order. After the admission orders were processed, the nurse would measure the daily weight using the electronic in-bed scale or the task was delegated to a certified medical assistant (CMA). The established time to obtain these routine daily weights was 5AM. After obtaining a patient's weight, staff were then responsible for documenting the weight in the patient's electronic health record (EHR) for the physician to review.

The need for standardized staff education was also identified as impacting process quality. During orientation training, staff are shown the correct minimum contents before zeroing the scale for an in-bed weight (one flat sheet, one blue mattress pad, one top sheet, one pillow, one pillowcase, one large blue blanket). However, there was no formal education check-off list for this task, and there were no follow up audits to ensure that the task was being completed correctly over time.

The maintenance of the bed scales was also a process quality measure. The leadership of the unit was unaware of any routinely scheduled BioMed department maintenance being performed on the in-bed scales to assure their accuracy. This was a concern as the accuracy of in-bed scales can drift over time if they are not calibrated and serviced according to manufacturers' recommendations (Gerl, Miko, Nelson, & Godaire, 2016).

Outcomes Assessment

The final process quality consideration was identified as the potential for increased risk of falls if electronic standing scales were obtained and utilized for obtaining the routine daily patient weights. Increased fall rates are also directly tied to decreased federal patient care

reimbursement through the Centers for Medicare and Medicaid Services (Lamsam et al., 2019). A measure to assess HF patient mobility was employed to ensure that the project would not increase patient fall risk. Readily available mobility assessment tools in the electronic health record were integrated into the project. Once deficiencies in process were identified, evidence-based interventions were developed to modify processes in order to obtain the desired outcomes (effects of healthcare on a patient or population). An outcome is the direct product of the structure and process behind it, and so in evaluating the current outcome (inaccurate weights), the cardiologist specialist group's concerns were justified. The current process for weighing patients on the unit did not align with current evidence-based practice. Therefore, structure and process interventions were developed to improve this outcome.

Methods

Context

This process improvement project was not being conducted in a vacuum. It was being conducted on a unit actively treating HF patients and in a health system that had many initiatives on its radar. One roadblock to initiating implementation of this project was the fact that the hospital system was scheduled to transition to a new EHR in January of 2020. This understandably took focus away from implementing a new process as the staff was engaged in first attending EHR education classes and then mastering the new charting process once the new EHR went live. Additionally, just as staff comfort level with the new EHR was rising, a national healthcare crisis started to emerge in the form of the COVID-19 Pandemic. This pandemic, and subsequent increases in inpatient admissions, resulted in the unit becoming a designated "COVID UNIT". Thus, final implementation and analysis of the project was unable to be

completed in its entirety. This paper will discuss the project work that was able to be completed as well as discussing the additional steps needed to complete the project in the future.

The project was approved as a quality initiative by the system institutional review board. A HF Steering Committee was recently reconvened to look at potential areas for process improvement and the CNL and the unit director were both invited to participate. Being able to bring this process improvement project to the committee was very timely. If implementation is successful, and can be shown to help decrease readmission rates, there is potential for this process to be rolled out hospital wide. No patient information was taken from the EHR and no patient identifiers were compiled or utilized.

Preliminary Data Collection

The first step of the process scope has been completed and the results of the observation audits were used to develop the project. Twenty patient weights were observed by the CNL student. Ten admission weights were observed on the day shift, and ten daily weights were observed on the night shift. Sixty percent of the admission weights were completed correctly. Two of the admission weight processes were not compliant because the patient was not placed into a new bed when they were admitted to the unit; they stayed in the bed they were transported in from the Emergency Department. Therefore, there was no way to know if the bed had been correctly zeroed prior to obtaining the patient's weight. An additional two admission weights were not compliant because staff did not ensure the patient was wearing minimal clothing, and that all patient care equipment was removed from the bed prior to obtaining the weight.

In stark contrast, only twenty percent of the daily weights were completed correctly. The biggest fallout for the daily weight was that only two of the ten patients were toileted/brief changed prior to obtaining the weight. Additionally, of those eight patients who were not

toileted/brief changed, one patient did not have standard bed linens verified and two patients had patient care equipment that was not removed from the bed prior to obtaining the weight.

Daily weights were obtained at or around 5 o'clock in the morning (night shift) and the task was often delegated to a CNA. During audit observations it was questioned whether the RN or CNA knew the Bedside Mobility Assessment Tool (BMAT) score of the patient. The RNs all knew and could report the score, the CNAs could not. This highlighted an opportunity for improved communication between the RNs and the CNAs on the mobility status of the patient utilizing BMAT/TUG terminology.

Diagnosis Related Group (DGR) data was pulled from the internal Monthly Working DRG HF Dashboard. DRG 291 (HF and shock with Complications and Comorbidities [CC]), DGR 292 (HF and shock with Major Complications or Comorbidities [MCC]), and DRG 293 (HF and shock without a MCC or CC) were combined and totaled for the unit. These acute HF DRG's are tracked internally because they are specifically monitored by CMS for associated thirty-day and ninety-day readmission rates (Lamsam et al., 2019). Hospital reimbursement for patient care is decreased when a patient with an acute HF diagnosis is readmitted within thirty to ninety days after discharge.

Interventions

The interventions proposed for this project were directed by the Donabedian model. To impact *structure* quality, namely the lack of a standing scale on the unit, a grant was written to obtain funds for the purchase of two new scales. In order to positively impact *process* quality, multiple interventions were developed and included:

- Gathering data concerning Biomed scale calibration processes and time intervals (in-bed scales and electronic standing scale).

- Developing a staff observation tool to observe staff weighing practices: to be used pre and post educational intervention to establish a baseline and to determine if meaningful practice change has occurred (Appendix C).
- Developing an educational module for RN and CNA staff using PowerPoint to learn the new standardized weighing process. This module included 1) correct procedures for obtaining in-bed scale weights and standing scale weights, 2) patient mobility evaluation using the Bedside Mobility Assessment Tool (BMAT) and the Timed Up and Go Test (TUG) introduced hospital wide in early 2020. (Appendix E). BMAT/TUG testing is performed on admission, daily, and as needed with any patient status changes. For the purpose of maintaining patient safety while implementing this new weighing process, it was determined that patients with a BMAT mobility level of 1 and 2 should be weighed using the in-bed scales due to their limited mobility. Additionally, patients with a BMAT mobility level of 3 and 4, as well as those patients who were able to pass the TUG test, were determined to be safe to ambulate for a standing scale weight. The module also included the following content:
 - The heightened focus being placed on HF readmission rates by the organization.
 - The HF steering committee and how they support opportunities for improvement.
 - The cardiology group and their concern that patient weights were not accurate.

- Data highlighting the number of patients discharged with an acute HF diagnosis.
- Specific Information about the scales purchased for the unit. Two BEFOUR Model MX810 electronic standing scales are described. They are cordless and battery operated with the capability to provide 100,000+ weights using just four disposable D-cell alkaline batteries. The scales have two wheels and are easily moveable enabling staff to bring them to patient rooms rather than requiring patients to ambulate to a scale outside of their room. There are integrated handrails that the patient can hold onto while being weighed. This is important considering the age of the patient population and that Level 3 BMAT mobility scores allow for assistive devices to be used (gait belt, walker, cane, sit to stand device, walker harness lift, and crutches). They are accurate up to 1,000 lbs and have a very intuitive digital display with a “Zero” Function button (used prior to obtaining every patient weight).
- The results of the literature review were highlighted. This literature review was important to share with the staff because it showed the rationale and purpose for the new patient weighing process (Cabral & Johnson, 2015). It was also important to share this information because the CNL will implement new process and quality improvement initiatives based on the most recent evidence-based practices found in scholarly peer-reviewed literature (American Association of Colleges of Nursing [AACN], 2007).

- Data from pre-implementation staff observation audits for the in-bed scale weighing process (admission weights & daily weights).
- The educational module will be uploaded on the unit's closed Facebook page for nurses and CNAs to view for three weeks. Staff will be instructed to "like" the module posting after viewing the content. Goal will be to verify that 90% of staff have viewed the educational module.
- A quiz will also be uploaded for completion after the educational module content is reviewed to the unit's closed Facebook page. This will verify staff knowledge of the new standardized weighing processes (Appendix F).
- Communication with staff about the educational module will be included in the unit based weekly newsletter. A reminder will be placed in the weekly newsletter after the module and quiz have been posted for 2 weeks if completion is less than 75%.

The proposed *outcomes* will be that patients who can ambulate safely, as determined by evaluation by BMAT and TUG Test, are weighed using a standing electronic scale, and that patients at too high of a risk for falls are weighed accurately using the in-bed scales. The cardiologists will then be able to manage fluid balances for their heart failure patients with confidence that the weights they are using for reference are accurate. By achieving these outcomes, the unit will ensure that they are providing the highest standard of care possible for their HF patient population based on best practice.

These outcomes will be evaluated as follows:

- A score of 80% on the post test quiz will be required to assure knowledge acquisition of the educational module. Goal is that 90% of staff have completed the quiz.
- EHR audits to ensure the BMAT and TUG Test evaluations are being completed and performed accurately and weights are documented.
- Staff Observational audits of obtaining in-bed and standing scale weights.

Completed Project Work/Results

Biomed Department

Information was obtained from the Biomed department for equipment calibration and maintenance processes relating to in-bed scales and the newly purchased electronic standing scales. The new patient care equipment items were processed through the Biomed department for intake and tagging. The department also maintained operation manuals for each item. Yearly maintenance was scheduled and the due date for this inspection was listed on an asset tag and attached to each electronic device used in patient care. If at any time a scale is thought to be out of calibration, the bed will be removed from the patient care environment and the Biomed department will be contacted. The equipment will be evaluated according to manufacturer recommendations.

Patient Care Item Weights

According to literature review, a common cause for inaccurate patient weights using an in-bed scale is that extra bed contents are not removed from the bed when obtaining the weight (Byrd, Langford, Paden, Plackemeier, & Seidelman, 2011). Data was collected on the weights of common patient care equipment items and extra linens by placing them on a bed and weighing

each item using the in-bed scale (Table 1). This quantitative weight data was compiled to demonstrate to the staff how these items can alter a patient's weight if they are left on the bed during the weighing process. These weights are significant as patients are routinely educated to call their doctor if their weight has increased by more than two to three pounds in one day (Jurgens, Shurpin, & Gumersell, 2010), and if these items are left on the bed during the weighing process, diuretic therapy cannot be prescribed correctly for adequate results.

Table 1. Weights of Common Bed Items

<u>Item Description</u>	<u>Weight (Using In-bed Scale)</u>
Patient Call Light	0.3 kg (0.66 lb)
Blood Pressure Cuff and Tubing	0.2 kg (0.44 lb)
Pulse Ox and Associated Wires	0.2 kg (0.44 lb)
Patient Urinal	0.2 kg (0.44 lb)
Cardiac Monitor and Lead Wires	0.2 kg (0.44 lb)
iPad Tablet	0.5 kg (1.10 lb)
Pillow and Pillowcase	0.8 kg (1.76 lb)
Thin White Blanket	0.7 kg (1.54 lb)
Thick Blue Blanket	1.6 kg (3.53 lb)
Patient Gown	0.2 kg (0.44 lb)

Staff Observation Tool

This tool was successfully used for project pre-implementation staff observations to establish baseline data on current practices and compare them to practices recommended by the literature review. Twenty staff observations were completed, ten for the patient admission weight process and ten for the patient daily weight process. Observation was used as a mode of data collection because the weighing process includes multiple steps which are not represented in subsequent staff charting of patient weights in the EHR. Current literature recommends that

minimum bed contents and minimum patient clothing must be verified for the initial admission patient weight. These two initial steps must be verified again with subsequent daily weights as well as ensuring that the weight is obtained after the patient is toileted/brief changed and prior to the patient eating breakfast (Yancy et al., 2013). Therefore, as represented on the checklist, a weight would be observed and audited as being compliant if 1) the scale used is zeroed prior to obtaining the patient weight, 2) if the patient is toileted prior to obtaining the patient weight, 3) minimum bed content has been verified and the patient is wearing a minimum amount of clothing, and finally, 4) the scale used corresponds to the correct mobility level of the patient based on a BMAT/TUG test assessment. If the weighing process deviated from these recommendations for the purpose of project data collection it was deemed non-compliant with recommendations. This data was included in the staff education module as a “learning/opportunity”. Post-education audits will be completed after the Facebook education module has been active for a minimum of three weeks. It will involve staff observations for new process implementation and results will be reported at subsequent staff meetings.

Staff Educational Module

The staff education PowerPoint module will be uploaded to the unit’s closed Facebook page along with the post-education quiz. The posting will be announced in a weekly newsletter when appropriate. The module will be available to staff for a minimum of three weeks before the completion date requirement. As the module is viewed and “liked”, staff member names will be checked off on a staffing list to verify and track completion. If a staff member fails to complete the education module in a timely manner a reminder email will be sent.

Post-Education Assessment

After staff have viewed the educational module, they will be instructed to complete a Post-education quiz (Appendix F). The quiz results will be electronically available to the CNL. The staff will be instructed to retake the quiz if they receive a score below 80%.

Future Project Work**New Process Implementation**

A “go-live” date will be assigned and announced in a weekly staff newsletter no sooner than one week after the education module is uploaded to the unit’s closed Facebook page. Starting on that “go-live” date, the two electronic standing scales will be placed on the unit and the new process will be highlighted during daily interprofessional rounds. The new process will also be highlighted in the nightly huddles for the off-shift staff. This will ensure that the new process is hardwired and that staff practices stay consistent between shifts.

Post-implementation Assessment

After the new process has been utilized for a minimum of one month, post-implementation observational audits will be started by the CNL. Thirty admission weights and thirty daily weights will be the observation goal to help determine statistical significance. The same observational checklist tool (Appendix C) that was used for pre-implementation will be used for the post-implementation observations. Once the sixty observations are completed, the compliance data will be shared with the staff during a monthly staff meeting. The goal is a compliance percentage of 90% or higher. This would show that the new process implementation was successful. If the compliance percentage is less than 90%, remediation education will be included in a minimum of two consecutive weekly newsletters.

Sustainability

To ensure that the newly implemented process is sustained over time, monthly chart audits will be completed. To encourage stakeholder participation (Lennox, Maher, & Reed, 2018), the audits will be assigned to staff members on the Unit Based Committee (UBC). This is a voluntary committee that is focused on improving unit culture and practice. Chart audits will focus on documentation concerning the patient's BMAT/TUG level, the type of equipment used to weigh the patient (in-bed scale, standing scale), and whether continent or incontinent urine output was charted at the same time as, or just prior to, the charted weight. The UBC will report the chart audit results to the CNL as a compliance percentage and the CNL will be the owner of the cumulative data. The goal is to maintain 90% or greater compliance to show that the process is being sustained over time.

Ethical Considerations

Confidentiality was one of the primary ethical considerations for this project. Direct observation of CNA and RN care practices were necessary. Any personal identification for staff was not included on the measurement tool in order to preserve staff confidentiality. The focus of this project was not to penalize performance. On the contrary it helped identify processes that did not align with best evidence-based practice, educate the staff on best evidence-based practice, and helped to implement change that would enable the staff to provide their patients with the best care possible.

Discussion**Summary**

Key findings for the project, to the extent that it was able to be implemented, would be to highlight that contrary to what was identified in the literature, preliminary data did show that the

staff was diligent in removing excess bed linens and patient care equipment from the bed prior to obtaining the weight. Whether this preliminary data trend is reflected similarly and considered to be statistically significant will be proven with post-implementation observations. Looking to the future, this project has great potential to be beneficial when fully implemented. Strengths to highlight would be improved accuracy of patient weights, decreased risk of falls while obtaining those patient weights, and decreased incidence of thirty-day and ninety-day readmission rates for acute HF patients.

Interpretation

Whether there is a positive correlation between implementation of this project and increased accuracy of patient weights, decreased length of stay, decreased risk of thirty-day and ninety-day readmission, and decreased risk of falls remains to be seen. A review of literature did not reveal any other publications combining all of these elements into one project. There is a significant potential for positive impact on HF patients, in terms of improved quality of life due to health optimization, and for the hospital itself with an improved bottom line due to increased reimbursement for patient care provided. At this point the anticipated outcomes are enough that this project should be implemented on the unit. Also, if favorable, the results should be presented to the HF Steering Committee to determine whether the process should be implemented house wide. The benefits would outweigh the cost as the potential for increased reimbursement would vastly outweigh the cost of purchasing more scales for use on other units.

Limitations

This work has the potential to be generalizable in this facility. However, if looking to generalize it outside of this specific hospital, one would have to look at how the mobility of patients is assessed. Specific criteria would need to be identified using that hospital system's

mobility assessment tool to identify patients who can ambulate safely to obtain a standing weight without increasing their risk for falls.

The biggest factor that could be considered to limit internal validity is the fact that the staff knows that they are being observed. The risk is inherent for the Hawthorne Effect (Wu, et al., 2018) with staff observations and this in itself could change how they perform their tasks. However, the only other way to observe this process in a patient room would be to view it on a video monitor without the staff knowing that they are being observed, but that technology is not installed in the patient rooms. Efforts were made to try to limit the observation research bias, specifically with the admission weights, by instructing the staff that the data collector was observing the admission process, and not specifically there to observe how the patients were weighed.

Conclusion

The staff on this unit are highly engaged and motivated to provide the highest level of patient care. The unit's CNL was very engaged with the staff and has gained their trust by being straightforward, knowledgeable, and eager to help them with any questions or concerns they may have. The rollout of this project plan is developed and will be implemented.

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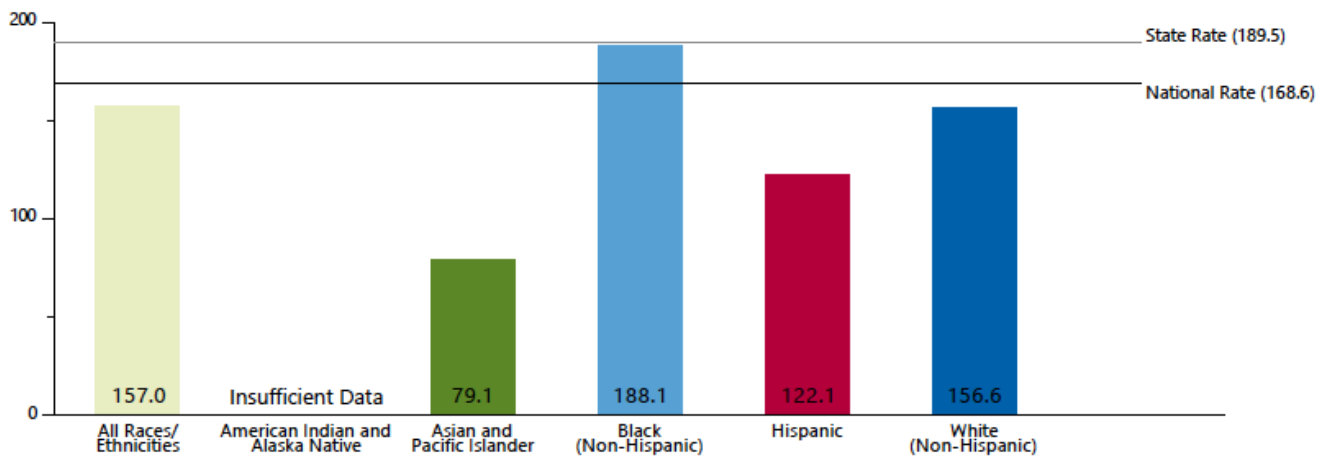
Appendix A

KENT COUNTY HEART FAILURE STATISTICS

County Profile for Kent, MI

CDC Interactive Atlas of Heart Disease and Stroke

Heart Failure Death Rate per 100,000 (any mention), 35+, All Races/Ethnicities, Both Genders, 2014-2016



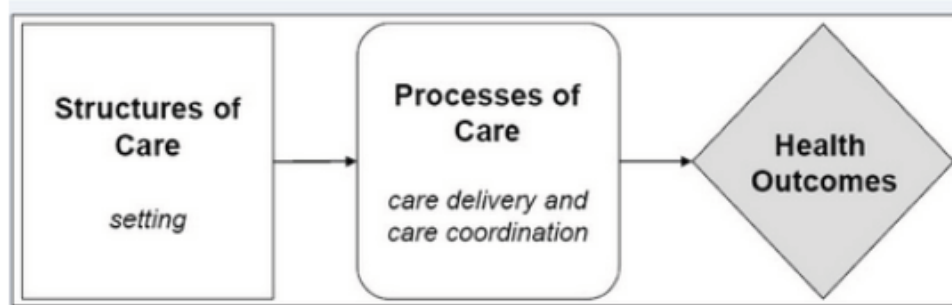
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion

Source: Interactive Atlas of Heart Disease and Stroke
www.cdc.gov/dhdsp/maps/atlas

Appendix B

QUALITY IMPROVEMENT MODEL

Donabedian Model



Current State:

- Cardiology group requesting process change
- Unit leadership buy-in
- Tool: in-bed scale
- Nursing staff

Proposed Intervention:

- Purchasing an electronic standing scale

Current State:

- Physicians placing daily weight orders
- Nursing staff identifying the order
- Nursing staff obtaining patient weight using in-bed scale
- Nursing staff charting the weight in the

Proposed Intervention:

- Standardized staff education on the proper way to obtain an accurate in-bed weight
- Check lists and audits to ensure competency and maintenance of the practice
- Structured BioMed maintenance of the in-bed scales
- Determining ambulation ability for standing scale weights based on mobility

Current State:

- Unit is lacking a clinical standard of care in obtaining daily weight for their heart failure patients

Proposed Intervention:

- Patients who can ambulate safely are weighed using an electronic standing scale
- Patients who are at too high of a risk for falls are weighed accurately using the in-bed scales
- Cardiologists manage fluid balances for their heart failure patients with confidence that the weights they are using for reference are accurate
- The unit will provide the highest standard of care possible for their heart failure patient population

Appendix C

HF Patient Weight: Observation Audit Tool

Date: _____

Time: _____

Admission:

Bed Scale Zeroed For New Patient: Y / N

Standard Bed Contents Verified: Y / N

Electronic Standing Scale Zeroed Prior To Obtaining Patient Weight: Y / N

Date: _____

Time: _____

Daily Weight: Before Breakfast Y / N

BMAT score 4 and/or Passed TUG test: Y / N

Patient Voided: Y / N

Minimum Clothing: Y / N

Electronic Standing Scale Zeroed: Y / N

BMAT less than 4: Y / N

Patient Voided/Brief Changed: Y / N





Foley Bag Drained: Y / N

Standard Bed Contents Verified: Y / N

Additional Bed Items : Y / N

Appendix D



Bedside Mobility Assessment Tool (BMAT)

<p>Sit and Shake Assessment (trunk strength and seated balance)</p>  <p>Instructions: (Obtain necessary assistive device, cane or walker.)</p> <ol style="list-style-type: none"> 1. From a semi-reclined position, ask patient to sit at the side of the bed. May use bed rail. 2. Note patient's ability to sit for > 2 minutes without caregiver assistance. 3. Ask patient to reach out and grab your hand and shake making sure patient reaches across midline. 	<p>FAIL →</p> <p>PASS →</p>	<p>Mobility Level 1 – Bedfast/Dependent</p> <ul style="list-style-type: none"> • Initiate falls bundle, if indicated • ICU: consider PT/OT consult for RASS score -2 to +2 • Use equipment for repositioning in bed • Use chair position in bed or sit in chair for meals and/or ADLs • Use equipment for transfers OOB • Initiate Level 1 ROM exercises* <hr/> <p>Continue to Stretch and Point Assessment</p>
<p>Stretch and Point Assessment (lower extremity strength and stability)</p>  <p>Instructions:</p> <ol style="list-style-type: none"> 1. With patient seated, have patient place both feet on floor with knees no higher than hips. 2. Ask patient to stretch one leg and straighten knee, then bend the ankle/flex and point toes. If appropriate, repeat with other leg. May test with only one leg (e.g. ankle cast, stroke). 	<p>FAIL →</p> <p>PASS →</p>	<p>Mobility Level 2 - Chairfast</p> <ul style="list-style-type: none"> • Initiate falls bundle • Use equipment for repositioning in bed • Sit on edge of the bed or chair for meals and/or ADLs • Use equipment for transfers OOB • Initiate Level 2 ROM exercises* <hr/> <p>Continue to Stand Assessment</p>
<p>Stand Assessment (lower extremity strength for standing)</p>  <p>Instructions: (Consider patient's cognitive ability, orientation, & presence of delirium.)</p> <ol style="list-style-type: none"> 1. Ask patient to elevate off the bed or chair (seated to standing). May use assistive device (cane, bedrail). 2. Patient should be able to raise buttocks off bed and hold for count of 5. May repeat once. May test with only one leg (e.g. ankle cast, stroke). 	<p>FAIL →</p> <p>PASS →</p>	<p>Mobility Level 3 – Stand</p> <ul style="list-style-type: none"> • Initiate falls bundle • Sit on the edge of bed or chair for meals and/or ADLs • Use equipment for transfers OOB and standing • Initiate Level 3 ROM exercises* <hr/> <p>Continue to Walk Assessment</p>
<p>Walk Assessment (standing balance and gait)</p>  <p>Instructions: (Use assistive device if needed.)</p> <ol style="list-style-type: none"> 1. Ask patient to march in place at bedside. 2. Then ask patient to advance step and return each foot. 3. Assess patient's balance, stability, and safety awareness. 	<p>FAIL →</p> <p>PASS →</p>	<p>Mobility Level 3 – Stand Implement Level 3 activities as above</p> <hr/> <p>Mobility Level 4 – Walk</p> <ul style="list-style-type: none"> • Initiate falls bundle, if indicated • Walking in room and in hallway as able • Use assistive devices as needed • Encourage out of bed for meals and/or ADLs • Initiate Level 4 ROM exercises*

<https://www.safety.duke.edu/sites/default/files/BMAT-Adult.pdf>

Appendix E

Timed Up and Go Test (TUG)

ASSESSMENT	
<h2 style="color: #4CAF50; margin: 0;">Timed Up & Go (TUG)</h2> <p>Purpose: To assess mobility</p> <p>Equipment: A stopwatch</p> <p>Directions: Patients wear their regular footwear and can use a walking aid, if needed. Begin by having the patient sit back in a standard arm chair and identify a line 3 meters, or 10 feet away, on the floor.</p> <p>① Instruct the patient:</p> <div style="background-color: #e8f5e9; padding: 5px; border: 1px solid #ccc;"> <p>When I say "Go," I want you to:</p> <ol style="list-style-type: none"> Stand up from the chair. Walk to the line on the floor at your normal pace. Turn. Walk back to the chair at your normal pace. Sit down again. </div> <p>② On the word "Go," begin timing.</p> <p>③ Stop timing after patient sits back down.</p> <p>④ Record time.</p> <div style="background-color: #e8f5e9; padding: 5px; border: 1px solid #ccc; margin-top: 10px;"> <p>Time in Seconds: _____</p> </div> <p style="font-size: small; margin-top: 10px;">An older adult who takes a12 seconds to complete the TUG is at risk for falling.</p> <p style="font-size: x-small; margin-top: 10px;">CDC's STEADI tools and resources can help you screen, assess, and intervene to reduce your patient's fall risk. For more information, visit www.cdc.gov/steady</p>	<p>Patient _____</p> <p>Date _____</p> <p>Time _____ ☐ AM ☐ PM</p> <hr/> <p>OBSERVATIONS</p> <p>Observe the patient's postural stability, gait, stride length, and sway.</p> <p>Check all that apply:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Slow tentative pace <input type="checkbox"/> Loss of balance <input type="checkbox"/> Short strides <input type="checkbox"/> Little or no arm swing <input type="checkbox"/> Steadying self on walls <input type="checkbox"/> Shuffling <input type="checkbox"/> En bloc turning <input type="checkbox"/> Not using assistive device properly <p style="font-size: x-small; margin-top: 10px;">These changes may signify neurological problems that require further evaluation.</p>
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: left;">  <p style="font-size: x-small; margin: 0;">Centers for Disease Control and Prevention National Center for Injury Prevention and Control</p> </div> <div style="text-align: center; font-size: x-small;">2017</div> <div style="text-align: right;">  <p style="font-size: x-small; margin: 0;">Stopping Elderly Accidents, Deaths & Injuries</p> </div> </div>	

https://www.cdc.gov/steady/pdf/TUG_Test-print.pdf

Appendix F

Post-education Quiz Questions

1. Which patients are appropriate for ambulation and use of an electronic standing scale?

a. BMAT Level 3 and Level 4

b. BMAT Level 1 and Level 2

*BMAT= Bedside Mobility Assessment Tool

2. In-bed scales must be zeroed prior to weighing new patients being admitted to a room and electronic standing scales must be zeroed prior to obtaining patient weights every time they are Used.

a. True

b. False

3. These items must be removed from a patient's bed when obtaining their weight...

a. Extra linens (sheets, pillows, blankets)

b. Patient belongings

c. Medical Equipment

d. All of the Above

4. Patients should be weighed:

a. Before Breakfast

b. After the First Morning Void

c. Both A and B

***Correct answers are in **BOLD** lettering