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Reducing 30-Day Readmission Rates For Copd Patients: A Care Standardization & Quality Improvement Project

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REDUCING 30-DAY READMISSION RATES FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS: A CARE STANDARDIZATION & QUALITY IMPROVEMENT PROJECT

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Signed:_____

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Abstract

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory lung disease that affects millions of Americans and accounts for close to 700,000 hospitalizations per year. On average, about 20% of patients hospitalized for acute exacerbation of COPD are readmitted to the hospital within 30 days of discharge. The quality of care delivered to COPD patients is often suboptimal and fragmented, contributing to unfavorable patient outcomes, and high rates of readmissions. The purpose of this DNP project was to reduce 30-day readmissions and improve quality of care by developing and implementing a standardized Discharge Care Bundle for COPD patients in the inpatient setting at an urban academic medical center. The COPD Discharge Care Bundle included the following interventions: pulmonary consultation, smoking cessation evaluation, medication reconciliation, spirometry (if not completed within the last year), patient education, and scheduling of a pulmonary follow-up appointment within 14 days of discharge. During the 3-month implementation period, a total of 30 patients were enrolled in the COPD Discharge Care Bundle program. Thirty-day readmissions data were collected for baseline and project timeframes. The readmission rate decreased from 45.5% for the baseline period to 13.3% post-implementation (p=0.01340). This DNP project provides a robust care standardization process that healthcare organizations can adopt and leverage to improve their COPD performance. An opportunity exists to promote best-practice, equitable care, influence clinical behavior, and accelerate the development and implementation of quality improvement efforts by expanding the inclusion of standardized COPD-related measures in all payer pay-for-performance models.

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Part 1

Reducing 30-Day Readmission Rates for COPD Patients: A Care Standardization & Quality Improvement Project

The National Collaborating Centre for Chronic Conditions (2004) characterizes COPD as a respiratory syndrome defined by “progressive, partially reversible airway obstruction and lung hyperinflation”. Clinicians often use the term ‘COPD’ to describe the conditions under this syndrome, including chronic bronchitis and emphysema, which result in a significant decline in lung function and quality of life. This disease affects over 12 million adults in the United States, and is responsible for more than 7 million emergency department visits (Hamadi et al., 2020). This chronic condition causes almost 700,000 hospitalizations per year (Mannino & Thomashow, 2015). On average, about 20% of patients hospitalized for acute exacerbation of COPD are readmitted to the hospital within 30 days of discharge. While the financial burden associated with COPD 30-day readmissions accounts for over $15 billion annually (Press et al., 2018), patients who are readmitted following a COPD hospitalization tend to have poorer outcomes compared to patients who are not readmitted, and are also at higher risk for mortality (Almagro et al., 2012). According to Centers for Medicare & Medicaid Services (CMS; 2014), hospital readmissions are costly and potentially preventable. Over the past 10 years, federal agencies and commercial payers have created targeted programs with the goal of reducing COPD readmissions. In 2012, CMS launched HRRP, aimed at reducing 30-day readmissions for specific common, arduous conditions. COPD became a target condition under the HRRP program starting in 2014, making hospitals with excessive readmissions susceptible to substantial financial risk and loss. Many commercial payers adopted a similar focus on COPD readmissions with associated payment penalties, only adding to an already burning platform for most health systems (Ferro, 2018).

Problem Statement

COPD is the third leading cause of hospital readmissions in the United States, accounting for over $15 billion annually in healthcare costs (Mannino and Thomashow, 2015; Press et al., 2018). According to the American Thoracic Society, the quality of care delivered to COPD patients is often suboptimal and fragmented, contributing to unfavorable patient outcomes and high rates of readmissions. A significant opportunity to reduce COPD 30-day readmission rates was identified at the hospital project site. An in-depth review of internal readmission rates for CMS (MS) - Diagnosis Related Groups (DRG) 190, 191, 192 - Chronic Obstructive Pulmonary Disease revealed readmission rates that are trending upward, exceeding the national rate of 19.8% in the last three years. Internal COPD readmission rates, which includes only readmissions to same hospital, were 16.8% in 2019, 20.3% in 2020, and 23.1% in 2021. It is expected that the overall COPD readmission rate may increase once readmissions to other hospitals is added to existing data, potentially exposing the hospital to financial penalties under the HRRP program. Clinical variability and unmet patient needs are modifiable risks for poor patient outcomes and 30-day readmissions for patients with comorbid conditions (Zafar et al., 2017). Healthcare organizations can optimize their performance by standardizing the care to minimize variation, improve the quality and efficiency of care, and provide ongoing performance measures that promote optimal outcomes and prevention of avoidable 30-day readmissions. This DNP project developed and implemented a standardized Discharge Care Bundle for COPD patients in the inpatient setting at an urban academic medical center. The overall goal of this quality improvement project was to reduce 30-day readmissions and improve quality of care.

Significance

COPD is associated with significant economic as well as human costs in the United States, and the magnitude and prevalence of these is expected to increase over the next years (Rotter et al., 2017). According to the 2020 Global Initiative for Chronic Obstructive Lung Disease (GOLD©) Report, globally there are approximately 3 million deaths per year that are

attributable to COPD. Due to the high increase of smoking in many countries, as well as aging populations, the prevalence of COPD is forecasted to rise over the next 40 years, with over 5.4 million deaths projected annually by 2060 from COPD. Best practice guidelines, such as GOLD©, have been developed for COPD to promote optimal treatment and minimize these costs. However, the guidelines alone rarely result in meaningful change. According to Dombrowski et al. (2016) despite the considerable number of resources dedicated to clinical research, there has been very little attention paid to ensure that the findings from various research efforts are implemented in routine practice. Although promising, literature reports that the creation of guidelines alone is not sufficient to drive change in clinical practice (Rotter et al., 2017). One approach to integrating evidence-based medicine guidelines into practice is through care standardization efforts. Care standardization is based on high-quality, evidence-based medicine, and it can take many different forms, such as admission order sets or care bundles. According to the Oxford Academic Health Science Network, care bundles have the ability to translate best practices to members of the interdisciplinary care team by outlining the critical steps in care and adapting these to situational context and practices. They also suggest that applying a package of measures – a care bundle – can promote favorable patient outcomes and potentially reduce readmission rates.

Review of Literature

Search Strategy

A robust literature search was conducted using the PubMed electronic database. The Cochrane Library was used secondarily to aid in identifying additional articles as relevant themes emerged. Search terms included COPD Healthcare Costs, COPD Readmissions Reduction, COPD Best Practices, COPD Discharge Care Bundle, COPD Care Standardization, Transitions of Care, and Implementation Science. The criteria for inclusion were articles written in English. Exclusion criteria were articles with studies that recruited subjects outside healthcare. The initial search returned 142 records. After filtering to only include articles within

last 15 years of publication, a total of 118 articles remained. Following duplicate removal, 105 articles were screened for title and abstract, followed by full text review on 81 articles. A total of 38 articles were included in the review of literature. See Appendix A for the PRISMA flow diagram.

Synthesis of Literature

Study designs included systematic reviews, randomized controlled trials (RCTs), prospective observational studies and cluster randomized design studies. Levels of evidence ranged from level I to III (Joanna Briggs Institute, 2013). The literature search results presented within four overarching domains of interest: financial impact of COPD 30-day readmissions, critical drivers for COPD readmissions, care standardization through the use of Discharge Care Bundles, and effectiveness of Discharge Care Bundles in reducing 30-day readmission rates. The articles introduced various frameworks to achieve care standardization and highlighted some of the initial results on reducing 30-day readmissions using care bundles for COPD patients. A potential gap was identified in the literature search, as few articles demonstrated large scale readmission reduction results. Strengths of the literature review included independent literature selection, inclusion of risk for bias assessments and use of GRADE to assess quality of evidence. A limitation was identified as quality of evidence varied within the literature review.

Literature Findings

Financial Impact of COPD 30-Day Readmissions

COPD accounts for $50 billion in healthcare costs annually, with hospitalizations for acute exacerbations of COPD being responsible for 70% of the overall COPD-related healthcare costs (Mannino and Thomashow, 2015; Press et al., 2018; Shaw et al., 2020). Thirty-day readmissions for COPD patients represent a significant portion of healthcare expense and account for over $15 billion annually (Mannino and Thomashow, 2015; Press et al., 2018). Shah et al. (2015) reviewed COPD readmission drivers in 7 states and found that recurrent COPD

exacerbation accounted for only 27.6% of readmissions, while the remainder were associated with other factors, such as dual eligibility (patients enrolled in both Medicare and Medicaid), a longer index hospital stay and more comorbidities.

Patients on public insurance are at higher risk of hospital readmission, underscoring the impact of social factors on health outcomes (Shah et al., 2015; Lin et al., 2020). For example, Shah et al. (2015) found that patients with dual eligibility were more likely to be readmitted than those patients with any other payer. Another factor affecting readmissions is severity of the condition. Press et al. (2018) found that patients with more severe COPD, typically marked by high symptomology, had increased utilization of healthcare resources such as outpatient and emergency room visits, and multiple inpatient hospitalizations, often within 30-days of index discharge.

Comorbidities increase overall healthcare utilization, and the costs associated with the care provided (Press et al., 2018; Schwab et al., 2017; Smith & Wrobel, 2014). Up to 98% of COPD patients were found to have at least one comorbid condition and more than 50% have four or more comorbidities adding significant burden and costs to COPD healthcare spending (Schwab et al., 2017). COPD patients with underlying comorbid conditions, such as congestive heart failure, acute myocardial infarction, sleep apnea, anxiety, and osteoporosis were associated with higher 30-day readmission rate and COPD-related costs (mean ratio range: 1.08–1.67, $P<0.0001$) (Press et al., 2018; Schwab et al. 2017). COPD patients with multiple comorbidities need to be identified early in their hospital stay, so that the appropriate resources can be mobilized prior to discharge.

Critical Drivers of COPD Readmissions

Comorbid conditions, such as congestive heart failure, hypertension and diabetes not only increase the overall healthcare costs, but are also critical drivers for COPD 30-day readmissions (Shah et al., 2015). The top comorbidities that have been found to significantly increase 30-day readmission rates in the COPD population are hypertension, diabetes, fluid and

electrolyte imbalances, and congestive heart failure (Zhang, et al., 2022; Buhr et al., 2019). Effectively and proactively managing comorbidities is essential for reducing COPD 30-day readmissions.

Suboptimal discharge medication reconciliation is associated with increased 30-day readmission rates (Uitvlugt et al, 2021; Polinski et al., 2016; Dalleur et al., 2021; Pellegrin et al., 2017). Thirty-day readmissions related to medication reconciliation are often preventable (Uitvlugt et al, 2021; Polinksi et al., 2016; Pellegrin et al., 2017). Pellegrin et al. (2017) found that 26% of 401 readmissions reviewed were related to medication issues, such as inadequate dosing or patient non-adherence to medication, and deemed potentially avoidable. Medication reconciliation ensures that the treatment plan a patient receives is appropriate, comprehensive and addresses any comorbidities. Discharge medication reconciliation ensures omissions, duplications, or drug interactions are avoided (Rose, 2021; Ziaeian et al., 2012). Medication reconciliation helps prevent complications and has been shown to be effective in reducing emergency room visits (Christensen & Lundh, 2013; Ceschi et al., 2021). In addition to medication reconciliation, post-discharge follow-up with pulmonary physician within 14 days of discharge can help identify medication-related complications early and mitigate growing issues, thus preventing avoidable readmissions (Health Quality Ontario, 2017).

COPD patients on public insurance ages 40-64 are more likely to be readmitted within 30-days of index discharge than patients 65 and older (Press et al., 2018; Simmering et al., 2016). Payer status has a direct effect on the readmission risk: while younger patients on public insurance are most likely to be readmitted, COPD patients within the same age group on private insurance have the lowest readmission rates. Furthermore, COPD patients under 65 who receive public insurance tend to have higher disease severity and progression than patients 65 and older who may have milder forms of COPD and a slower rate of disease progression (Simmering et al., 2016). Identifying COPD patients under 65 who receive public insurance early in the admission process to ensure prompt pulmonary consultation and treatment management

may be an effective way to address a more progressive disease state, and to ensure that any additional support patients may need is identified and addressed prior to discharge (Steenson et al., 2018).

Poor or inconsistent patient education is a common driver of 30-day readmissions for COPD patients (Jennings et al., 2015; Shorofsky et al., 2015; Zafar et al., 2017). Patients are often unclear about the various inhaler types and how to properly use them (Zafar et al. 2017). Moreover, patients are unaware or unable to identify early signs of disease exacerbation and the action plan they should use following discharge from the hospital (Shorofsky et al., 2015). Therefore, robust patient education that focuses on the patient's understanding of the prescribed medications, inhaler technique, and COPD action plan could improve patient outcomes, including 30-day readmission rates (Collinsworth et al., 2018).

Prolonged index hospitalizations have been linked to increased risk for 30-day readmissions (Engel et al., 2017; Press et al., 2018). A hospital course longer than 8 days is associated with a higher risk of readmission (Engel et al., 2017), highlighting the importance of comprehensive and timely treatment when patients are first admitted with COPD. A Discharge Care Bundle initiated upon patient admission could reduce length of stay (Parikh et al., 2016). Pulmonary consultation can expedite treatment and alleviate an acute exacerbation of COPD. Use of a Discharge Care Bundle ensures that all important care components, such as medication reconciliation, spirometry testing, patient education, smoking cessation evaluation, confirming telephonic outreach within 72 hours and scheduling of follow-up appointment within 14 days of discharge are being addressed for the patient in a timely and consistently manner, and support an early, safe discharge (Collinsworth et al., 2018; Bath et al., 2019; Gershon et al., 2017; Harrison et al., 2011; Health Quality Ontario, 2017; Press et al., 2018).

COPD readmissions occur early within the 30-day window, with one half occurring within 15 days of discharge (Jacobs et al., 2018; Mannino and Thomashow, 2015; Press et al., 2018; Shaw et al., 2020). According to Jacobs et al. (2018), the highest readmission rates are within

72 hours of discharge (4.2 – 5.5%), and the readmissions within 15 days account for 58% of total readmissions. Two interventions that have been proven successful at preventing early readmissions are post-discharge telephonic outreach within 72 hours and pulmonary provider follow-up appointment within 14 days of discharge (Bath et al., 2019; Harrison et al., 2011; Health Quality Ontario, 2017;).

Cigarette smoking is a primary cause for development of COPD and a leading factor for exacerbations in patients with a confirmed COPD diagnosis (American Lung Association, 2021). Patients who smoke have a higher risk for 30-day readmissions than patients who quit smoking or those who never smoked (Zhang et al., 2022). Smoking interferes with the therapeutic response of inhaled glucocorticoids and can heighten a patient's inflammatory state, causing more severe damage to lungs (GOLD©, 2019). Referral to a smoking cessation program is a highly efficient way to prevent future COPD exacerbations, and subsequently, 30-day readmissions (American Lung Association, 2021; GOLD©, 2019; Jennings et al., 2015; Zhang et al., 2022).

Spirometry testing is underutilized in COPD patients, despite evidence of its effectiveness in enabling appropriate treatment and potentially avoiding preventable 30-day readmissions (Yu et al., 2014; Gershon et al., 2017; Loh et al., 2018). GOLD© developed and published specific guidelines for diagnosing COPD, which include a combination of standardized testing, such as spirometry, and clinician assessment. However, spirometry testing to confirm a COPD diagnosis is often missed (Loh et al., 2018; Rice et al., 2020; Rodriguez, 2017). Spirometry testing can confirm a diagnosis of COPD leading to a better allocation of inpatient resources, thus aiding in preventing 30-day readmissions (Gershon et al., 2017; Loh et al., 2018).

COPD 30-day readmissions represent a major healthcare burden. Readmission drivers include both social and clinical factors and are influenced by adequate treatment and targeted

discharge planning. A COPD Discharge Care Bundle implemented at the time of inpatient admission may provide a structured way to reduce readmissions through the use of evidence-based practices that are performed consistently, reliably and timely by the inter-disciplinary care team.

Care Standardization Through the Use of Discharge Care Bundles

Care standardization through the use of a Discharge Care Bundle has proven to be a useful vehicle for achieving improved patient outcomes, including lower readmission rates (Ospina et al., 2016; Parikh et al., 2016; Shaw et al. 2020; Vanhaecht et al., 2016).

IHI defines care bundles as a set of three to five evidence-based interventions that are implemented consistently and reliably with the goal of improving the care patients receive. Care bundles are practical tools that aid in the adoption of evidence-based practices for a procedure or condition. Care bundles have the ability to shape admission and discharge care processes by utilizing an inter-disciplinary model, facilitating the translation of guidelines or evidence into task-oriented processes, and outlining the milestones that patients should meet during a particular phase of care (Shaw et al., 2020).

Care bundles can be used across various healthcare areas and are designed to help prevent or manage various health conditions (Chalder et al., 2016). A systematic review of 37 studies reports that care bundles can reduce the risk of poor patient outcomes when compared to regular care (Lavallée et al., 2017). Furthermore, adequate fidelity to the care bundle is associated with a greater impact on outcomes (RR = 0.37 [95% CI 0.21 to 0.66]). Not only do care bundles promote improved outcomes for patients, but they can also enhance clinicians' overall satisfaction (Lavallée et al., 2017; Shaw et al., 2020). Healthcare professionals report care bundles as positives for their ability to standardize patient care, provide a clear pathway for patients and help identify post-discharge needs (Shaw et al., 2020; Vanhaecht et al., 2016).

Effectiveness of COPD Discharge Care Bundles in Reducing 30-Day Readmission Rates

While robust clinical guidelines for the treatment of COPD have been developed to improve patient health outcomes, many patient needs remain unmet due to the absence of guidelines translated into simple tasks that members of a care team can easily follow (Vanhaecht et al., 2016). Discharge Care Bundles play a critical role in providing high quality care for COPD patients, as they drive standardization and utilization of evidence-based medicine in daily work (Ospina et al., 2016). Pulmonary consultation, discharge medication reconciliation, spirometry, patient education focusing on inhaler technique, referral to smoking cessation program, telephonic outreach within 72 hours and pulmonary follow-up appointment scheduled within 14 days of discharge are associated with significant decrease in 30-day readmissions (Ospina et al., 2016; Gershon et al., 2017; Loh et al., 2018; Parikh et al., 2016; Shaw et al. 2020; Vanhaecht et al., 2016; Zhong et. al in 2022).

The 30-day readmission rate was the primary outcome measure for this DNP quality improvement project. Several articles demonstrate that implementation of a Discharge Care Bundle can reduce 30-day readmission rates for COPD patients. The systematic reviews published by Ospina et al. (2016) and Zhong et al. (2022) reported significant reduction of 30-day readmission rates with use of a Discharge Care Bundle. Vanhaecht et al. (2016) achieved a 30-day readmission rate of 9.7% for patients placed on a clinical care pathway versus 15.3% for patients who received usual care. Furthermore, Parikh et al. (2016) lowered readmission rates from 54.4% in controls to 9.1% for patients enrolled in the care bundle, while Zafar et al. (2017) achieved a 14.7% readmission rate post implementation of a care bundle versus 22.7% pre-intervention. For more specific information, please refer to Appendix E, Data Table for 30-Day Readmission Rates.

Project Model

The Donabedian model for quality of care was the conceptual model utilized for this project. This model proposes that “structure, process, and outcomes are closely linked and can

determine outcome, such that structure leads to process, and process leads and influences directly the outcome" (Donabedian, 2005).

In this context, structure was defined as the physical or organizational characteristics where healthcare occurs. The structural measures evaluate the aspects of an organization that promote delivering of high-quality care, and often the question that comes to mind is whether the infrastructure is adequate for the care interventions. For the purposes of this project, structure was represented by the inpatient setting at the hospital project site. The organizational support provided for this project included the collaborative, interdisciplinary development of the COPD Discharge Care Bundle, administrative, and IT support.

The process pillar focuses on the care delivered to patients, and it relies on the existing structure to provide resources and delineate workflows to support and conduct patient care. The implementation of the COPD Discharge Care Bundle represented the process. The COPD Discharge Care Bundle was fully operationalized in the electronic medical record (EMR) to ensure standardization across the various disciplines involved (pulmonary provider, medicine provider, transitions of care pharmacist and respiratory therapy).

In the Donabedian model, outcomes are measured by evaluating the impact of an intervention or cluster of interventions on specific desired results. The key outcome that was tracked and evaluated for the COPD Discharge Care Bundle was 30-day readmission rates.

The impact of the COPD Discharge Care Bundle on 30-day readmission rates informed program changes and future quality improvement efforts. A decrease in 30-day readmission rates for the implementation period (November, December 2022 and January 2023) when compared to pre-intervention data (November, December 2021 and January 2022) was the marker for achieved success. Please refer to Appendix B for the Donabedian Model for this project.

Organizational Assessment

The hospital project site is part of an integrated health care system comprised of a distinguished medical school, eight hospital campuses, and an extensive ambulatory footprint. The health system is world renowned for its dedication and excellence in research, patient care, and education across a range of specialties. Several hospitals within the health system received Magnet designation, and are leaders in research and innovation, as well as diversity and inclusion.

SWOT Analysis

The SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is a structured, systematic way of exploring areas for healthcare development, for resource deployment, and areas of vulnerability needing improvement or restructuring (Blayney et al., 2008). The identification of these organizational factors as they relate to the DNP project allowed the Project Leader to leverage existing strengths, consider the impact of weaknesses, seize opportunities and proactively monitor and manage potential threats. Graphically depicted in Appendix C, the SWOT analysis follows.

Strengths

The organization's commitment to clinical excellence and continuous improvement made the hospital project site the optimal setting to successfully conduct and implement a care redesign project. The organization's large ambulatory footprint ensured that patients were followed through the care continuum following index hospitalization. The Transitions of Care Call Center (TOCC) main function is to perform telephonic outreach 72 hours post hospital discharge for patients discharged to home and home with service. TOCC ensures patients are adhering to their discharge plan and mitigate any issues patients may report, helping prevent avoidable readmissions. The TOCC was leveraged along with other interventions to reduce COPD readmissions. Within the organization, strategic priorities included care standardization and 'systemness'.

Weaknesses

The health system has rapidly expanded over the past 10 years to the large organization that is now. Due to its rapid growth and still being in the early stages of system integration process, system level approvals and decision processes are not yet well defined and streamlined, often requiring time consuming layers of approval. There is a tendency toward siloed work which often leads to duplication of efforts across sites and inefficiencies. While most hospital sites are leveraging the same EMR system currently, the EMR-driven protocols are not standardized across the system, which often resulted in varied protocols for the same conditions. Implementation of the COPD Discharge Care Bundle at the hospital project site demonstrated its ability to standardize and align protocols, and evidence-based interventions for a priority disease across multiple disciplines.

Opportunities

One of the greatest opportunities for the organization was to standardize the care provided to COPD patients, as this had the potential to better align structures and processes, improve patient outcomes and reduce the cost of care. This presented an opportunity for the hospital project site to develop a center of excellence for COPD care.

Threats

The organization is surrounded by several high performing health systems, increasing the risk for losing both patients as well as talent to its competitors. The use of standardized programs and tools helps improve patient outcomes and satisfaction, ensuring its patient base. Improved patient outcomes are linked to improved clinician satisfaction (Figueroa et al., 2018) which could help mitigate the talent drain. At the same time, the constantly changing and increasingly more demanding payment and performance models that are being released by payers add pressure to reduce the cost of care. This highlights the importance of quality improvement efforts that target key measure outcomes, such as 30-day readmissions rates. The implementation of the COPD Discharge Care Bundle presented an opportunity to build on

existing success, and it served as a step forward in addressing the current health system weaknesses and threats.

Project Goal and Aims

According to the American Thoracic Society, the quality of care delivered to COPD patients is often suboptimal and fragmented, contributing to unfavorable patient outcomes and high rates of readmissions. The overall goal of this DNP project was to reduce 30-day readmissions and improve quality of care by developing and implementing a standardized Discharge Care Bundle for COPD patients in the inpatient setting at an urban academic medical center. The first aim of this project was to develop a Discharge Care Bundle for COPD patients in the inpatient setting based on evidence-based standards for clinical care. The second aim was to implement and evaluate use of the COPD Discharge Care Bundle. The third aim was to make recommendations for sustainability and scalability across the healthcare system and nationally.

Part 2

Methods

Overview of Project Methods

The goal of this quality improvement DNP project was to reduce 30-day readmissions and improve quality of care by developing and implementing a standardized Discharge Care Bundle for COPD patients. The aims and methods for this project are described in this chapter.

Aim 1: Develop a Discharge Care Bundle for COPD patients based on evidence-based standards for clinical care.

A COPD Discharge Care Bundle did not exist at the hospital project site prior to the implementation of this DNP project. To develop the COPD Discharge Care Bundle, an interdisciplinary COPD taskforce was launched as part of this project. The COPD taskforce was comprised of the following stakeholders: a) Project Leader, who served as co-chair, b) COPD Pulmonary Co-Chairs, c) Director of Pharmacy, d) Transitions of Care Pharmacist, e) Internal Medicine Medical Director, f) Director of Respiratory Therapy g) Transitions of Care Call Center Director and h) Director of Clinical Data Operations. A kick-off meeting was held to clarify the goals of the COPD Discharge Care Bundle, delineate the roles and responsibilities of each taskforce member, and finalize the proposed timeline for the project. Following the kick-off meeting, the taskforce met on a weekly basis to ensure the project stayed within the agreed upon implementation timeline. See Appendix D for the project timeline. The taskforce membership collaboratively reviewed the most recently published GOLD© guidelines, along with the literature review to determine which evidence-based interventions should be considered for the COPD Discharge Care Bundle. A current state analysis was conducted during which COPD care plans, order sets, checklists, and data reports were collected and reviewed. Equipped with findings from the review and a clear understanding of current clinical care, the COPD Taskforce developed the COPD Discharge Care Bundle. The COPD Discharge Care

Bundle was presented to the system-level COPD workgroup for review and approval prior to operationalizing it in the EMR.

Aim 2: Implement and evaluate the COPD Discharge Care Bundle.

The project was implemented on the inpatient units at the hospital project site. The target population was patients 18 years and older with a primary diagnosis of COPD with an assigned MS-DRG of 190, 191, 192 – Chronic Obstructive Pulmonary Disease, admitted to an inpatient level of care. Patients discharged to a skilled nursing facility, transferred to another facility, left against medical advice or on hospice care were excluded from enrollment. The timeline for project implementation was November 1st, 2022 through January 31st, 2023.

The COPD Discharge Care Bundle was fully operationalized in the EMR. Discipline-specific tip sheets were developed, and trainings were provided to all affected clinicians (pulmonologists, respiratory therapists, Medicine providers and the transitions of care pharmacists) prior to project launch. The Discharge Care Bundle was designed to automatically initiate in the EMR upon admission for patients with an admitting diagnosis under MS-DRG 190 (Chronic Obstructive Pulmonary Disease with Major Complication or Comorbidity), 191 (Chronic Obstructive Pulmonary Disease with Complication or Comorbidity), and 192 (Chronic Obstructive Pulmonary Disease without Complication or Comorbidity). The COPD Discharge Care Bundle included the following interventions: pulmonary consultation, smoking cessation evaluation, medication reconciliation, spirometry (if not completed within the last year), patient education, and scheduling of pulmonary follow-up appointment within 14 days of discharge. The transitions of care pharmacist ensured that the Discharge Care Bundle was complete prior to patient discharge as part of daily work. Patients placed on the COPD Discharge Care Bundle were referred via EMR to the TOCC call center following hospital discharge for telephonic outreach within 72 hours of discharge.

Weekly fidelity meetings were instituted upon program launch with the COPD taskforce members to ensure any issues were addressed expeditiously, to review program utilization and

to identify any opportunities for improvement. Using real-time data, available via the Discharge Care Bundle build in the EMR, the Project Leader tracked fidelity to the care bundle and program enrollment using an auditing tool. The auditing tool was completed on a weekly basis by the Project Leader and presented during the fidelity meetings for review and discussion. Issues identified during fidelity meetings were triaged by the Project Leader and escalated to the appropriate team for immediate intervention. Clinical concerns were escalated to the COPD Pulmonary Co-Chair, and issues with the EMR build were directed to the IT department. All issues, concerns, and their resolutions were tracked by the Project Leader and presented monthly at the system-level COPD workgroup and to the Vice President for Quality and Regulatory Affairs during the duration of the project.

Evaluation/ Analytical Plan

The project's success was evaluated by a realized reduction in 30-day COPD readmission rates for patients 18 and older, with an assigned MS-DRG of 190, 191, 192 – Chronic Obstructive Pulmonary Disease, admitted to one of the inpatient units, and who were discharged to home or home with services when compared to historical data during comparable timeframes. The 30-day readmission rate was calculated for the baseline period, which spans November 1st 2021 to January 31st 2022, and was compared to the 30-day readmission rate for the project implementation period of November 1st 2022 to January 31st 2023. For the purposes of this project, 30-day readmission rate was calculated using EMR data and included 30-day readmissions to project site only. The 30-day readmission rate was determined by dividing the number of 30-day readmissions (numerator) by the number of discharges (denominator). The same methodology was applied for both baseline and implementation data to calculate the respective readmission rates.

Descriptive statistics were performed on all continuous variables (age and LOS) to describe the baseline and implementation groups' respective demographic and clinical characteristics. Frequency and percentage statistics were used for categorical variables

(gender, marital status, payor, preferred language, race/ethnicity, smoking, hypertension, diabetes, fluid and electrolyte imbalances, CHF, and discharge disposition).

Aim 3: Make recommendations for sustainability and scalability.

Sustainability

The established COPD interdisciplinary taskforce was absorbed into the system-level COPD workgroup following completion of this DNP project. The system-level COPD workgroup is responsible for collecting, tracking, and monitoring data following DNP project completion. Based on findings from the data, feedback from end users, and leadership input, the system-level COPD workgroup will institute performance improvement efforts to address any identified gaps.

Scalability

The COPD Discharge Care Bundle has become the standard of care at the hospital project site following the completion of this DNP project. Expansion of the COPD Discharge Care Bundle to the other hospital campuses is under consideration by leadership. Additionally, the above presented care bundle standardization process can be modified and applied as an intervention to reduce readmissions of other priority disease groups, such as Congestive Heart Failure or Pneumonia.

Dissemination

This DNP project's impact and lessons learned were shared internally with various stakeholders, including all clinical teams involved in the implementation and ongoing success of the COPD Discharge Care Bundle, as well as pulmonary and quality leaders from across the system. Externally, submission of abstracts for poster and podium presentations to the American Thoracic Society and American Lung Association annual conferences are being considered.

Project Timeline

See Appendix D.

Statement on Human Subjects

This project has been reviewed and deemed a Quality Improvement project by the Yale University Institutional Review Board (IRB).

Part. 3

Systems, Policy and Business Implications

Systems Overview

The organization's mission is to provide exceptional patient-centered care and promote optimal health outcomes through continuous improvement, standardization, research, and outreach in the many diverse communities they serve. The health system was created in 2013 following the merger of two organizations, and since its inception has focused on increasing efficiencies and improving quality and outcomes.

The COVID-19 pandemic came at a time when the organization was prioritizing system integration and standardization efforts. Given the devastating and disruptive nature of the pandemic, these efforts were paused as the health system braced itself for an influx of critically ill patients. In 2021, the organization launched a new advertising campaign that spoke to the health system's commitment post-COVID to overcome the most challenging and complex health problems. System integration and care standardization efforts have since restarted. The organization recognized that addressing COVID and providing high-quality care for our vulnerable patient populations long term requires a standardized and integrated health system.

This DNP project was implemented at an urban academic medical center, one of the eight acute care hospitals within one larger health system. The hospital project site is a 799-bed, teaching hospital.

There are several aspects of the organizational structure that supported the implementation of this quality improvement project. The steadfast commitment to the serving communities is recognized by accreditors, national publications and ranking organizations. The organization prides itself for receiving several quality awards, including ranking as a top 100 Hospital in nation for Patient Safety for Cardiac Care, Interventional Coronary Care, and Stroke Care and a top 100 hospital for Medical Excellence in Interventional Cardiac Care. The organization strives for the best possible outcomes for their patients, as evidenced by their

mission statement, vision, and proven track of excellence. Its dedication to high value care made the organization the optimal setting for implementing this DNP project, as quality improvement efforts are prioritized and embraced. The benefits that this DNP project proposed were in alignment with the organization's strategic plan.

Leadership and Stakeholder Engagement

The objective of this DNP project was to design, implement and evaluate a Discharge Care Bundle program for COPD patients. Implementation of this DNP project required senior leadership support and approval from the system-level COPD Workgroup and the Vice President for Quality and Regulatory Affairs, both of which were obtained prior to project launch. Continuous engagement from the following stakeholders was critical to the project's success: a) COPD Co-Chairs, b) Director of Pharmacy, c) Transitions of Care Pharmacist, d) Internal Medicine Medical Director, e) Director of Respiratory Therapy, f) Transitions of Care Call Center Director, g) Director of Clinical Data Operations, and h) Senior Technical Analysist.

Monthly status updates were provided to the External Subject Matter Expert, Vice President for Quality and Regulatory Affairs and the system-level COPD Workgroup. Results and recommendations for further improvement were formulated and shared upon DNP project completion.

Business Case

This DNP project was relevant and timely to the hospital project site, as it aligned with the quadruple aim of "improving population health, enhancing patient experience, improving patient and provider satisfaction, while retaining costs".

The total implementation costs for this project were $4,170. These costs included non-productive clinical time to allow for training, training materials, and provision of refreshments during clinician trainings. The IT department provided technical services for the EMR build and monthly data reporting. The Transitions of Care pharmacist assumed the responsibility of

ensuring the care bundle interventions were completed prior to patient discharge as part of daily work. There were no incremental costs associated with IT or pharmacy services.

There were significant indirect benefits, as well as potential increased revenue associated with the rollout of this project. The revenue potential was tied to the goal of preventing a modest 1 readmission in 2022 during the months November and December, and 4 readmissions per calendar year starting with 2023. Based on the assumption that by preventing 30-day COPD readmissions there will be an opportunity to backfill admissions and therefore increase capacity, there was an indirect revenue benefit of $19,721 associated with preventing 1 readmission in 2022 during the months of November and December, and $78,883 for following calendar years associated with preventing 4 readmissions per year. Indirect benefits also included improvement in clinical quality measures, reduction in mortality and increased patient and employee satisfaction. The estimated financial benefit allowed for a 6048% ROI.

A potential risk to a seamless project implementation was COVID-19. While the number of cases and severity of disease had decreased since the pandemic started, it still possessed a high risk for delay and disruption in project implementation. No delays were encountered during the development or implementation of this DNP project. Considering COPD patients' heightened risk of COVID, this DNP project presented as an excellent opportunity to prepare for a potential next surge with the goal of providing high-quality care for this vulnerable population.

Part 4

Results

The primary objective of this quality improvement project was to reduce 30-day readmission rates for COPD patients by developing and implementing a standardized COPD Discharge Care Bundle. Baseline and project data were collected from billing, EMR, and through manual chart reviews. The project was launched on November 1st, 2022, and ended on January 31st, 2023. During this 3-month implementation period, a total of 30 patients (n=30) were enrolled in the COPD Discharge Care Bundle program. Four project patients were readmitted to the hospital within 30-days of index hospitalization (13.3% readmission rate). Review of the retrospective data for the baseline period (November 1st, 2021, to January 31st, 2022) revealed that a total of 22 patients were included in the baseline period (n=22), out of which 10 were readmitted within 30-days of index hospitalization (45.5% readmission rate). See Table 1. The readmission data for baseline and project timeframes were analyzed using Fisher's Exact Test to determine if a change in the readmission rate between the two groups is statistically significant. The decrease in 30-day readmission rate following project implementation was statistically significant (p = 0.0134).

Descriptive statistics were used to describe the implementation group's respective demographic and clinical characteristics (see Table 2). The mean age of project patients was 69 years old, with males accounting for 56.7% of the total project enrollment volume. Sixty-three percent of patients identified their ethnic background as Hispanic or African American. Patients who smoked represented 46.7% of the project population, and 75% of the project patients who were readmitted within 30-days (n=4). A majority of patients (67.7%) had at least one of the following comorbidities or prior medical conditions: hypertension, congestive heart failure, fluid and electrolyte imbalances, and diabetes. The most prevalent comorbid condition was hypertension (56.7%).

Part 5

Discussion

This quality improvement DNP project demonstrated the feasibility and effectiveness of a standardized clinical care process to reduce 30-day COPD readmissions. The goal and aims of this project aligned with the organization's strategic plan. The reduction in COPD 30-day readmissions using the bundle, 13.3% post-implementation as compared to 45.5% for the baseline period, is statistically significant (P=0.01340). Additionally, the project achieved a readmission rate lower than the national rate of 19.8% (Medicare, 2023).

Implementation of the COPD Discharge Care Bundle improved the care patients received. Prior to the launch of the Discharge Care Bundle, interventions such as spirometry, scheduling of follow-up appointments within 14 days, and post-discharge telephonic outreach within 72 hours were not used consistently. Referrals to a smoking cessation program were often missed, which may have contributed to higher-than-normal readmission rates in the prior year for this population, considering the high percentage of patients who smoke within this population (72.7% of baseline patients, and 47% of project patients were active smokers). The Discharge Care Bundle facilitated the implementation of a comprehensive discharge planning process. According to Jacobs et al. (2018), readmissions within 15 days account for more than 50% of total readmissions. The baseline patient group included a total of 22 patients, out of which 10 were readmitted within 30-days of discharge. Of the 10 readmitted baseline patients, 90% returned to the hospital within 14 days of discharge. The COPD Discharge Care Bundle closed the gaps in discharge planning, such that only one patient out of the readmitted project patients (n=4) returned to the hospital within 14 days of index discharge. See Table 3.

Limitations

Two limitations of the project were identified. The sample size was small (n=30) and limited to a single hospital project site within one large healthcare system. The results and findings from this DNP project may not be fully applicable to other sites or may require

modifications to establish appropriate fit within existing structures, such as IT platforms. A second limitation was the 3-month implementation period. Additional challenges and benefits may become apparent after a longer implementation period. An opportunity for collecting additional information exists for this DNP project, as COPD leadership agreed to continue the project as part of standard care at this site.

Modifications for Sustainability

The greatest opportunity to improve the COPD Discharge Care Bundle is to establish a partnership with inpatient nursing in implementation. Select interventions, such providing patient education and referral to smoking cessation programs can be performed by inpatient nurses. Leveraging inpatient nurses to perform these interventions can help eliminate the need for additional resources. A future collaboration with inpatient nursing can enhance the current project model and promote sustainability and scalability.

Improvement of the data collection process for efficiency is a second recommendation. No one individual data source captured all the required data elements, therefore multiple sources were used (billing data, EMR reports, and manual chart reviews). The information gathered was validated through manual chart reviews in the EMR to confirm accuracy and completeness. The laborious process could impede sustainability or delay scale and a modification of a more comprehensive data base or interface is recommended. IT system priorities and budgetary implications would have to be evaluated.

Recommendations for Scalability

The implementation of the COPD Discharge Care Bundle underscores the benefits of creating and implementing a standardized, interdisciplinary care model to reduce 30-day readmission rates for COPD patients. While this DNP project focused solely on the COPD population at one hospital site, this model can be leveraged for COPD patients across an entire organization. Additionally, the above presented care bundle standardization process can be modified and applied as an intervention to reduce readmissions of other priority disease groups,

such as Congestive Heart Failure or Pneumonia. This project also highlights the importance of deploying resources to promote accountability at every level. In this DNP project, the transitions of care pharmacist ensured that the Discharge Care Bundle was complete prior to patient discharge as part of daily work. The Project Leader held weekly fidelity meetings with the clinical team to ensure any issues were addressed expeditiously, to review program utilization, and to identify any opportunities for improvement. This DNP project's oversight structure fostered a high level of accountability for all stakeholders involved in its implementation.

Policy and Healthcare Systems Implications

The COPD Discharge Care Bundle helped improve the quality of care patients receive, by ensuring the delivery of evidence-based medicine. This DNP project demonstrated high value care by achieving statistically and clinically significant results. The care standardization process that was followed in the development and implementation of the COPD Discharge Care Bundle can be disseminated internally as well as externally with other organizations interested in optimizing their performance.

According to Stone et al., (2022), the clinicians' fidelity to a Discharge Care Bundle was much higher (53% compared to 19%), when the bundle was associated with pay-for-performance measures. Pay-for-performance is a reimbursement model under value-based care that ties reimbursement to best practice interventions for a specific procedure or condition. From a policy standpoint, there is an opportunity to influence clinical behavior and accelerate the development and implementation of quality improvement efforts, such as this DNP project, by leveraging pay for performance models. To ensure equitable care, payers need to collaborate on a national level to standardize the measures included in the pay-for-performance models and mandate the expansion of pay-for-performance models for all payers. Including standardized COPD-related measures in all payer pay-for-performance models would promote equitable and best-practice clinical care for this vulnerable population.

Conclusion

COPD readmissions are associated with high financial burden and human cost. Patients who are readmitted tend to have poorer outcomes compared to patients who are not readmitted (Almagro et al., 2012). The purpose of this quality improvement DNP project was to develop and implement a COPD Discharge Care Bundle based on evidence-based standards in clinical care at an urban academic medical center. The standardization of COPD care demonstrated high value care by achieving statistically significant reduction in 30-day COPD readmissions, positive return on investment, including increased capacity and revenue capture opportunity, and improved performance on publicly reported core measures. This project provides a COPD care standardization process that healthcare organizations can adopt to improve care outcomes and leverage for increasingly popular value-based care payment initiatives. This project also provides a model for care standardization with broader applicability to other chronic disease conditions.

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Table 1

Frequency Table for Readmissions

Readmission within 30-days	Group			
	Baseline (n=22)		*Program (n=30)*	
	Volume	*Percentage*	*Volume*	*Percentage*
No	12	54.5%	26	86.7%
Yes	10	45.5%	4	13.3%

Table 2

Frequency Table for Demographic and Clinical Characteristics of Patients

VARIABLE	GROUP	
	Baseline (N=22)	Program (N=30)
Gender		
Male	16 (72.73%)	17 (56.67%)
Female	6 (27.27%)	13 (43.33%)
Race/Ethnicity		
White	3 (13.64%)	6 (20.00%)
African American	7 (31.82%)	7 (23.33%)
Hispanic	5 (22.73%)	12 (40.00%)
Asian	3 (13.64%)	1 (3.33%)
Other	4 (18.18%)	4 (13.33%)
Smoking Status		
Former	6 (27.27%)	15 (50.00%)
Never	0	1 (3.33%)
Smoker	16 (72.73%)	14 (46.67%)
Discharge Disposition		
Discharge to home or self-care	6 (27.27%)	12 (40.00%)
Discharge to home under care or organized health service	16 (72.73%)	18 (60.00%)
Composite Comorbidity		
No	4 (18.18%)	10 (33.33%)
Yes	18 (81.82%)	20 (66.67%)
Comorbidities		
Hypertension		
No	7 (31.82%)	13 (43.33%)
Yes	15 (68.18%)	17 (56.67%)
Congestive Heart Failure		
No	21 (95.45%)	28 (93.33%)
Yes	1 (4.55%)	2 (6.67%)

Fluid and Electrolyte Imbalances		
No	19 (86.36)	28 (93.33%)
Yes	3 (13.64%)	2 (6.67%)
Diabetes		
No	11 (50.00%)	19 (63.33%)
Yes	11 (50.00%)	11 (36.67%)

Table 3

Frequency Table for Readmissions Delta

Readmissions Delta by Group (Days Between Index Discharge and Readmission Episode)				
Variables	Group			
	Baseline Readmissions (n=10)		*Program Readmissions (n=4)*	
	Volume	*Percentage*	*Volume*	*Percentage*
Patients readmitted within 14 days of index discharge	9	90%	1	25%
Patients readmitted after 14 days of index discharge	1	10%	3	75%

Appendix A

Adapted PRISMA Flow Diagram

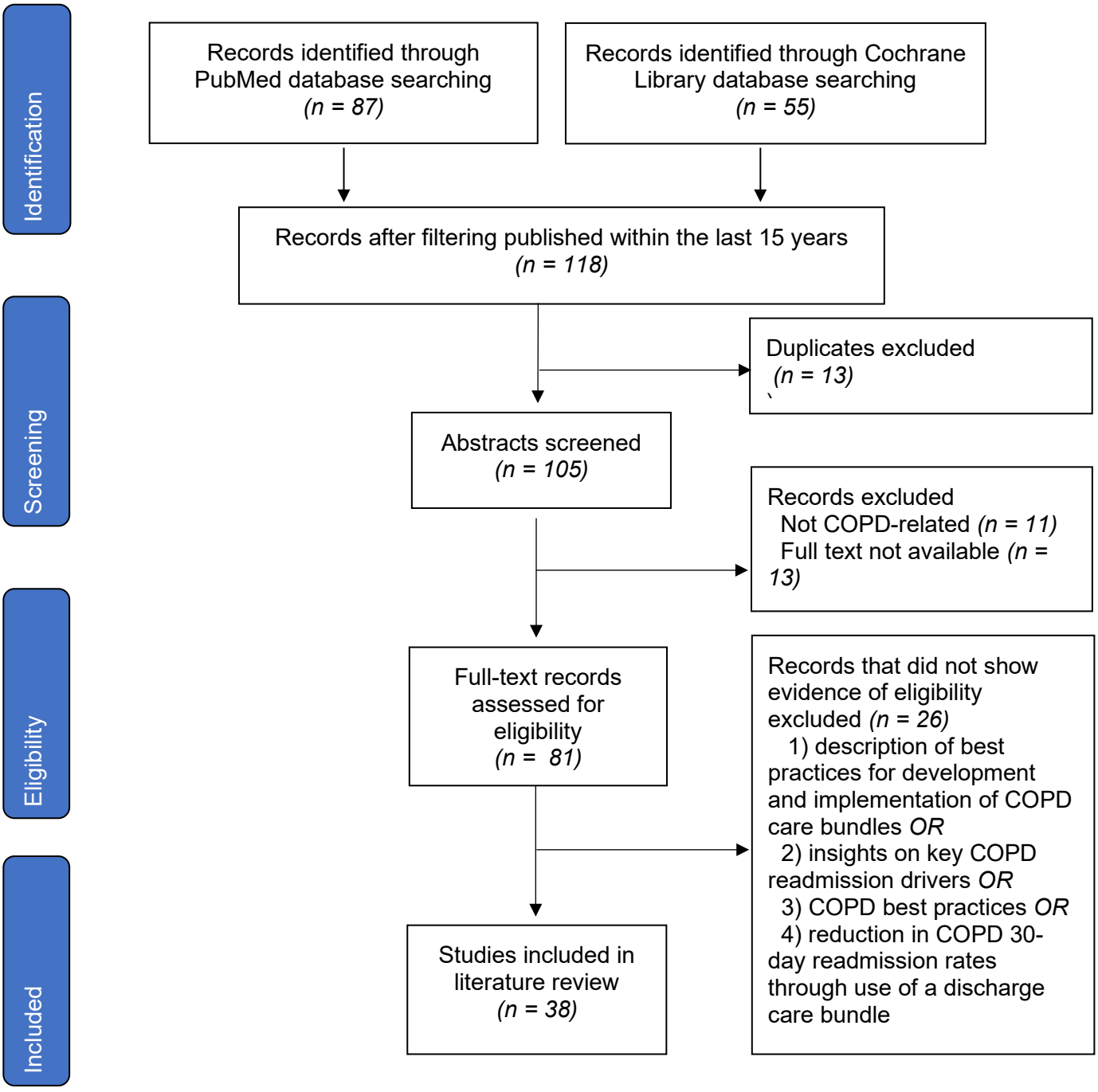
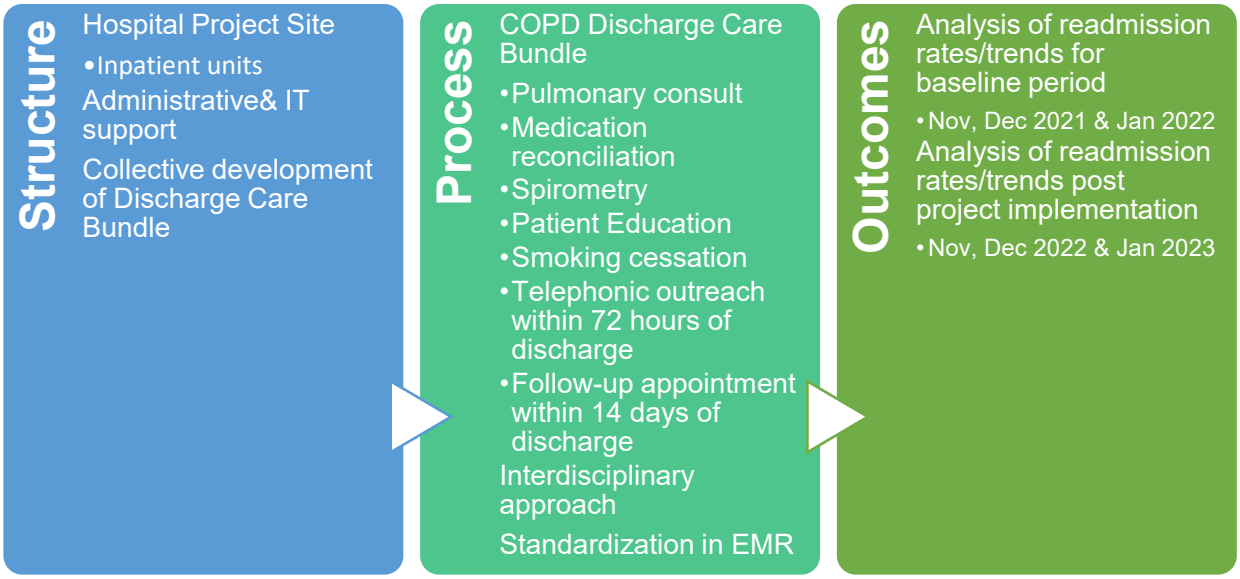


Figure 1 Flow diagram to show number of studies remaining at each state of literature review
Source: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Appendix B

Project Model

Donabedian Model

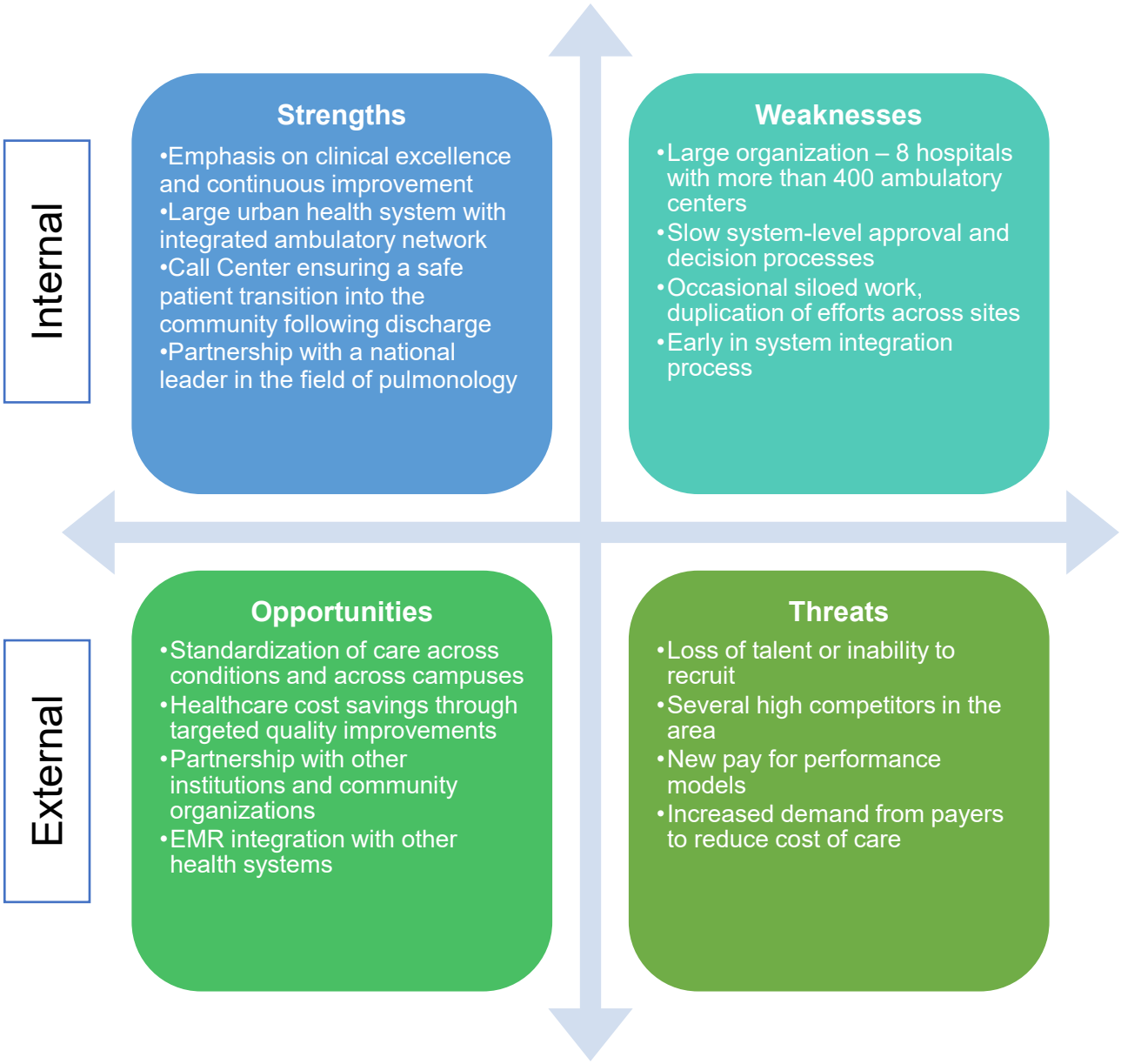


Donabedian A. (2005). Evaluating the quality of medical care. *The Milbank quarterly*, *83*(4), 691–729.

https://doi.org/10.1111/j.1468-0009.2005.00397.x

Appendix C

SWOT Analysis



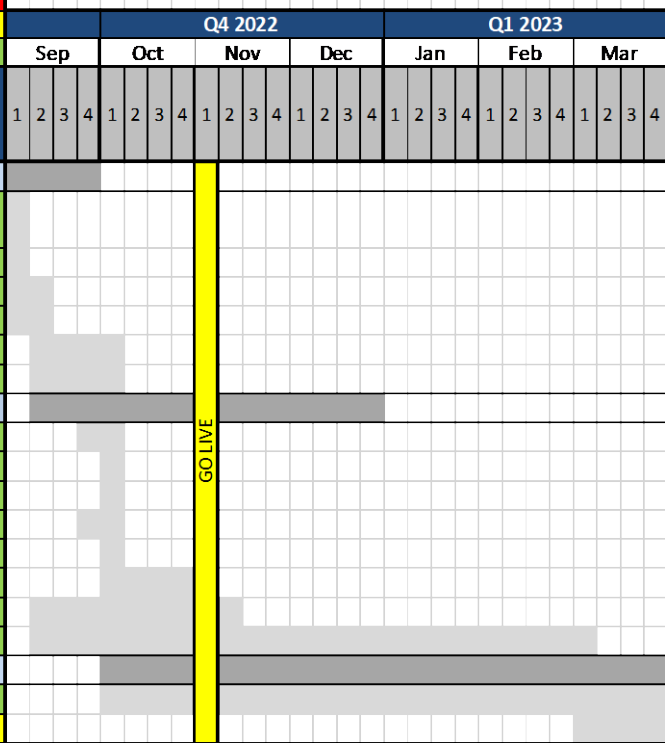
Appendix D

COPD Discharge Care Bundle Gantt chart

COPD Discharge Care Bundle

Key:	
Not started	
In progress	
Done	

Task No.	Task Name	Status	Responsible	Target Date	Notes
Development					
1	Stakeholders identification + taskforce launch				
2	Literature review				
3	Current state analysis				
4	Gap analysis				
5	Discharge care bundle designed				
6	Data & reporting structure				
Implementation					
1	Discharge care bundle build in EMR				
2	Demo				
3	Sign off				
4	Communication plan				
5	Training sessions				
6	Go-live				
7	Post go-live support				
8	Evaluation				
Sustainability and scalability					
1	COPD Workgroup				
2	Expansion to other clinical specialties				



Appendix E

Data Extraction Table for 30-Day Readmission Rates

Study	Level of Evidence	Readmission	Mortality	LOS	Cost/Case
Ospina et al., 2016	Systematic review	30 Day: RR: 0.80; 95% CI 0.65 to 0.99	RR: 0.74; 95% CI 0.43 to 1.28		
Zhong et al., 2022	Systematic review	30 Day: RR: 0.45, 95% CI:0.24–0.84 (COPD - related readmissions only)	No difference	No difference	
Vanhaecht et al., 2016	Cluster randomized controlled trial	30 Day: 9.7% vs 15.3% (odds ratio =0.427; 95% CI: 0.222-0.822; *P*=0.040).	No difference	No difference	
Parik et al., 2016	Prospective analysis	30 Day: 9.1% vs 54.4% (*P* =0.001) 60 Day: 22.7%vs 77% (*P* =0.0003)		51.2 vs 101.1 hours (*P*-value =0.001)	$7,652 vs $19,954 (*P* =0.044)
Shorofsky et al., 2015	Retrospective study	90 Day: 18.6% vs 32.2% (*P* =0.017) 1Y: 30.5% vs 61.9% (*P* =0.038)			
Zafar et al., 2017	Cross sectional study	30 Day: 14.7% vs 22.7%		4.6 vs 4.8 days (*P*-value =0.045)	