Implementation of a Pulmonary Disease Navigator Program for 30-day Chronic Lung Disease Readmission Reduction

Intermountain Health

Primary Contact Information:
Farukh Usmani, MD, MSHSM
Medical Director, Digital Technology Services
Farukh.Usmani@imail.org

Clinical Project Leads:
Peter Crossno, MD, FACP, FCCP
System Medical Director, Respiratory Care Services
Peter.Crossno@imail.org

Carrie Winberg, MSHA, RRT, ACCS, NPS
System Administrative Director Respiratory Care Services
Carrie.winberg@imail.org

Kim Bennion, MSHS, RRT, CHC, FAARC
System Director of Research, Respiratory Care Services
Kim.Bennion@imail.org

Informatics Project Lead:
Farukh Usmani, MD, MSHSM
Medical Director, Digital Technology Services
Farukh.Usmani@imail.org

Executive Summary

In October of 2012, statutory requirements for the Hospital Readmission Reduction Programs (HRRP) were established setting forth reductions in payments for excess readmissions.[1] HRRP is a Medicare value-based purchasing program that encourages hospitals to improve communication and care coordination to better engage patients and caregivers in discharge plans and, in turn, reduce avoidable readmissions.

Based on national survey data, the cost of COPD in the US has been estimated to be $49.9 billion USD per year with indirect costs accounting for 41% of total costs.[2,3] In 2013, the National Institute of Health reported that Chronic Obstructive Pulmonary Disease (COPD) was a major cause of disability and the third leading cause of death in the United States. Currently, over twelve million people are diagnosed with COPD. It is estimated that over twelve million more people may have the disease and not even know it as this chronic condition develops slowly. In the 2014 Surgeon General's report regarding the fifty-year impact of tobacco use on US health, it was reported that the total economic

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cost of COPD was over $289 billion annually.[4] In 2014, Patel, Nagar and Dalal, published a meta-analysis of fifty-three studies to further quantify the impact of COPD on US health.[5] They reported five key findings regarding direct and indirect costs.

An initial analysis of COPD readmissions within the Intermountain Healthcare System demonstrated a COPD 30-day readmission rate of 18.2%. We utilized our organization's baseline COPD outcomes data to help create a COPD Playbook to guide management of the disease. The playbook was driven by a multi-disciplinary care team using integrated tools within the electronic medical record such as a COPD dashboard, predictive scoring, evidence-based protocols, and order sets to facilitate transitional care across the continuum for the COPD population. From inception to pilot and then to formal establishment of the PDN (Pulmonary Disease Navigator) model utilizing the EHR solutions, total 30-day hospital readmission for COPD patients was reduced by 7%.

Lessons Learned Included:

• Illustrated the importance of identification of disease specific care goals and alignment of care pathways with primary aim. In this case, consolidating and adapting known care elements for COPD into a comprehensive plan/playbook with a specific aim towards reducing readmission rates

• Allowed recognition and integration of respiratory care into the management of COPD patients from the inpatient to outpatient settings

• Facilitated the design and follow-up of a care plan/pathway for COPD patients utilizing a care dashboard and Pulmonary Disease Navigator model. For high-touch personalized care

• Increased the awareness of patients and their home caregivers regarding their care plan in terms of their COPD process, referral resources, the need for medication compliance via delivery devices, the need for tobacco cessation, and early disease symptom exacerbation and the need for earlier intervention to avoid further worsening symptoms and protentional hospital admission

• Finally, and most importantly, these initiatives assisted in the identification of the need to provide more enhanced IT/EHR solutions with artificial intelligence to more adequately scale this for enhanced population health management (currently planned for 2023).

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The Intermountain Healthcare Journey: 10 Years in the Making

How Our Journey Began

Betty's Story

Having a mother with Chronic Obstructive Pulmonary Disease (COPD) and as a registered respiratory therapist for over forty years, I was able to view first-hand the wide range of variability of care she received…some evidence-based and some not. Seeking to understand chronic lung care across our organization, a baseline outcomes medical record review was performed for both COPD and asthma patients in 2011-2012. Four abstracts were accepted for publication and national presentation at the American Association for Respiratory Care's International Congress for our organization's improvement initiatives for COPD patients between 2014-2018 .[6-9] Using outcomes from a baseline chart review of COPD "frequent fliers", a COPD Playbook was created to identify gaps in care and potential areas for improvement. This was shared with the Pulmonary Division, executive leaders, and other key stakeholders. From the first shared edition in November 2017 to current, substantial improvements have been made to institute best practices to include but not be limited to, the initiation of Pulmonary Disease Navigators, the creation of a COPD dashboard, improvement in diagnostic pulmonary function testing for definitive diagnosis, the creation of a COPD Exacerbation Protocol for use in the emergency department/in hospital setting and ambulatory outpatient clinics, and improved communication between patients, Pulmonary Disease Navigators, physicians/advanced practicing providers and other members of the healthcare team. The protocol, as well as communications, are coordinated with the help of the electronic medical record, iCentra (Cerner, Intermountain Healthcare). Upon the publication of our abstracts, Respiratory Care was approached by Intermountain Executive leaders to participate in the National Committee for Quality Assurance's grant funded, eight national hospital learning collaboratives. The Advanced Care Planning Learning Collaborative occurred with noteworthy outcomes. The Intermountain Healthcare COPD care team attended two weeks of training at Gunderson Health where education was given to more fully understood the need to meet with patients and their family members to gather information regarding end-of-life desires, provide education, complete the required forms, and honoring a patient's wishes. Twenty patients were referred to the collaborative by their primary care/pulmonary physicians. The outcomes included but were not limited to 0(0%) of patients were aware of end-of-life choices and 19 (95%) completed an advanced directive and Physician's Order for Life Sustaining Treatment (POLST). Prior to the COVID pandemic, COPD was selected for organizational-wide utilization of the Gunderson Health's Respecting Choices end-of-life program. With 19 (95%) of the COPD patients in the original trial choosing to die at home, it was our impression this could well mitigate frequent hospitalizations and 30-day readmission rates as well as in-hospital mortality. Most importantly, patient's wishes would be identified, documented, and honored. Documentation was created in iCentra, which helped facilitate the coordination of care. Using the discussion facilitation techniques learned, my mother died exactly as she has desired…in my home, surrounded by her family with the window shades open and 1940's music playing and NOT has a hospital readmission. This "gift of a lifetime" should be offered to all chronically ill patients. My mother's journey drove my passion for improving care among COPD patients. We became active lobbyists for health care initiatives each year. She never lived to see the fruits of her labors; however, Utah has since passed legislation for e-cigarette/vaping and raised the tobacco purchase age to twenty-one. Every chronic lung patient deserves evidence-based best practices which are consistently applied. We have been able to conduct care audits to assure compliance to medical executive committee approved best practice protocols for our chronic lung patients. The ease with which patient data can be acquired from the EHR now makes possible timely audits, the identification of gaps requiring closure, and timely corrective action plans to assure compliance. In the words of my mother, "I lived a high-quality, long life despite COPD because of my caring Respiratory Therapists and other providers who cared to provide me with state-of-the-art healthcare!"

Kim Bennion MSHS, RRT, CHC, FAARC

Define the Clinical Problem and Pre-Implementation Performance

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Intermountain Healthcare is currently a Utah-based, not-for-profit system of 33 hospitals, including a virtual hospital that spans across Utah, Idaho, Nevada, Colorado, Montana, Kansas, Arizona, and New Mexico. Population health management of COPD patients has had multiple prongs with the creation of multiple IT/EHR solutions.

In 2011-2012, an electronic, baseline chart review of COPD patients aided in the recognition of potential gaps in care and opportunities for care improvement which were displayed in the *COPD Play Book* (Figure One). Baseline outcomes from the chart reviews were published in abstract form by the American Association for Respiratory Care.[6] (Figure Two). The research and reporting received national recognition by the American Respiratory Care Foundation where the Charles W. Serby Research Fellowship was bestowed on the registered respiratory therapist who conducted/published the findings and created the *COPD Play Book*. Research identification of areas for improvement prompted the development of an electronic dashboard which was maintained, monitored, and applied by select respiratory therapists designated as Pulmonary Disease Navigators (PDNs). Utilizing an electronic care dashboard (Figure Three), the "*COPD Playbook*", the electronic PDN/Respiratory Outpatient Clinic (ROC) COPD Order Set (Figure Four), and the Ambulatory High-Risk COPD Exacerbation Protocol (Figure Five-pages 1-5) embedded in the medical record, COPD patients were identified during hospitalization for care coordination by the newly developed position of Pulmonary Disease Navigators (PDN) with the key target to provide high-touch, timely health care access in arenas other than the emergency room or admission while utilizing the PDN Assessment Form in the EHR (Figure Six-pages 1-11). The key goal being to reduce all-cause 30-day hospital readmissions. An additional three AARC abstracts of outcomes were accepted for publication and international presentation during 2018 (Figures 7-9) [7,8,9]. Variations in practice across the corporation are controlled by ongoing auditing and monitoring with timely feedback and continued education as needed. Results are reported via dashboards accessible to caregivers/managers/directors.

Figure One: COPD Play Book (*screen shots only*)

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Examples of specific areas for improvement identified during the initial chart reviews and included in the COPD Playbook are displayed below:

The "COPD Playbook"

Goal	Status
Identify MD champion	Completed 3/2017
Implement COPD Exacerbation Protocol (all hospitals)	Completed 4/1/2015
Monitor Protocol Utilization	Completed 4/1/2015 & ongoing
PFT result EMR integration	Manual process implemented 2018
COPD Playbook Creation	Completed 2015
PDN Pilot Implementation	Q4 2016

The "COPD Playbook"

Goal	Status
Pts discharged with documented COPD Care Plan	Completed manually 2018
PDNs in ROC to improved HC access	Pilot completed 2018; full implementation 2019
Enhanced communication of Care Plan to all team members	Completed 2019
Pt/caregiver education (e.g., disease, Care Plan)	Education revision & High risk patient SBAR Handoff embedded in EMR 2015

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The "COPD Playbook"

Goal	Status
Timely referrals (e.g., PR, PFT, dietary, sleep study)	2022 manual process completed; electronic referrals for some
COPD Prognostication Criteria	To be completed (Q3 2023 iCARE study: AI/RPM)
Advance Care Planning	EMR documentation screens completed 2018;
System Standard for Advance Care Planning	2019 IH contract with Gunderson Health; COPD selected as pilot group for implementation; COVID slowed implementation

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Defining the Clinical Problem(s) & Performance

AB = Advisory Board (Research Council of Washington for research, technology and consulting); 11 strategies for strengthening COPD inpatient and post-discharge care). The table above was created to address all AB strategies before the 2015 AB Playbook for Reducing COPD Readmissions was published. Only one key strategy was not specifically identified/addressed: creation of patient interviews from a 360-perspective; however, Cipher Health post-discharge questions were created and implemented summer 2017.

Goals	Status
Verify/honor advance directives	Completed 2021 with EMR integration
Track/report CMS COPD 30-day Hospital Readmissions	2018: monthly reports created and disseminated
Employ RRTs at Telecritical Care Desk	Completed Q1 2020
Create COPD Action Plan in iCentra EMR	Completed 2019
10-Years of COPD abstract outcomes publication project (student interns)	2021-2022; completed for publication and international presentation in Nov 2022

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Figure Two: Defining the Problem
2014 COPD Abstract/Poster Publication (*Respiratory Care Journal*).

Figure Three: PDN Dashboard for Ongoing Auditing and Monitoring

COPD	January					February				
	MKD	LDS	IMC	UV	SGRH	MKD	LDS	IMC	UV	SGRH
Hospitalized AE-COPD Pts	18	20	43	31	35	18	15	45	45	22
Pts Enrolled in RET	17	20	41	31	33	18	15	45	45	20
Status										
Better		10	11	15	12	0	3	6	25	8
Same		5	13	3	6	0	4	18	4	2
Worse			3	0	2	0		2	2	0
No Contact		5	14	13	10	18	7	21	12	7
Pts seen in ROC		1	15	3	2	0	2	10	2	1
ROC Visit Status										
Pt Refused			2	2				1		
Phone Only (Pt request)				i7				33	44	
Video Visits			2	2				2	3	
No Show			1	2				5	1	
Pending Visits to ROC										
# of Readmissions	2	2	4	0	3	1	1	2	1	3
Early(1-7)	0		1	0	0	0	1	0	1	2
Late(8+)	2		3	0	3	23		2	0	1
#Readmission for COPD	2	2	3	0	1	1	1	1	1	0
Total Readmission %	11.8%	10.0%	9.8%	0.0%	9.1%	5.6%	6.7%	4.4%	2.2%	13.6%
Deaths	0		1	3	3	0		1	2	2
SNF/Care Facility	1	2	4	4	6	3	3	4	3	1
Trilogy/NIV	0		9	1	4	0	3	5	1	1
Pts still in-house	2		4	3	8	1		4	6	3
Re-Enrolled	0		3	2	0	0		3	2	0
Asthma Pts Enrolled	8		5	16	8	9		2	19	3
ROC Visit			2		0	0		0	0	0
Video Visit					0	0		0	0	0
Re-Enrolled					0	0		0	1	0

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Figure Four: High Risk Pulmonary Patient Order Set in Electronic Medical Record
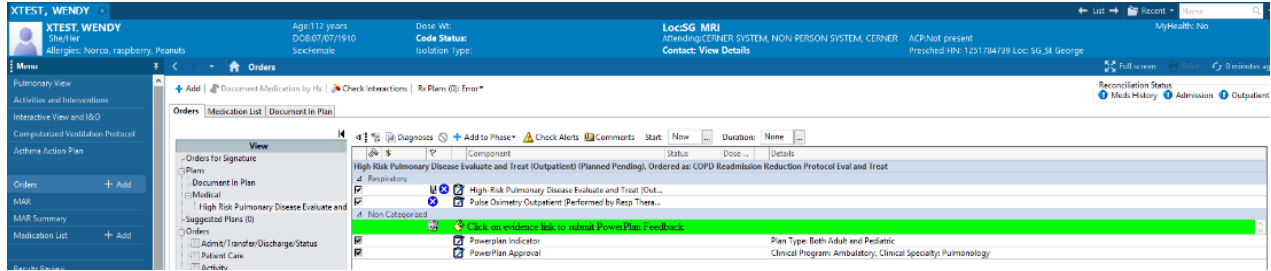
Figure Five: Ambulatory High-Risk COPD Exacerbation Protocol (embedded in EHR) Page 1.

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Page 2.
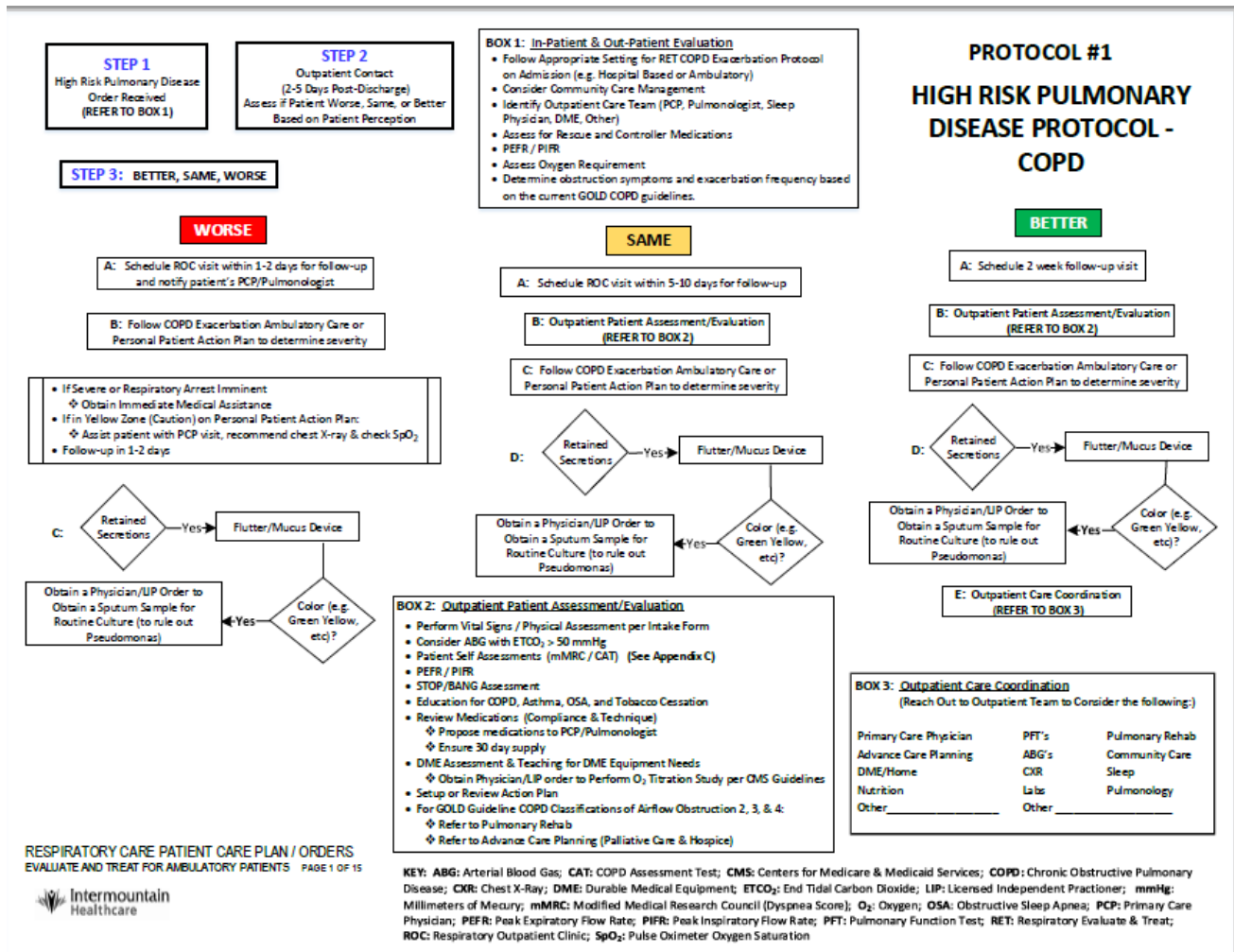
Adult Management of COPD Exacerbation:
Ambulatory Based Care

Go to following pages for
Symptom Assessment, Functional Assessment (see Appendix A),
Medications and Frequencies (see Appendix B)

Grayed-out – Obtain a Physician/LIP order for steroid and antibiotic use.

*Initial Symptom Assessment
(see Appendix A)

Start Medication
(see Appendix B)

Mild
- Inhaled SABA and Ipratropium (see Appendix B)

Moderate to Severe
- Inhaled SABA and Ipratropium (see Appendix B)
- Add Oral Steroid & Antibiotic

Impending or Actual Respiratory Arrest
- Obtain Immediate Medical Assistance

Repeat Assessment

Mild Exacerbation
- Physical exam: mild symptoms at rest
- MDI Criteria ***

Moderate to Severe Exacerbation
- Physical exam: moderate to severe symptoms at rest, accessory muscle use, pursed lip breathing
- Nebulized SABA + Ipratropium per frequency (see Appendix B)
- Oral systemic corticosteroids

Good Response
- Response retained 60 minutes after last treatment

Incomplete Response
- Mild to Moderate Symptoms

Severe Response
- Physical Exam symptoms severe, drowsiness and confusion

Follow High Risk Pulmonary Disease Protocol (see Protocol #1 – Main Page)

Individualized decision re: Hospitalization

Obtain Immediate Medical Assistance

Non-SVN Delivery Device (MDI, DPI, SMI, etc..) with Spacer as Applicable ◄—Yes— *****MDI, DPI, SMI, etc.. Criteria Met?** —No► Small Volume Nebulizer

***MDI Criteria
- RR <28
- 3 Second Breath Hold
- Alert
- Verify Adequate Inspiratory Flow for Device

KEY: COPD: Chronic Obstructive Pulmonary Disease; DPI: Dry Powder Inhaler; LIP: License Independent Practioner; MDI: Metered Dose Inhaler; RR: Respiratory Rate; SABA: Short Acting Beta Agonist; SMI: Soft Mist Inhaler; SVN: Small Volume Nebulizer; 🩺 Physician Order

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EVALUATE AND TREAT FOR AMBULATORY PATIENTS, PAGE 2 OF 15

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FORMAL EVALUATION OF ADULT **COPD** EXACERBATION SEVERITY IN THE
Ambulatory Based Care
(To be used with Management of Adult COPD Exacerbation Flow Diagram)

Appendix A

Assessment

SYMPTOMS	MILD	MODERATE	SEVERE	SUBSET: Respiratory Arrest Imminent
Breathlessness/Dyspnea	While walking Can lie down	While at rest Prefers sitting	While at rest Sits forward	Marked while at rest Sits forward
Talks In	Sentences	Phrases	Words	
Alertness	May be agitated	Usually agitated	Impaired	Drowsy or confused
Respiratory Rate	Increased	Increased	Often >30/minute	
Use of Accessory Muscles; Sternomastoid & Abdominal, Pursed Lip Breathing	Usually Not	Commonly	Marked	Marked
Breath Sounds	Intermittent wheezing	Moderate wheezing	Absent or tight, Severe wheezing	Absent or tight
Pulse/Minute	<100	100-120	>120	Bradycardia

Functional Assessment

	MILD	MODERATE	SEVERE	SUBSET: Respiratory Arrest Imminent
PaO_2 (on home oxygen)	Normal (ABG not usually necessary)	Hypoxic	Possible cyanosis	Possible cyanosis
and/or PCO_2	Increased	Moderately increased	Possible respiratory failure	Respiratory Failure
pH	Normal Compensated	<7.35 Noncompensated	<7.35 Noncompensated	<7.30 Noncompensated
SaO_2 and/or SpO_2 percent (on home O_2)	85-88%	<85%	<80%	<80%
Peripheral Edema	May be increasing	Increasing	New onset marked	New onset marked
Sputum Volume and Purulence	Increased volume	Increased volume	Increased volume and purulence	Increased volume and purulence
Activities of Daily Living	Mild reduction	Moderate reduction	Marked reduction	Marked reduction

KEY: ABG: Arterial Blood Gas; COPD: Chronic Obstructive Pulmonary Disease; O_2: Oxygen; PaO_2: Arterial Oxygen Pressure; PCO_2: Partial Pressure of Carbon Dioxide in Blood; pH: Measurement of Blood Alkalinity or Acidity; SaO_2: Arterial Blood Oxygen Saturation; SpO_2: Pulse Oximeter Oxygen Saturation

Notes:
- The presence of several parameters, but not necessarily all, indicates the general classification of the exacerbation.
- Many of these parameters have not been systematically studied, especially as they correlate with each other. Thus, they serve only as general guides.
- The emotional impact of COPD systems on the patient and family is variable but must be recognized and addressed and can affect approaches to treatment and follow-up.

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FORMAL EVALUATION OF ADULT **COPD** EXACERBATION SEVERITY IN THE

Ambulatory Based Care
(To be used with Management of Adult COPD Exacerbation Flow Diagram)

Appendix B

SABA by Nebulizer or MDI for Exacerbation
Medication Dosage and Frequency Guidelines for Respiratory Therapy

See Appendix A for full list of Symptoms	MILD (Intermittent wheezing)	MODERATE (Moderate wheezing, history of asthma)	SEVERE (Severe wheezing, severe dyspnea, unable to sleep)	SUBSET: Respiratory Arrest Imminent
Ambulatory Adult ROC	2.5 mg Albuterol once, then 2.5 mg Albuterol Q1 hour PRN Add 0.5 mg Ipratropium to first dose	2.5 - 5 mg Albuterol once, then Q4 hours and Q1 hour PRN Add 0.5 mg Ipratropium to first dose and then Q4 hours NOTE: If the patient needs more than (2) Q1 hour treatments, return to Initial Assessment on Adult Management of COPD Exacerbation Flow Chart and notify Physician/LIP	Patient to Emergency Department (Follow Hospital Exacerbation Protocol)	Patient to Emergency Department (Follow Hospital Exacerbation Protocol)

KEY: COPD: Chronic Obstructive Pulmonary Disease; LIP: Licensed Independent Practitioner; MDI: Metered Dose Inhaler; mg: Milligram; PRN: As Needed; Q1: Every 1 Hour; Q4: Every 4 Hours; ROC: Respiratory Outpatient Clinic; SABA: Short Acting Beta Agonist

Notes:
- The presence of several parameters, but not necessarily all, indicates the general classification of the exacerbation.
- Many of these parameters have not been systematically studied, especially as they correlate with each other. Thus, they serve only as general guides.
- The emotional impact of COPD systems on the patient and family is variable but must be recognized and addressed and can affect approaches to treatment and follow-up.

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Note: The COPD Ambulatory Exacerbation Protocol (pages -4 above) is an example of design and implementation as well as thoughtful application of information and technology.

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mMrc Dyspnea Scale

Grade	Dyspnea related to activity
0	Breathlessness only on strenuous exercise
1	Breathless when hurrying on the level or walking up a slight hill
2	Walks slower than other people of same age on the level due to shortness of breath or need to stop for breath when walking at own pace
3	Short of breath after walking few minutes on the level or about 100 yards (90m)
4	Too breathless to leave the house, or breathless when dressing or undressing

Modified from The Medical Research Council Dyspnea scale (mMRC dyspnea scale)

Appendix C

Adult Management of
COPD

Ambulatory Based Care
Assessment Tests

CAT Test

COPD Assessment Test (CAT)

Statement (left)	Scale	Statement (right)	SCORE
I never cough	0 1 2 3 4 5	I cough all the time	
I have no phlegm (mucus) in my chest at all	0 1 2 3 4 5	My chest is completely full of phlegm (mucus)	
My chest does not feel tight at all	0 1 2 3 4 5	My chest feels very tight	
When I walk up a hill or one flight of stairs I am not breathless	0 1 2 3 4 5	When I walk up a hill or one flight of stairs I am very breathless	
I am not limited doing any activities at home	0 1 2 3 4 5	I am very limited doing activities at home	
I am confident leaving my home despite my condition	0 1 2 3 4 5	I am not at all confident leaving my home because of my lung condition	
I sleep soundly	0 1 2 3 4 5	I don't sleep soundly because of my lung condition	
I have lots of energy	0 1 2 3 4 5	I have no energy at all	

COPD Assessment Test and CAT logo is a trademark of the GlaxoSmithKline group of companies.
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www.catestonline.org

TOTAL SCORE

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Examples of thoughtful application of information and technology (EMR documentation screens):

Figure Six: COPD Phase 1 PDN Initial Assessment

Page 1 (above & below)

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Respiratory Outpatient Readmission Reduction - XTEST, PACIFIC

*Performed on: 12/09/2022 16:24 MST By: STUCKI, RCP, TAMMY

Obstructive Sleep Apnea Questionnaire

Primary Care Physician
Cerner, Cerner

Total Score:

STOPBANG Risk Interpretation
- ○ High Risk for Moderate to Severe OSA (5-8)
- ○ Intermediate Risk for OSA (3-4)
- ○ Low Risk for OSA (0-2)
- ● Diagnosed OSA
- ○ Patient Unable to Answer
- ○ Negative Sleep Study within 3 yr and <10% weight gain

Have you had a sleep study and been diagnosed as having sleep apnea?
- ● Yes
- ○ No
- ○ Patient Unable to Answer
- ○ Negative Sleep Study within 3 yr and <10% weight gain

STOP-BANG Questions

Snoring: Do you snore loudly (louder than talking or loud enough to be heard through closed doors?)
- ○ Yes ○ No

Tiredness/fatigue: Do you often feel tired, fatigued, or sleepy during the daytime, even after a "good" night's sleep?
- ○ Yes ○ No

Observed apnea: Has anyone ever observed you stop breathing during your sleep?
- ○ Yes ○ No

Pressure: Do you have or are you being treated for high blood pressure at home?
- ○ Yes ○ No

Height _____ cm
Weight _____ kg
Body Mass Index: Over 35?
- ○ Yes ○ No

Body Mass Index: _____

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Respiratory Outpatient Readmission Reduction - XTEST, PACIFIC

*Performed on: 12/09/2022 16:24 MST By: STUCKI, RCP, TAMMY

Social History

Mark all as Reviewed

Social

+ Add | Modify | Display: Active | ☐ Unable to Obtain

Category	Details	Last Updated
Tobacco	Use: Never smoker.	04/11/2019 10:44 MDT
	Use: Never smoker.	08/17/2021 13:56 MDT
	Use: Former smoker. Type: Cigarettes. Total pack years (# pack/day x # years) 72. Stopped age: 59 Years.	12/09/2022 16:29 MST
Alcohol		
Substance Use		
Sexual, Gender Identity and Orienta...		
Home/Environment		
Employment/School		
Hobbies/Interests		

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Respiratory Outpatient Readmission Reduction - XTEST, PACIFIC

*Performed on: 12/09/2022 16:24 MST By: STUCKI, RCP, TAMMY

Cardiac and Pulmonary History

Cardiac History
- ☐ None
- ☐ Arrythmia
- ☑ Hypertension
- ☐ Congestive heart failure
- ☐ Edema
- ☐ Orthopnea
- ☐ Atherosclerotic Heart Disease
- ☐ Thrombosis
- ☐ Myocardial infarction
- ☐ Post Heart Surgery (within 4 weeks)
- ☐ Other:

Pulmonary History
- ☐ None
- ☑ Sleep apnea
- ☐ Pneumonia
- ☐ Upper respiratory infection
- ☐ Lung carcinoma
- ☐ Asthma
- ☐ History of Asthma
- ☐ bronchitis
- ☐ Lobectomy
- ☐ Pneumonectomy
- ☐ Fibrosis
- ☐ Cystic Fibrosis
- ☑ Emphysema
- ☐ Bronchiectasis
- ☑ Chronic obstructive pulmonary disease
- ☐ Other:

Mark all as Reviewed

Diagnosis (Problem) being Addressed this Visit

+ Add | Modify | Convert | Display: All | ... | IMO

	Priority	Annotated Display	Condition Name	Date	Code	Clinical Dx
ⓘ	▾	Maturity onset diabetes mellitus in youth (MODY)	Maturity onset diabetes mellitus in youth (MODY)	09/19/2018	E13.9	Maturity onset diabetes ...
ⓘ	▾	Pre-procedural laboratory examination	Pre-procedural laboratory examination	11/11/2020	Z01.812	Pre-procedural laborator...
ⓘ	▾	COPD with acute exacerbation	COPD with acute exacerbation	03/02/2021	J44.1	COPD with acute exacerb...

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Figure Seven: 2018 AARC Published Abstract/Poster for In-Hospital Mortality and 30-Day Readmission Rates

Outcomes from the Implementation of a Pulmonary Disease Navigator for Higher Risk Patients, In-Hospital Mortality and 30-Day Readmission Rates

Kim Bennion MsHS, RRT, CHC, Scott Daniel RRT, Kyle White RRT, Gardner Gee and Tammy Stucki RRT

Background

Dixie Regional Medical Center is a 245-bed hospital and is one of 23 acute care hospitals of the Intermountain Healthcare Corporation. To improve CMS Core Measures[1] for COPD hospital 30-day readmission and mortality, we instituted a Pulmonary Disease Navigator (PDN).

PDN duties include but are not limited to:
1) Earlier disease education
2) Creation of documented care plans
3) Transition Care Management
4) Timely, medically necessary referrals (e.g., PFT, pulmonary rehab)
5) Post-discharge follow-up phone calls for care plan adherence
6) Medication instructs
7) Training patients on the proper use of CPAP, BiPAP and other equipment
8) Airway clearance methods
9) Breathing exercises
10) Tobacco cessation and all aspects of symptom management
11) Interdisciplinary pulmonary care training

We sought to identify what, if any, outcomes might be improved with the addition of the PDN.

Method

Between May 2017 - March 2018, 127 patients were identified as diagnosed with COPD and followed by our PDN. Of these 127, 67 (53%) were admitted with COPD exacerbation. We sought to determine what, if any, impact the PDN might have on COPD patient care and outcomes. Daily readmission and hospital mortality data was gathered on a daily basis using various tracking programs. COPD education was taught to new admissions and readmitted patients.

Results

Pre and Post Pulmonary Disease Navigator Outcomes

DRMC COPD In-Hospital and 30-Day Mortality All Payer by Quarter

Discharge Qtr	Cases #	In-Hospital Mortality #	In-Hospital Rate %	Mortality 30-Day #	30-Day Rate %
Qtr 2-2016	42	3	7.14	7	16.67
Qtr 3-2016	32	0	0	0	0
Qtr 4-2016	52	2	3.85	6	11.54
Qtr 1-2017	87	4	4.6	11	12.64
Qtr 2-2017	73	3	4.11	6	8.22
Qtr 3-2017	43	3	6.98	6	13.95
Qtr 4-2017	58	1	1.72	2	3.45
Qtr 1-2018*	89	2	2.25	5	5.62

*incomplete quarter data

Pre/Post PDN Implementation

Conclusion

PDN implementation occurred Q3 2016. It is interesting to compare Q2 2016 with Q2 2017, as well as Q4 2016 with Q4 2017 outcomes for both in-hospital mortality and 30-Day readmission rates. While we cannot conclude an absolute cause and effect relationship solely with the implementation of the PDN implementation Q3 2017, the drop in both outcomes tends to strengthen our suggestion that employing a PDN impacted our outcomes. Other detailed outcomes are reported in separate abstracts.

Since initial implementation of the PDN, we can assume and report other benefits. These include, but are not limited to:
1) Physicians requesting PDNs in their offices
2) Physicians requesting RRTs as telemedicine consultants
3) Enhanced patient/healthcare team communication
4) Improved timeliness of medically necessary referrals (e.g., Tobacco Cessation, PFT, and Advance Care Planning)
5) Elevation of Respiratory Therapy as a profession.

It is our impression that patients, their families and members of the healthcare team benefit from detailed, timely, coordinated interventions that are best guided by Respiratory Therapists under the general supervision, direction and orders from patient physicians.

References

[1]https://www.cms.gov/Medicare/Quality-Initiatives-Patient-AssessmentInstruments/HospitalQualityInits/Measure-Methodology.html

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Figure Eight: 2018 AARC Published Abstract/Poster for Inhaled Medication Delivery and Inspiratory Flowrates

Adult Inhaled Medication Delivery and Inspiratory Flowrates
A Pulmonary Disease Navigator's Findings Among Medically Complex Patients

Kim Bennion MsHS, RRT CHC, Scott Daniel RRT, Kyle White RRT, and Tammy Stucki RRT

Background

Dixie Regional Medical Center is a 245-bed hospital and is one of 23 acute care hospitals of the Intermountain Healthcare Corporation. To improve CMS Core Measures[1] for COPD hospital 30-day readmission and mortality, we instituted a Pulmonary Disease Navigator (PDN). PDN duties include the assessment of care plans to include medications and their delivery as well as several other services. Tracking inspiratory flow rate (IFR) capabilities among medically complex COPD patients, the PDN reported patient inability to generate manufacturer's recommended IFR for their devices in a number of patients. Dry Powered Inhalers (DPI) generally require an inspiratory flow of 30-90 LPM. Studies have suggested that ideal IFR will determine laminar flow and thus better deposition of the medication[2],[3]. We utilize the InCheck Dial® to assess the patient's ability to generate adequate IFR in lieu of DPI resistance. DPIs and pressurized metered dose inhalers (MDI) are rated based on resistance (low to high). Further requirements to consider for DPI/MDI use are: 1) respiratory rate < 28, 2) 3 second breath hold, and 3) patient alert.

Method

Between May 2017-March 2018, 127 patients were identified as being diagnosed with COPD and were followed by our PDN.

Figure One: In-Check Dial® inspiratory flow device.

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Results

PDN outcomes for patient IFRs are reported in Table One.

Figure Two: We utilize the InCheck Dial® to assure adequate patient inspiratory flow.

Inhaler Resistance Range

Figure Three: We utilize the InCheck Dial® to assure adequate patient inspiratory flow.

References

[1]https://www.cms.gov/Medicare/Quality-Initiatives-Patient-AssessmentInstruments/HospitalQualityInits/Measure-Methodology.html

[2]Kanabuchi K, Kondo T, Tanigaki T, Tajiri S, Hayama N, Takahari Y and Iwao K (2011). Minimal inspiratory flow from dry powder inhalers according to a biphasic model of pressure vs. flow relationship. Tokai J Exp Clin Med. 2011 Apr 20;36(1):1-4.

[3]Mahler DA (2017). Peak inspiratory flow rate as a criterion for dry powder inhaler use in chronic obstructive pulmonary disease. Ann Am Thorac Soc. Jul;14(7):1103-1107. doi: 10.1513/AnnalsATS.201702-156PS.

[4]Braman S, Carlin B, Hanania N, Mahler D, Ohar J, Pinto-Plata V, Shah T, Eubanks D, Dhand R (2018). Results of a Pulmonologist Survey Regarding Knowledge and Practices With Inhalation Devices for COPD. Respiratory Care July 2018, 63 (7) 840-848; DOI: http://doi.org/10.4187/respcare.05717

Table One: Adult Patient Inspiratory Flows for Inhaled Medication Delivery

Adult Inspiratory Flow Rates n=127 # (%)			
< 80 LPM*	< 70 LPM*	< 65 LPM*	< 50 LPM*
23 (18)	12 (9)	13 (10)	2 (2)
23 (18%) patients had IFR < 90 LPM*			

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Figure Nine: 2018 AARC Published Abstract/Poster for COPD Pulmonary Function Testing

Quality Measures of Standard Adherence

St. George Regional Hospital (SGRH), previously known as Dixie Regional Medical Center (DRMC-245 beds) and Intermountain Medical Center (IMC-504 beds) were selected as PDN pilot sites. PDN workflow is based on the system COPD Readmission Reduction Protocol (Figure Five above). Duties include, but are not be limited to: 1) inpatient evaluations before hospital discharge to include community care management, 2) evaluations in the Respiratory Outpatient Clinic, 3) evaluation of care plans and patient compliance to care plan, 4) assessment of oxygen requirement or other durable medical equipment needs, 5) physician contact for referrals for medically necessary services for which patients met physician defined clinical criteria (protocols), 6) medications and their delivery, 7) patient/caregiver education, 8) the utilization of a COPD observation unit (SGRH only), and 9) scheduled 2-week post-discharge clinic visits to include pre-/post-pulmonary function testing, 6-minute walk, tobacco cessation, sleep study, pulmonary rehabilitation and serious illness discussions/advance care planning with goal attainment scaling as part of the National Committee for Quality Assurance Serious Illness Learning Collaborative, a $50,000 grant funded project. Between May 2017 - March 2018 at DRMC, 127 patients were identified as diagnosed with COPD and followed by the PDN. Of these 127, 67 (53%) were admitted with COPD exacerbation. At IMC between November 2017-September 2018, 417 patients were diagnosed with COPD (DRG 190, 291 & 192) and/or had a COPD diagnosis in their medical record. All 417 were contacted by a PDN. Outcomes were tracked, analyzed, and reported via the COPD dashboard.

Following the PDN pilot program at the facilities demonstrated the benefit of the PDN program in reducing 30-day All-Cause Readmissions for COPD (Figures Ten & Eleven from St George Hospital, formerly known as Dixie Regional Medical Center) the program was expanded to include the three additional trauma centers: McKay-Dee Hospital (MKDH), Latter-day Saint Hospital, (LDSH) and Utah Valley Hospital (UVH). The system average before the pilot began in 2017 for 30-day All-Cause Readmission was 18.2% as compared

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to 11.2% following PDN and information technology solutions. Even though this is below the CMS penalty, Intermountain

sought to further reduce the readmission rate at the PDN sites. We then further refined documentation tools to assist the PDNs in detailing the following inpatient and outpatient information: inpatient evaluations to include community care management, outpatient evaluation of care plans, oxygen requirements and other durable medical equipment needs, medication regimen evaluation, and referral recommendations to the provider for protocol driven outpatient services, like pulmonary function testing, pulmonary rehab, sleep study, and advanced care planning. Figures Twelve and Thirteen are example reports of the 2017-2022 CMS Penalty and Intermountain Healthcare System all-cause COPD Hospital Readmission Outcomes. Key process indicators (KPIs) are reported as value-based care with the utilization of standardized clinical practice utilizing evidence-based protocols, performing ongoing auditing and monitoring, and quarterly reporting to senior leadership. With CMS penalties in play, Respiratory Care leadership has provided reports since 2016 in terms of quality, community stewardship, healthcare access, and growth.

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Figures Ten & Eleven: SGRH Initial Outcomes Utilizing PDN and EHR Solution

RESULTS

Pre and Post Pulmonary Disease Navigator Outcomes

DRMC COPD In-Hospital and 30-Day Mortality All Payer by Quarter					
Discharge Qtr	Cases #	In-Hospital Mortality #	In-Hospital Rate %	Mortality 30-Day #	30-Day Rate %
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Qtr 1-2017	87	4	4.6	11	12.64
Qtr 2-2017	73	3	4.11	6	8.22
Qtr 3-2017	43	3	6.98	6	13.95
Qtr 4-2017	58	1	1.72	2	3.45
Qtr 1-2018*	89	2	2.25	5	5.62

*incomplete quarter data

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Figure Twelve: 2017-2022 CMS Penalty and Intermountain Healthcare System All Cause COPD Hospital Readmission Outcomes

Graphic display of the impact of the utilization of standard of care and outcomes with the support of information technology solutions.

Figure Thirteen: Intermountain Healthcare CMS 30-Day Readmission Rate
Dec 1, 2019 – Dec 1, 2022
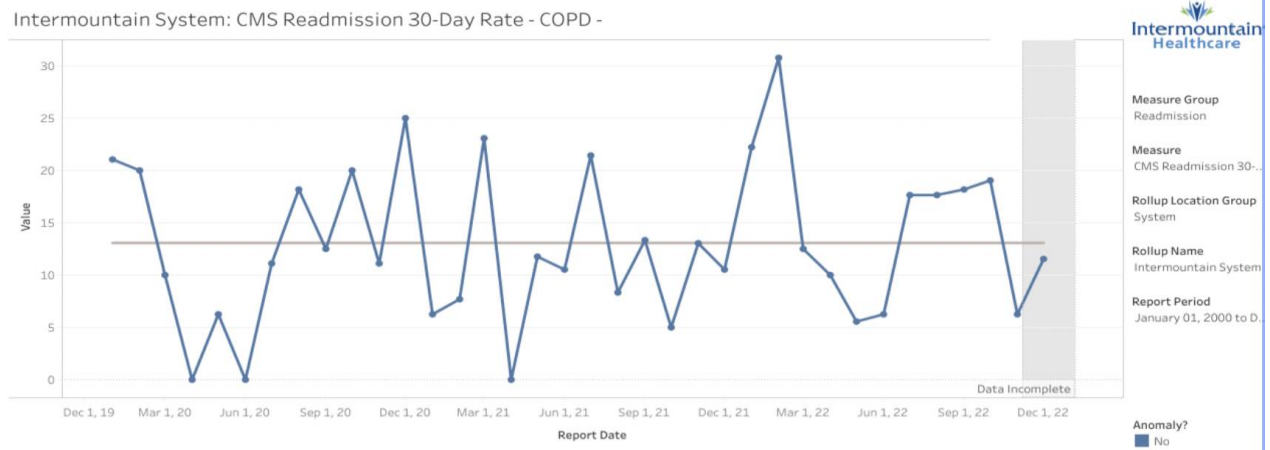
Measure Steward Organization

The Medicare Hospital Readmission Reduction Programs (HRRP) tracks all outcomes relative to the six included diagnoses and procedures for targeted tracking of 30-day unplanned admissions.[1] CMS calculates the payment reduction and component results for each hospital based on its performance during a rolling performance period. The payment adjustment factor is the form of the payment reduction CMS uses to reduce hospital payments. Payment reductions are applied to all Medicare fee-for-service base operating diagnosis-related group payments during the FY (October 1 to September 30). The payment reduction is capped at 3 percent (that is, a payment adjustment factor of 0.97).

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CMS sends confidential Hospital-Specific Reports (HSRs) to hospitals annually. CMS gives hospitals 30 days to review their HRRP data as reflected in their HSRs, submit questions about the calculation of their results, and request calculation corrections. The Review and Correction period for HRRP is only for discrepancies related to the calculation of the payment reduction and component results.[1]

Numerator – Intermountain follows the Medicare HRRP as the guideline for numerator inclusion. Overall, we include those adult patients ≥ 18 years of age with a 30-day readmission diagnosis of COPD.

Denominator of Intermountain COPD Patient Readmissions Extraction
While the Medicare HRRP program assigns reimbursement penalties for 30-day hospital, all cause readmissions based on DRG 190, 191 and 192 Intermountain initiatives have focused on adults ≥ 18 years of age with a diagnosis of COPD in the medical record. However, one of the gaps of care identified in 2011-2012 included the inclusion of patients in the COPD diagnosis of COPD based on clinical findings with a lack of definitive diagnosis of COPD via pulmonary function testing. A lack of access via the EHR to PFT results if performed in physician clinics was also noted. To address this, an information technology solution was created to link PFT results to be viewable in via the patient's EHR.

Clinical Exemption Criteria from the Measurement Cohort
While included in the Medical HRRP results, Intermountain has excluded patients with a DRG diagnosis of 190, 191 or 192 who is < 18 years of age/or hospice care. It should be noted that very few patients with the designated DRG diagnosis are <18 years of age. The majority of pediatric patients with the designated COPD DRG diagnosis codes are cared for in our stand-alone pediatric hospital which are not included in the Medicare HRRP program/COPD outcomes reports.

The data extraction is a by-product of EHR documentation obtained from the enterprise data warehouse (EDW) or the HealtheIntent population health platform and claims data.

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Design and Implementation Model Practices and Governance

ARCIE Reference Document:
This was an initiative originating from the work of and coordinated by Respiratory Care Clinical Services. Continued monitoring of compliance continues to be their stewardship.

Approved	Organization's President, CEO, COO, Nursing Chief Officer, and Chief Information Officer and Hospital Medical Executive Committees
Reviewed	Representatives from Respiratory Care Services and System/ Facility Respiratory Care Medical Directors, Hospitalists, Intensivists, Pulmonologists, Primary Care Physicians, Hospital and Home Care nurses, and Respiratory Therapists and aides, Information Technology Consultants, Patient/Provider Education Consultants
Consulted	Representatives from Respiratory Care Services and System/ Facility Respiratory Care Medical Directors, Hospitalists, Intensivists, Pulmonologists, Primary Care Physicians, Hospital and Home Care nurses, and Respiratory Therapists and aides, Information Technology Consultants, Patient/Provider Education Consultants
Informed	Representatives from Respiratory Care Services and System/ Facility Respiratory Care Medical Directors, Hospitalists, Intensivists, Pulmonologists, Primary Care Physicians, Hospital and Home Care nurses, and Respiratory Therapists and aides, Information Technology Consultants, Patient/Provider Education Consultants
Executed	Respiratory Care Services and System/Facility Respiratory Care Medical Directors, Hospitalists, Intensivists, Pulmonologists, Primary Care Physicians, Hospital and Home Care nurses, Respiratory Therapists and aides, Information Technology Consultants, Patient/Provider Education Consultants

Sub-committees met ad hoc as various documents and processes were created. Utilize charts describing critical multidisciplinary committees if applicable. Education to staffs included interactive computer training modules with case scenarios, FACT sheets and hands-on trainings (Figures Sixteen & Seventeen-pages 1-3). Super User trainers were utilized to conduct trainings and to document competencies following didactic and computerized training modules.

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Figure Sixteen: Example of COPD Diagnosing and Staging FACT Sheet Education

Figure Seventeen: Example of EHR Computerized Training Module for Education-Page 1

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Page 2.

Page 3.

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Tools, Resources, and Timeline for Clinical Staff Training

Under the direction of a pulmonary medical director, and a committee of pulmonary disease navigators, and based on the COPD GOLD Standards, the Ambulatory High-Risk COPD Protocol was developed as well as EHR workflows to include but not be limited to the order set, communication of order, documentation of intervention(s) as well as outcomes reporting generation. Respiratory Care Medical Directors at each hospital presented all aspects of the referral and care workflows mentioned above to the Medical Executive Committees for approval. Further, the Respiratory Care Medical Directors were tasked with the dissemination of the protocols, processes, and workflows prior to implementation. Outcomes of the two-facility pilot previously reported in this application were included. Hospital-based caregivers of all disciplines were educated on high-level information regarding the new initiative. Hospital-based respiratory therapists were provided more detailed education in care coordination with the pulmonary disease navigators in terms of items listed previously in the workflow and electronic medical record. Respiratory Therapists received both didactic training with reinforced learning via computer-based protocols which provided case examples for protocol application practice. All of this occurred the quarter prior to go-live. The merging of protocols and the electronic medical record inclusion in physician/advance practice provider Power Plans has improved workflows, patient through put, and minimized the number of charting "clicks" required to care for this subset of patients.

Clinical Transformation enabled through Information and Technology

This section is devoted to describing the longitudinal clinical workflow and all the different touchpoints where information and technology drives improved adherence to the standard of care.

Figure Fifteen: Flow Chart Longitudinal Clinical Workflow Integrating IT/EHR Solution Touch Points

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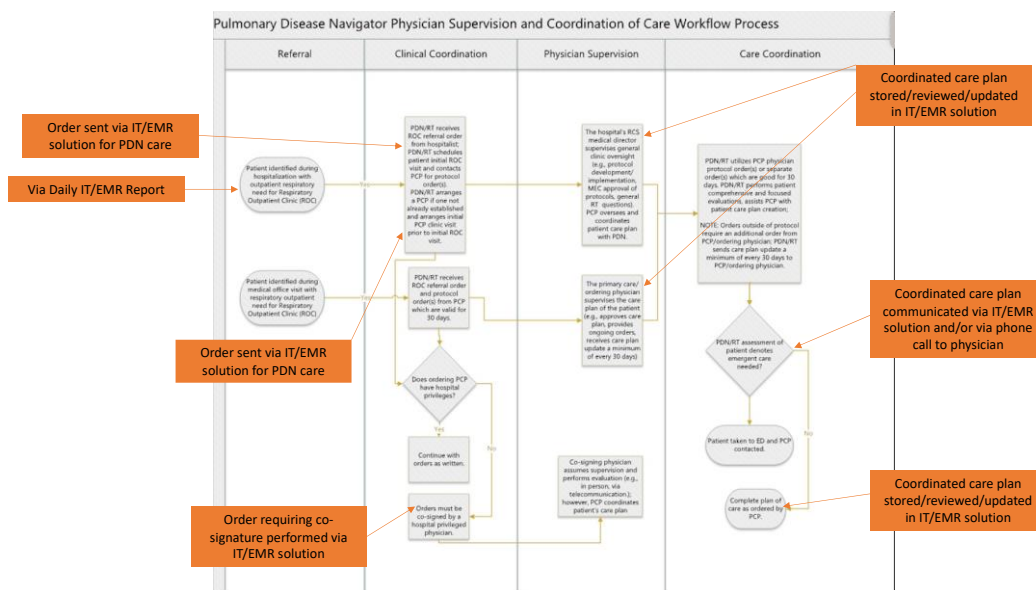
Note: PDNs can "propose orders" to providers for authentication within the EHR.
Multiple disciplines now have access to the protocol, patient history, clinical data, behavioral health data, social determinants of health data, and/or behavior health data to risk adjust the patient. The protocol as well as the data listed above were used for clinical decision support and communication of care. Throughout the process, key system leaders met with the IT clinical support team met to revise the IT/EHR support tool to enhance patient care and timely interventions. Medication management was a pivotal patient safety best practice that was identified. Using the protocol questions in association with the ongoing patient education to their care plan, patients were more aware of the signs/symptoms of an exacerbation and were able to receive earlier, at home exacerbation mitigating interventions.

Patient Information and Technology Interventions

Currently, the Intermountain Healthcare LIVE score is available daily from EHR embedded calculations by facility for all patients with COPD. It is a prognostication score for mortality, readmission, and comorbidity (Figure Sixteen). PDNs and other disciplines utilize this score for identification of patients at risk as well as patient referrals including but not limited to advanced care planning, disease home management, and referrals to other service lines for comorbid condition management. The LIVE score combines a patient's simple laboratory values (levels of hemoglobin, albumin, creatinine, chloride, and potassium) to identify those patients who are at high risk of death or further disease advancement, and who may most need referrals to palliative care and advanced care planning resources. The PDN has the ability to guide the patient and family through these end-of-life decisions.

Patients are called by the PDNs as part of the assessment (refer to Ambulatory High-Risk COPD Protocol) to both report symptoms as well as the RPM measures following discharge. This data is used to drive/adapt the individualized care plan.

As previously mentioned, this has set the groundwork for the artificial intelligence platform that will have a patient IT interface for remote patient monitoring.

Figure Sixteen: The COPD LIVE Risk Score

Risk Score Info	LIVE score is a COPD risk score that ranges from high(1) to low(5) for mortality, readmission and comorbidity It is externally validated (National VA data and U of Chicago). * Denotes a Preliminary Score, Not Enough Lab Values Available IMRS - Intermountain Risk Score. READMIT 30 - Risk of readmission within 30 days for CHF. DEATH 30 - Risk of all-causes of death within 30 days. DEATH YEAR - Risk of all-causes of death within 1 year. All are externally validated. IMACE - Risk of Cardiovascular, acute MI or stroke mortality within 3 years. ICOPD - Risk of readmission within 30 days for patients with COPD. PNEUM - Risk of readmission within 30 days for patients with pneumonia. All are internally derived and validated based on laboratory data.

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Improving Adherence to the Standard of Care

Over the past ten years, clinicians have worked tirelessly with data extraction, the creation and application of the Ambulatory COPD High-Risk Protocol, refinement of both in person assessment and RPM data to evaluate patient status, provide education to patients and their home caregivers, and to communicate care plan outcomes to multiple disciplines using IT/EHR solutions.

Intermountain Health utilized our organization's baseline COPD outcomes data to help create the PDN model which ultimately provided the workflows to decrease the total 30-day hospital readmission for COPD by 7%. The guiding benchmark for the outcome is to remain above the CMS penalty line.

The adherence to the standard of care is represented by the increase in utilization of the EHR tools, which represent an increase in the PDN engagement activity. (Figures 17 -19).

Figure 17 — Respiratory Outpatient Readmission Reduction PowerForm

Figure 18 — High-Risk Pulmonary Disease Evaluate and Treat (outpatient)

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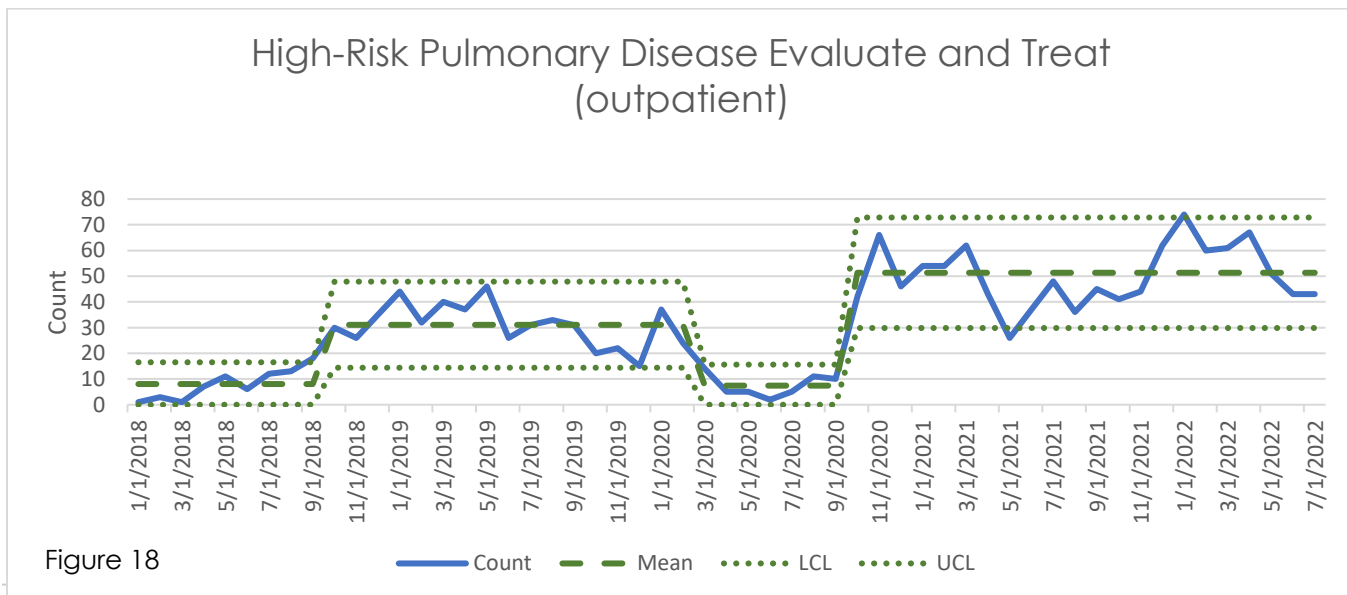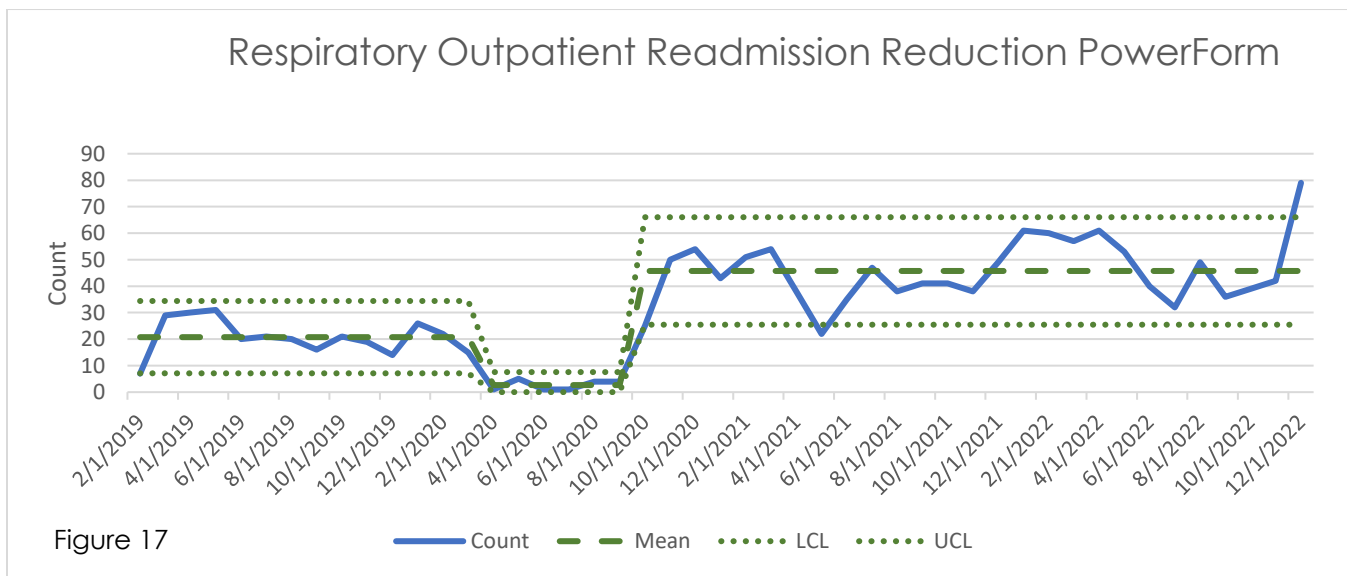
Telephone Follow-up Visit for Respiratory Risk Readmissions

Figure 19

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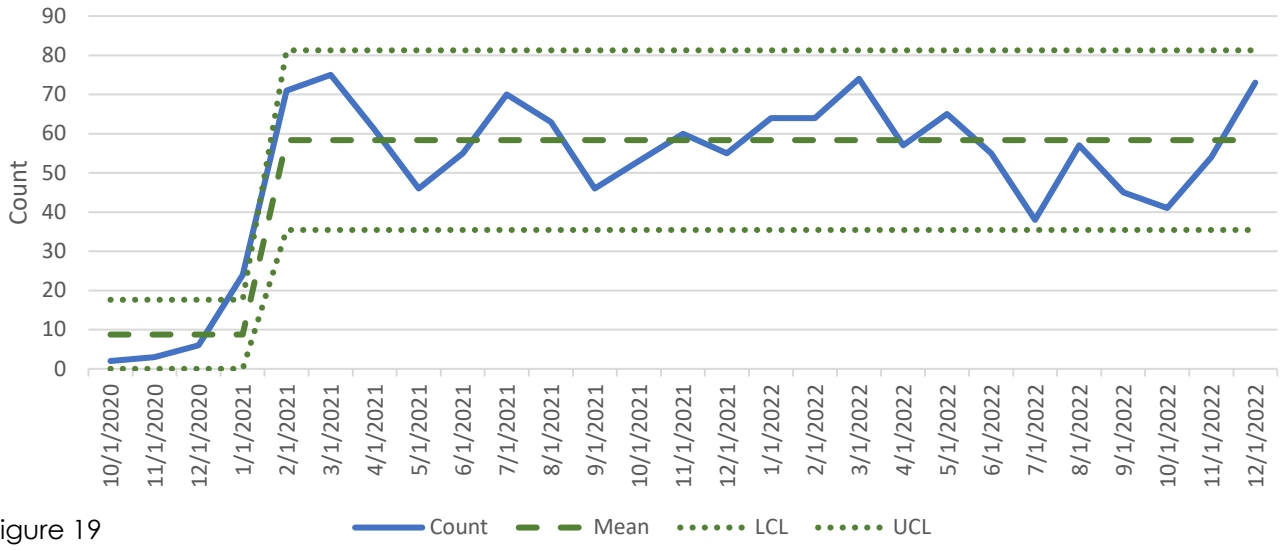
Improving Patient Outcomes

Six major direct and indirect outcomes were appreciated as a result of utilizing enhanced information technology. These include but are not limited to:

- Decrease in all cause 30-day readmission rates for this subset of complex COPD patients from 18.2 to 7.1% when comparing readmissions from 2017 (initiation) to 2022 – Figure twelve

- Identification of patients unable to "trigger" medication delivery devices due to in adequate patient inspiratory flow required to overcome the resistance of devices (19%-24% of patients identified in this category). Medication and/or delivery devices were changed upon physician notification and order

- Enhanced coordination of the patient's individual care plan among all care clinicians (e.g., physicians, respiratory therapists, nursing, pharmacists)

- Timely communication of patient status as all documentation was accessible to all clinicians as well as the ability to "author for" orders for the physician/advance practice provider. These were routed to the provider's inbox for order authentication prior to implementation. This allowed for more timely changes in the patient's care plan as needed saving human resource time.

- The Ambulatory COPD High-Risk Protocol was embedded in the EHR/IT solution and associated with the patient's specific medical record thereby assuring federal regulatory requirement compliance. This also served as a resource/reminder of the various steps in the protocol as well as "hard stops" which notified the PDN when an additional physician order was required.

- During the COVID pandemic, a time when chronic lung patients are at high-risk for severe exacerbations, only 1 of 53 patients enrolled in the SGRH study required hospital admission. The initiatives implemented over the last 10 years, including the EHR/IT solutions, made timely, high-touch care in the home possible. Providing alternative health care access proved highly valuable.

- With the system initiatives implemented, 30-day hospital admission rates as a system for this subset of patients has decreased from 18.2% to 7.1% which is well below the national average. The Medicare 3-month reports is our external performance benchmark. Further, we partner with Vizient data monthly to track outcomes as well our Select Health insurance arm outcomes. These resources are used for clinical care refinement as needed. Further, our participation in the National Committee for Quality Assurance (NCQA) Advance Care Planning Collaborative, assisted us with identifying those patients for referral to palliative and advance care planning.

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- **Figure Twelve: 2017-2022 CMS Penalty and Intermountain Healthcare System All Cause COPD Hospital Readmission Outcomes**
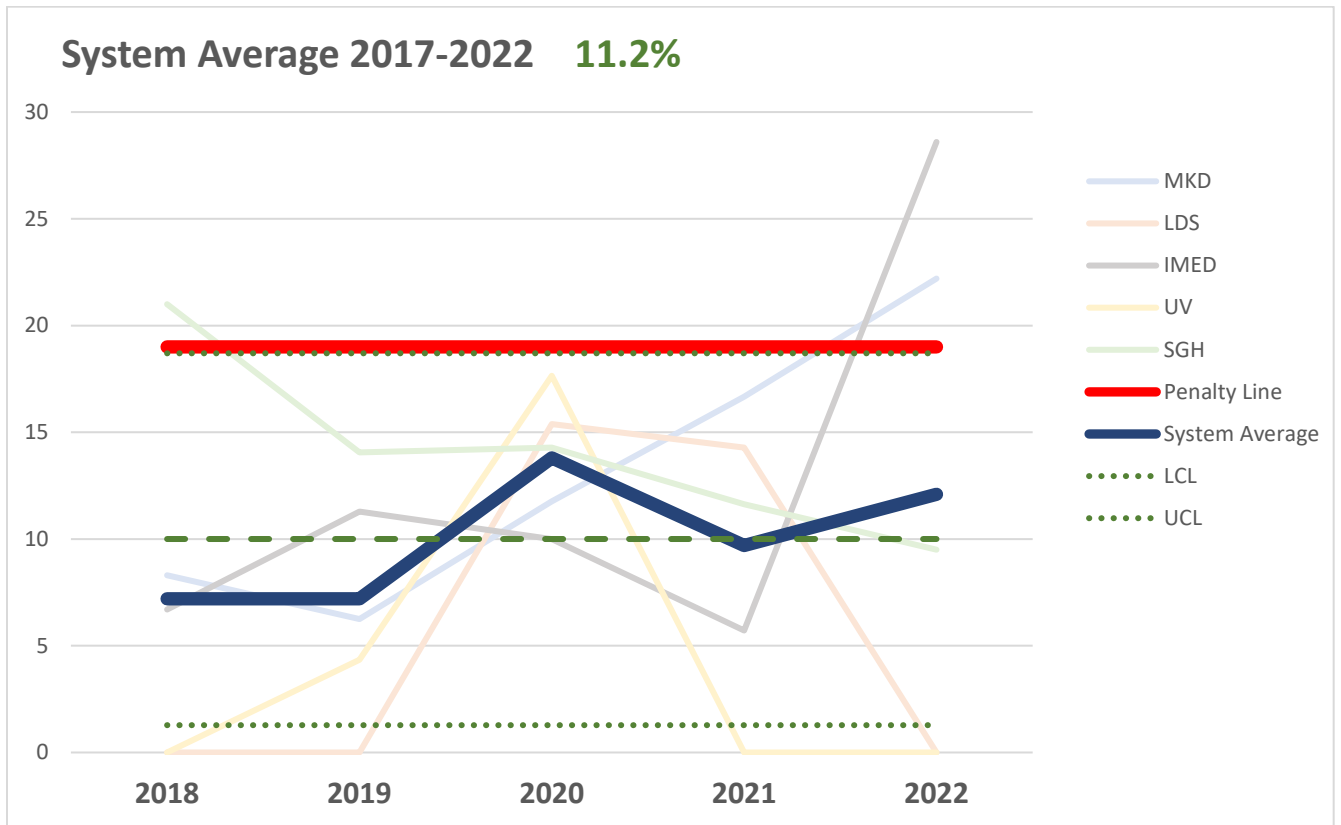
Figure 13

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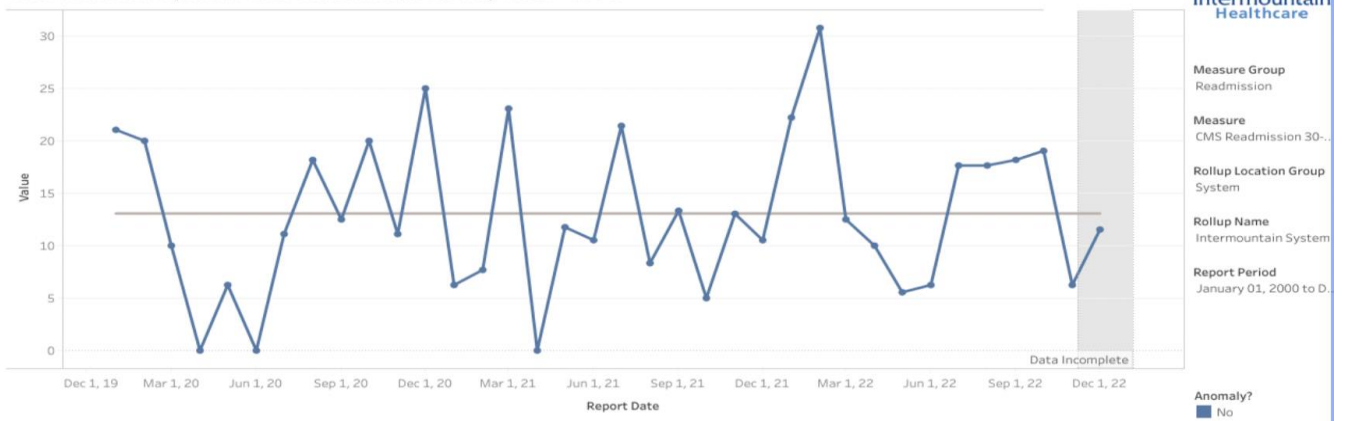
Accountability and Driving Resilient Care Redesign

The capability to monitor monthly outcomes and utilization of the PDN tools has been a key factor in the success and sustainment of the decrease in COPD 30-day readmissions as shown the sample below. (Figure 18).

Figure Eighteen: COPD Hospital Readmission Rates by Payor at St George Hospital 2014-2017 (Pre-initiatives) and 2018 – November 2022 Hospital (Post-initiatives)
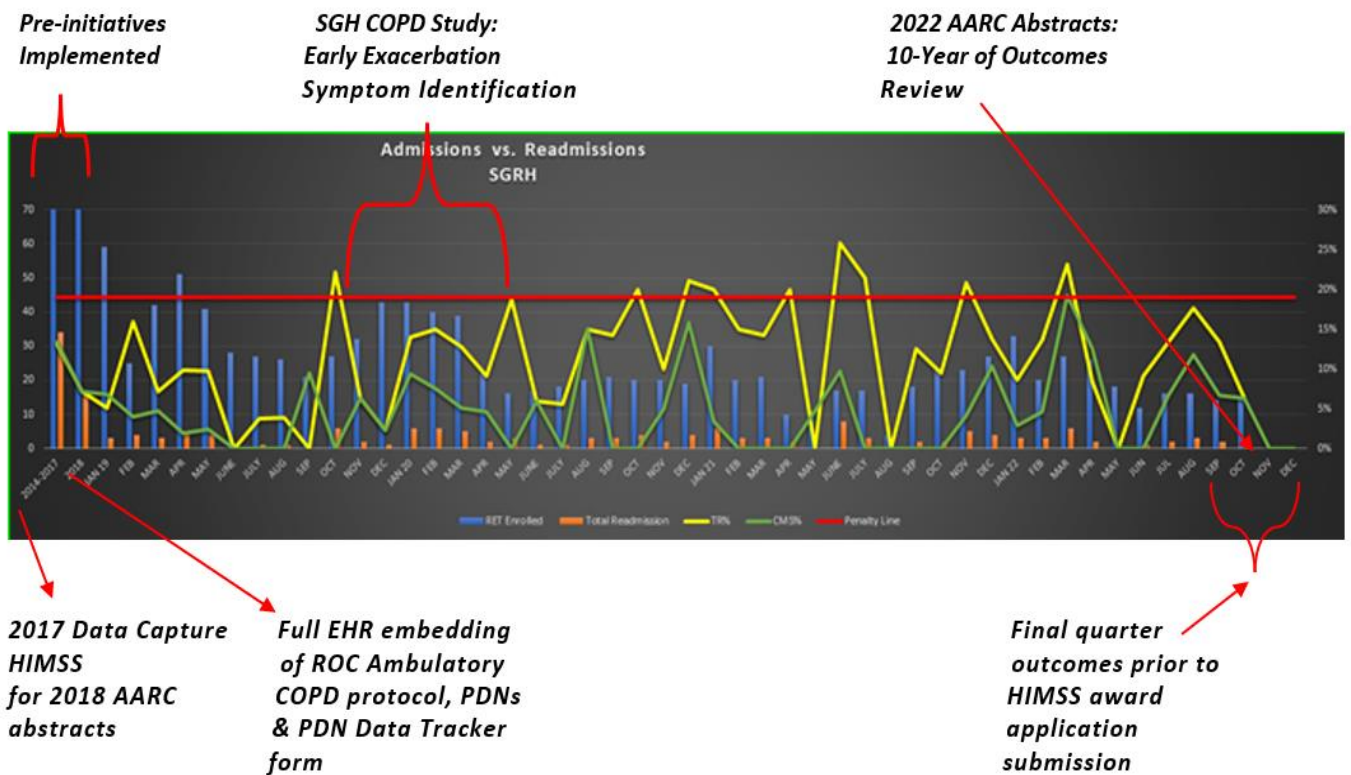
Key:
- <u>Orange</u>: Total readmissions
- <u>Yellow</u>: All payors
- <u>Green</u>: CMS readmissions
- <u>Blue</u>: Intermountain Healthcare internal readmission rate
- <u>Red</u>: CMS penalty line

Besides monthly reporting of the key initiative to decrease and maintain COPD 30-day readmission rates below 8%, tracking of the number of diagnostic pulmonary function testing, referrals to Pulmonary Rehabilitation and palliative care/hospice, patient care plan compliance (e.g., tobacco cessation, medication compliance for taking as prescribed and the ability to overcome medication delivery device resistance) and improved access to healthcare in other sites rather than the emergency room/in-patient

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admission were also tracked/reported. Routine chart audits/reports via the EHR/IT solution were performed to assure compliance to the defined

process (e.g., order co-signatures obtained as required, PDN documentation completed).

In 2018, AARC abstracts reported three key findings:

- Thirty-day readmissions and in-hospital mortality outcomes (Figure Seven above)
- Patients were identified as those unable to overcome the medication device resistance by tracking and documenting their inspiratory flow capabilities. If unable to demonstrate adequate inspiratory flow, providers were contacted both by communication in the IT/EHR solution created for this project as well as via phone as needed to change medication. This was published in the *Respiratory Care Journal.*[8] The poster of these outcomes is presented in Figure Eight above.
- Pulmonary function testing was accessible in the EHR for only 58% of patients studied. This was due to both in accessibility of PFTs performed as well as those who had never had a diagnostic PFT and/or patients not having a PFT in over two years (Figure Nine).

    - A funded study was conducted at SGH to determine what, if any, available devices for physiological, remote patient monitoring might assist in earlier capture of COPD exacerbation and thus, more timely intervention. The study included the primary outcome of healthcare access and hospital readmissions for COPD patients. Secondary outcomes included patient engagement, interventions, and the determination of which, if any device, proved valuable in earlier identification of an exacerbation. PDNs tracked the outcomes of the use of three monitoring devices (pulse oximetry, expiratory flow, and inspiratory flow) as well as patient symptom reporting utilizing the COPD Ambulatory Protocol each week. A screen shot example of the study's information technology tracker of the three devices utilized by the COPD outpatients is reported in Figure Nineteen.

Figure Nineteen: Example of the St George Hospital Study Information Technology Tracker of High-Risk COPD Outpatients

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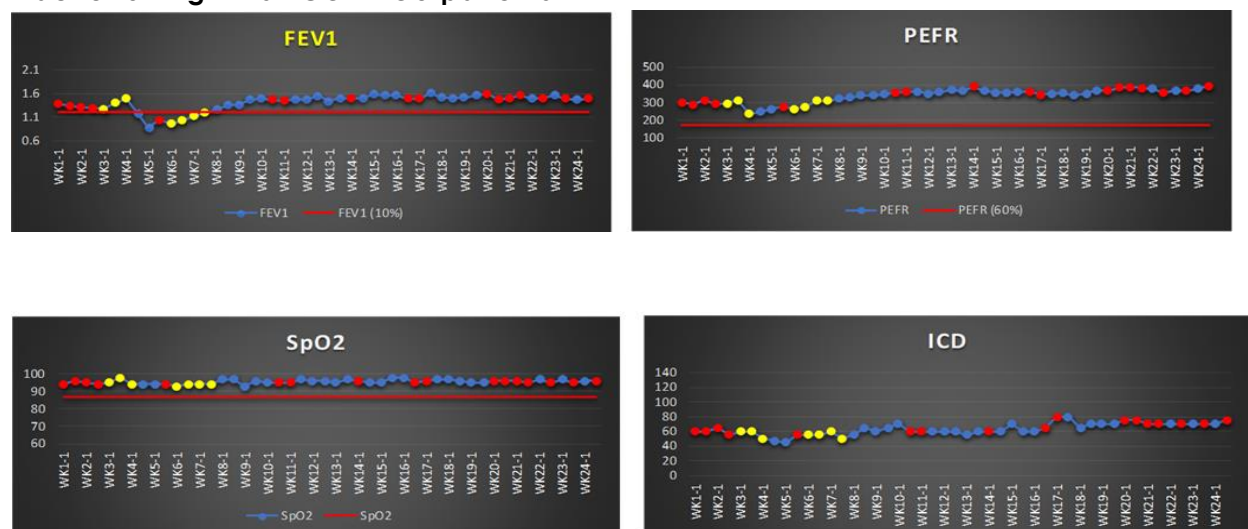
- Of 53 trial patients, 1 (2%) patient enrolled in the study was readmitted to the hospital within six months.
- Compared to a patient identifying worsened cough, shortness of breath, or mucous production, *a drop in the FEV1 by 10% was noted on average 3 days prior to patient reporting.*

As a result of our work to date as well as these study outcomes, the organization has received $2 million of unrestricted funding integrating one of the original study devices with another device and artificial intelligence embedded in the medical record across the system for COPD RPM beginning in 2023. This solution is an artificial intelligence platform for remote patient monitoring. The goal is to include 5,000 patients with these primary and secondary outcomes:

- Primary Outcomes:
    o Decrease hospital readmissions rates
    o Decrease 30-day, in hospital mortality
    o Increase diagnostic pulmonary function testing (definitive COPD diagnosis and disease staging)
    o Improved coordination of care between all healthcare arenas and multiple disciplines (e.g., surveys/feedback)
    o Improved patient access to healthcare (e.g., referrals, right time, right place at least cost, patient surveys/feedback)

- Secondary Outcomes:
    o Improved patient & provider compliance to Ambulatory COPD & Asthma Exacerbation Protocols (MEC approved annually; revised per COPD GOLD and GINA asthma standards)
    o Earlier identification of symptom exacerbation
    o Improved patient outcomes in improved healthcare access
    o "Nudging" for improved care plan compliance
    o Aggregation of population health for reporting
    o Earlier identification and treatments of patients with undiagnosed obstructive sleep apnea (OSA) or non-compliant with previously ordered therapy(ies)

Intermountain Health has partnered with vendors with an artificial intelligence (AI) platform utilizing four remote patient monitoring devices to fully scope this "high-touch, personalized care". This will allow for compliance and outcomes tracking to improve accountability. Our current dashboards are visible to the PDNs, physicians, and other caregivers. With the addition of the AI platform, reports can be as specific as to each patient as well as aggregated population health outcomes. A more accurate registry for COPD as well as adult asthma patients will be created via the AI platform with gradual integration into the electronic medical record. This stepped wedge cluster randomization trial is slated for implementation during August 2023-August 2025.

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How Does One Truly Measure Success?

Brian's Story

I never really fit in with my family. At the age of 10, I started smoking. I watched my father overdose so many times. By the age of 38, I had two heart attacks, had stents placed and was diagnosed with COPD. I continued to smoke. I was homeless and literally living on the streets for 10 years prior to meeting Kim and the Respiratory Therapists (RTs). They changed my life.

I was entered into the NCQA study and had some very heart-felt discussions with Kim and Helen. They were patient with me as I asked them questions over and over about my end-of-life options. We documented everything on the required forms which made me feel so much more secure that my wishes would come true.

Kim made me the lead of the COPD Patient Family Advisory Council. We met for six months having dinner with other COPD patients like me. We made some real changes to improve our care and the care of others. Every time I would lead a meeting, I felt like such a loser because I was still smoking. I had many discussions with my RTs about it. Finally, I was able to quit! Kim once asked me what was different this time. I told her that it was the first time I really felt like people cared about me. If I had a question, I had a consistent person to talk to. I still reach out to my RT every day! They got me into government assisted housing, Medicaid, and medications. I keep my clinic appointments. I even got my driver's license and a car!

People with chronic disease like me honestly don't want to stay sick. Too often, we just don't know how to care for ourselves. My RTs help me know what I should do when I'm not feeling well. This program changed my life. As they put it, it is "high-touch, personalized, timely healthcare when it is needed most." I love my RTs, and I love this program!

<div align="right">

Brian P.
Patient

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Brian passed away on April 11, 2023, we thank him for allowing us to be a part of his life and healthcare.

Primary Contact Information:
Farukh Usmani, MD, MS
Medical Director, Digital Technology Services
Intermountain Health
Email: **Farukh.Usmani@imail.org**
Telephone: 646-673-3725

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