

Design and Implementation of Student Pharmacist-Driven Assessment of Heart Failure Regimen Appropriateness in Skilled Nursing Facility Residents with Heart Failure: A Quality Assurance Project

by Judy Zheng, 2024 PharmD Candidate, Natalie McCourt, 2024 PharmD Candidate, Mara Kieser, MS, RPh, BCGP



Abstract

Objective: To provide a framework and evaluate the impact of student pharmacists in optimizing heart failure (HF) regimens in hospitalized patients discharged to skilled nursing facilities (SNF) through targeted disease state patient profile reviews.

Methods: Two student pharmacists performed patient profile reviews of residents with HF to assess for guideline-directed medical therapy (GDMT) at the recommended doses and identify medications that may worsen HF. Findings and recommendations were presented to a pharmacist, using evidence-based guidelines, who later presented them to the SNF providers during weekly huddles.

Results: Thirty patient profiles with a confirmed HF diagnosis (21 HFpEF, 6 HFrEF, 3 unclassified) were reviewed, and 21 were identified to be on GDMT with 3 patients at target doses. Of the 30 patients, 10 (33%) warranted no changes while 20 (67%) tallied 23 total recommendations. These included 6 suggestions to discontinue medications, 4 to decrease dose, 4 to increase dose, 8 to change regimen, and 1 to initiate a new GDMT medication. The most common medications that may worsen HF (5 or more occurrences) included albuterol (11), furosemide (11), ondansetron (8), pantoprazole (6), sertraline (5), and trazodone (5). Other less common medications were amiodarone, metformin, tamsulosin, and citalopram.

Conclusion: Student pharmacists completed patient chart reviews to optimize HF regimens. These assessments demonstrated a positive outcome of incorporating student pharmacists as pharmacy extenders and preventing HF readmission and hospitalization rates. Additionally, this quality assurance project adds to the growing body of evidence for student-led targeted disease state interventions and provides a framework for future work, particularly in SNFs.

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Heart failure (HF) is a leading cause of morbidity, mortality, and hospitalization in adults over the age of 65.¹

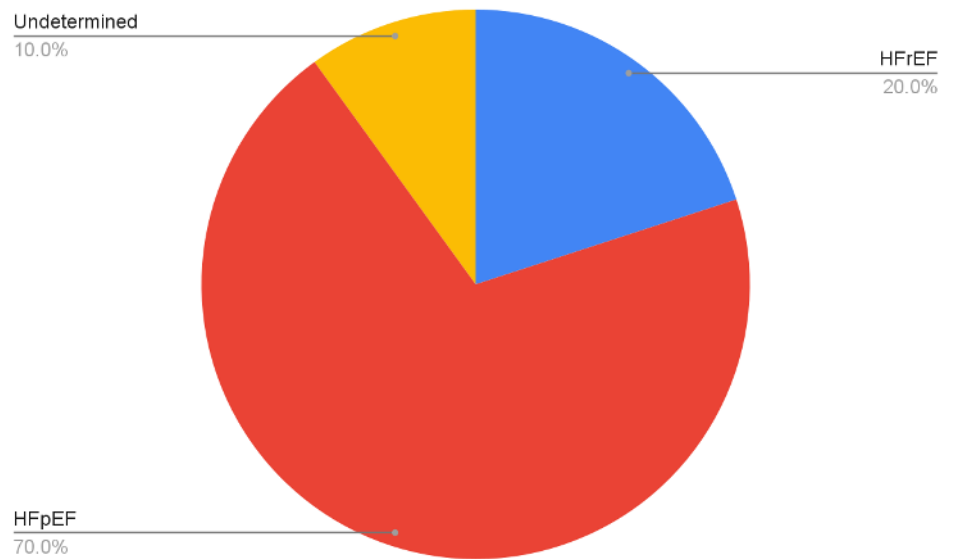
The disease is characterized by structural and/or functional abnormalities of the cardiac hemodynamics, thereby impairing the heart's ability to sufficiently meet the body's oxygen demand. The disease state is predominantly divided into two classifications based on ejection fraction (EF), the percentage of blood volume pumped out of the heart to the rest of the body per heartbeat. These classifications include heart failure with reduced ejection fraction (HFrEF), in which the heart ejects 40% or less blood volume present in the left ventricle, or heart failure with preserved ejection fraction (HFpEF), in which the heart ejects 50% or more blood volume present in the left ventricle.² HFrEF and HFpEF determine which guideline-directed medical therapy (GDMT) pathway is utilized to assess gaps in HF medication management.

HF patients commonly present with cardinal symptoms of fatigue, dyspnea, and reduced exercise tolerance, with incidence being highest among older adults, a population often burdened with concomitant comorbidities, polypharmacy, and age-related pharmacokinetic and pharmacodynamic changes.¹ These, among other patient-specific factors, such as declining cognitive function, insurance coverage, and socioeconomic status, pose major and variable challenges to HF management. HF is a common cause of hospitalization in the United States. One strategy adopted by health systems to reduce the length of hospital stay and healthcare costs is to discharge older, frail adults to skilled nursing facilities (SNF) for recovery.³ However, these patients, as well as long-term residents of SNFs, face substantial risks of adverse events. This includes increased mortality and hospital readmission rates, with SNF 30-day rehospitalization rates due to HF in 27-43% of HF patients.^{1,3-4}

Current nursing home quality measures related to HF include the percentage of short-stay residents who are hospitalized after admission and percent of residents who make improvements in overall function. In addition, long-term quality measures consist of the number of hospitalizations

FIGURE 1. Heart Failure Diagnosis

Proportion of residents with confirmed heart failure and classification



HFrEF, heart failure with reduced ejection fraction; HFpEF, heart failure with preserved ejection fraction

per 1,000 long-stay residents, percent of residents experiencing one or more falls, and percent of residents with increased need for help with activities of daily living.⁵ Notably, in the early month of the second quarter of 2023, the Center for Medicare and Medicaid Services proposed changes to the SNF payment rates for the fiscal year 2024. These proposals support the SNF Quality Reporting Program and the SNF Value-Based Purchasing Program.⁶ As a nation, there has been a major shift in payment structures that prioritizes quality and outcome of care and, thus, there needs to be a change in the way health care providers deliver care. These modifications are essential for health systems to meet new reimbursement criteria and ensure adequate compensation to continue serving patients and their families.

Of the various HF management strategies, conducting targeted disease state interventions with the goal of optimizing medication regimen for safety and efficacy is an integral component of pharmacy services. However, health systems are often limited in their ability to perform a comprehensive review of patient charts due to time, resources, and cost constraints. These limitations are further amplified post-COVID-19 pandemic due to high staff turnover and employee burnout rates. In an effort to combat these issues as well as enhance quality of care and cost efficiency,

an interdisciplinary team leveraging student pharmacists was formed to develop a streamlined process for assessing medication therapy management for SNF residents. To date, there is no literature evaluating the impact of student-driven targeted interventions on HF residents in SNF.

The primary objective of the quality assurance project was to incorporate student pharmacists in the development and implementation of a framework assessing the appropriateness of HF medication regimens for hospitalized patients discharged to SNFs. Student pharmacists were tasked with reviewing HF patient charts weekly for GDMT at recommended doses as well as medications that may worsen HF, thus making appropriate recommendations using evidence-based guidelines.

Methods

A team of one consultant pharmacist/faculty member and two second-year student pharmacists from the University of Wisconsin-Madison School of Pharmacy collaborated with the Capitol Lakes Health Center (CLHC) medical director to develop a workflow for HF medication management for residents at the CLHC facility. The site is a 52-bed SNF consisting of rehabilitation and residential floors that provide care for patients with a wide range of diagnoses, including infections, HF, hypertension, diabetes, dementia, and falls.

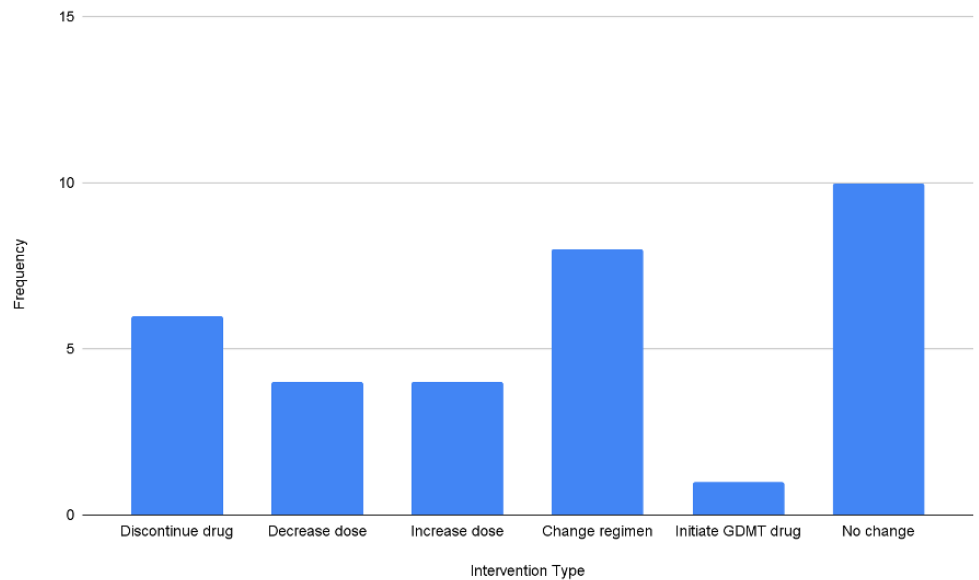
During the onboarding process, the second-year student pharmacists with no prior experience or knowledge of this clinical disease state underwent a detailed review of HF, including the pathophysiology, classifications, symptoms, risk factors, and guidelines. In addition, the learners were granted access to the SNF's electronic health records (EHR) and an electronic Box folder where all chart review documents were stored. To ensure compliance with the Health Insurance Portability and Accountability Act, all protected health information on the chart reviews was de-identified. For example, only patient initials were recorded, as opposed to their full name. Moreover, an initial chart review template was provided to the students, which was revised throughout the duration of the project to only collect pertinent patient health information. Electronic access to both the EHR and Box folder enabled the students to independently review patient profiles remotely. However, a weekly in-person meeting was held on-site at the SNF to review recommendations and rationales.

The original inclusion criteria were admitted HF patients on diuretics with an HFrEF diagnosis, which later expanded to also include those with HFpEF. Patient profiles were assessed for GDMT regimens using the 2021 Optimization of Heart Failure Treatment: Expert Consensus Decision Pathway guideline, which was replaced midway by the 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure update to keep current with the most recent clinical evidence.^{2,7} Additionally, medications that may worsen HF were identified using the 2016 Scientific Statement: Drugs That May Cause or Exacerbate Heart Failure.⁸

Each week, the consultant pharmacist identified two HF patients for review and notified the student pharmacists of their assigned patient. The student learners then individually conducted patient profile reviews using chart review documentation developed and revised by the team, as well as EHRs to survey for the primary objectives and make appropriate recommendations to optimize the resident's HF therapy. This was due prior to the weekly interdisciplinary patient review, also known as a "huddle." Students began by collecting pertinent patient information from the EHR by

FIGURE 2. Frequency of Interventions

Frequency of types of interventions from 30 patient chart reviews



sifting through the records and documents, including discharge summaries. After data collection, students reviewed the information and made appropriate therapy recommendations, such as discontinuing medications, altering doses, switching regimens, and initiating a GDMT drug. These recommendations were then documented in a provider presentation format (discontinue, taper, start, monitor, etc.) prior to meeting with the consultant pharmacist.

After finalizing documentation, the student pharmacists and pharmacist reviewed the patient charts together and discussed recommendations including rationales. Finally, the pharmacist presented the recommendations to nurse practitioners and providers of the facility during Friday afternoon huddles at the SNF. Upon follow-up, the pharmacist shared treatment decisions made during the previous week's huddle with the learners.

Throughout the course of the project, the pharmacist tracked the assessments and recommendations made by the student learners. This included tallying the number of patients on GDMT, on a recommended GDMT dose, the type of HF, whether the patient was on medications that worsened their HF, and the name of the medication that worsened their HF. The information was recorded on an Excel spreadsheet that was updated weekly. The primary objective implemented by the student learners included utilizing a framework developed

to assess information, such as whether the HF patients were on GDMT, whether the GDMT was at recommended doses, and whether the patient was on medications that may worsen their HF.

Results

Thirty (8 males, 22 females) patient chart reviews were completed between February 2022 and June 2022. The average resident age was 85 years old with a mean body mass index of 25.8 kg/m². Among the HF diagnosis, 21 were HFpEF and 6 were HFrEF with 3 undocumented EF values (Figure 1). The student learners identified that 21 patients were on at least one GDMT agent with 3 patients at target doses. Of those patients, 11 were on an angiotensin converting enzyme inhibitor (ACEi) or an angiotensin II receptor blocker (ARB); 20 were on beta blockers with metoprolol succinate and carvedilol being most common; 9 were on spironolactone; 2 were on empagliflozin; and 27 were taking diuretics, mostly furosemide with 2 prescribed torsemide.

Out of the 30 chart reviews, 10 (33%) warranted no change in recommendations at the time of assessment, while the remaining 20 (67%) tallied a total of 23 recommendations provided by the student learners. Recommendations included 6 suggestions to discontinue medications, 4 to decrease the dose, 4 to increase the dose, 8 to change the regimen, and 1 to initiate a new GDMT medication (Figure

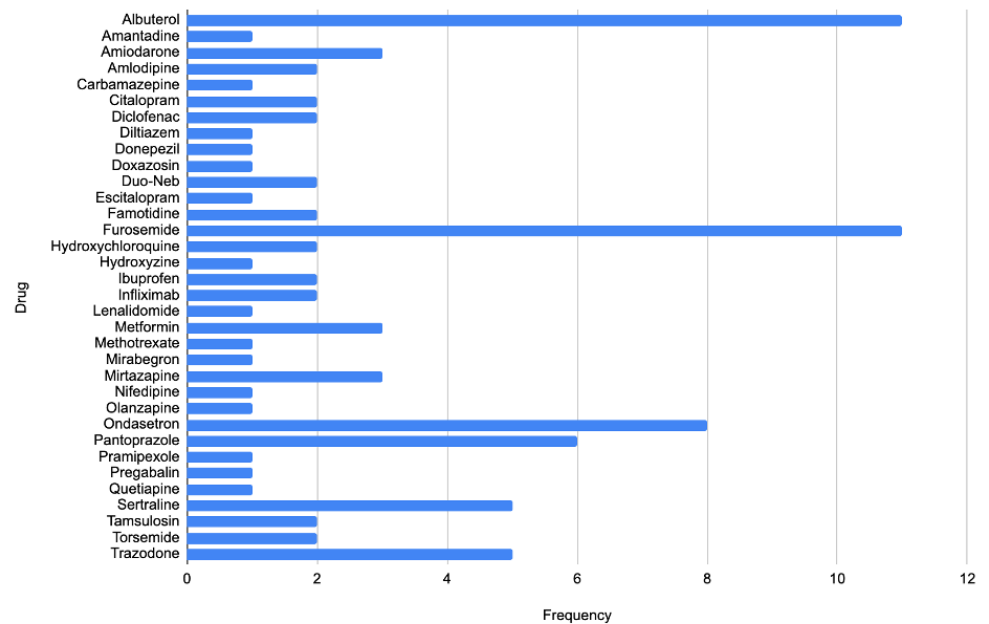
2). The most common medications observed that may worsen HF, defined as 5 or more occurrences, included albuterol (11), furosemide (11), ondansetron (8), pantoprazole (6), sertraline (5), and trazodone (5). Examples of other less common medications were amiodarone, metformin, tamsulosin, and citalopram, among others (Figure 3).

Discussion

The primary purpose of this quality assurance project was to develop a framework for assessing whether HF patients at a SNF were on GDMT at the recommended doses, as well as whether they were prescribed medications that may potentially worsen their HF. The template utilized to assess HF regimen appropriateness initially entailed tallying the total number of patients based on whether those patients were or were not on GDMT, were or were not at the recommended doses, and were or were not on medications that worsened their HF. As the project progressed and the second-year student pharmacists gained in-depth knowledge of the disease state, the framework expanded to include medication recommendations made by the student pharmacists. These recommendations included initiation of medication, including starting doses, discontinuing a medication with a taper schedule, if necessary, as well as supportive care medication alternatives. At the beginning of the project, these frameworks were due one week prior to the weekly huddles to discuss the care of each SNF resident. Due to quick patient turnover and short time to discharge, this framework was transitioned to be completed one day prior to these meetings.

After assessing the appropriateness of medication regimens in HF patients in a SNF over five months, the majority of the patient population presented with preserved ejection fraction compared to reduced ejection fraction, with the remaining population being undetermined. When assessing the frequency of use of GDMT drug classes, diuretics were most commonly prescribed followed by beta blockers, as well as ACEis and ARBs. Achieving target doses of HF GDMT was often limited due to patient comorbidities, fragility, and vulnerability to adverse effects such as hypotension, bradycardia, and worsening

FIGURE 3. Frequency of Drugs that May Worsen Heart Failure⁸
Prevalence and frequency of drugs used by residents that may worsen heart failure



kidney function. When monitoring medications that may worsen HF, literature is limited to medications that may worsen heart contractility for patients with HFrEF. The pathophysiology of these medications was defined as whether they prolong the time it takes for the heart's electrical system to recharge between heartbeats. The most frequently prescribed medications that worsened HFrEF included furosemide, albuterol, and ondansetron. The quality assurance project duration was concluded after five months due to the declining census of the CLHC, which limited the number of HF patients for review.

This project highlights the ability of student pharmacists to serve as extensions of pharmacy services. Previous studies have defined the role of student pharmacists in HF management, placing emphasis on the extent of knowledge they possess around pathophysiology and GDMT for HF. One retrospective study investigated the impact of student pharmacist-driven phone calls to HF patients post-hospital discharge to assess 30- and 90-day hospital readmission rates.⁹ With the utilization of student pharmacists on their Advanced Pharmacy Practice Experiences for HF patient monitoring, a statistically significant decrease in hospital readmission rates was observed for both 30-day (-12.98%, $p = 0.006$) and 90-day (-15.27%, $p = 0.007$) readmission. Another publication evaluated

the impact of home-based visits with HF patients that were conducted by a nurse and pharmacist to assess HF medication regimen appropriateness within one week of hospital discharge.¹⁰ The study focused on comparison of in-home visits versus usual care to assess the intervention's impact on the rate of hospital readmission, death, and the cost of hospital readmission. The HF patients that received home-based visits had fewer unplanned readmissions (36 vs. 63, $p = 0.03$) and reduced mean cost of hospital-based care (\$3,200 [95%CI \$1,800-\$4,600] vs. \$5,400 [95%CI \$3,200-\$6,800]).

Both studies show that pharmacy involvement, including student pharmacists, provides valuable knowledge and skills that contribute to improving health outcomes and reducing healthcare costs. Our intervention further highlights that student pharmacists in the second year of their pharmacy curriculum are also capable of providing comprehensive HF medication reviews and establishing recommendations to optimize HF regimens. Additionally, this project focuses on the long-term care facility population, which currently lacks literature that utilizes interventions similar to this framework. Upon review of the results at the conclusion of the project, it was found that zero of the HF patients receiving this intervention were readmitted to a SNF or were rehospitalized for any cause. This further translates to a potential reduction

in healthcare costs for both the HF patients and the facilities.

Limitations

One limitation of this evaluation is the time lag between patient discharge and the scheduled weekly huddles at the SNF. Despite prompt completion of weekly patient chart reviews, resident discharge can be unpredictable in nature. As a result, recommendations lose feasibility for implementation after the patient leaves the facility. Although there were few unsuccessful attempts made to follow up with patient providers, efforts were shortly terminated.

Another limitation is the change in inclusion criteria to better adapt to HF diagnoses observed at the SNF. Shortly after piloting the project, it became apparent that HFpEF was the more common HF diagnosis; however, guidelines and resources were selected and tailored to those with HFrEF. With further research, it was evident that there lacked available clinical evidence and recommendations specific for HFpEF. Thus, the team agreed to use the best available alternative and adopted the HFrEF guidelines and resources for the HFpEF patients. Fortunately, the HF management guidelines were updated midway in April of 2022 and included evidence-based recommendations for those with HFpEF. The team quickly reacted and adapted to the most recent report. However, the resource used to screen for medications that may worsen HF continued to be applied throughout the project duration despite specifications for the HFrEF patient population.

Other limitations include the consistently low census at the SNF and the few patients admitted with HF, and the high cost of GDMT medications, such as valsartan/sacubitril and the SGLT2 inhibitors drug class.

Conclusion

Student-driven patient chart reviews for optimizing HF regimens demonstrated a positive outcome of incorporating student pharmacists as pharmacy extenders. Assessments were completed by identifying target doses of GDMT and medications that may worsen HF and subsequent evaluation of patient health information to make appropriate recommendations using

evidence-based guidelines. This quality assurance project adds to the growing body of evidence that supports student-led targeted disease state intervention and provides a framework for future work, particularly in SNFs.

Judy Zheng and Natalie McCourt are 2024 Doctor of Pharmacy Candidates at the University of Wisconsin-Madison School of Pharmacy in Madison, WI. Mara Kieser is a Faculty member at the University of Wisconsin-Madison School of Pharmacy and a Consultant Pharmacist at the Capitol Lakes Health Center in Madison, WI.

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Corresponding Author: Mara Kieser - mara.kieser@wisc.edu.

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