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Lincoln County Community Paramedicine Data Collection Initiative

Katie Rosingana BA

University of Southern Maine, Cutler Institute, katherine.rosingana@maine.edu

Evelyn Ali BS

University of Southern Maine, Muskie School of Public Service, Cutler Institute, evelyn.ali@maine.edu

Karen Pearson MLIS, MA

University of Southern Maine, Cutler Institute, karen.pearson@maine.edu

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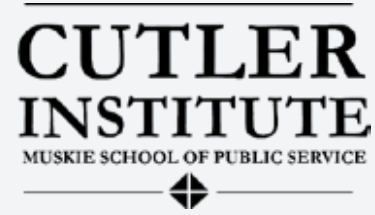


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Lincoln County Community Paramedicine Data Collection Initiative

FEBRUARY 2020



The Project

In 2019, with funding from the Doree Taylor Charitable Foundation, LincolnHealth embarked on data collection and analysis of patients in Lincoln County, Maine who use Community Paramedicine Services (CP). This project lays the groundwork highlighting the value of Community Paramedicine services, particularly regarding patient health outcomes, the reduction of emergency department (ED) use and hospital re-admissions, and cost effectiveness.

Project Goals:

- Standardize collection of patient data from all previous and current participants of CP program, spanning three to four years (data collected 2016-2019)
- Data analysis for trends in patient population, patient care, and high cost service use
- User-friendly report that can be shared with policy makers and stakeholders, to garner support for reimbursement of CP services

Project Components:

- LincolnHealth staff dedicated to pulling and cleaning CP-relevant data from patient medical records
- Technical assistance from Cutler Institute ensuring relevant data points collected for analysis
- Data analysis, preliminary cost analysis, and report generation

Background: Community Paramedicine (CP)





CP is defined as: *the practice by an emergency medical services provider primarily in an out-of-hospital setting of providing episodic patient evaluation, advice and treatment directed at preventing or improving a particular medical condition, within the scope of practice of the emergency medical services provider as specifically requested or directed by a physician. (Sec. 1. 32 MRSA §84, sub-§4)*

Community Paramedicine provides a supportive healthcare service based on the needs of the community to help reduce unnecessary emergency department visits and avoid re-hospitalizations.

Background: Community Paramedicine (CP)

- Twelve Community Paramedicine pilot projects were authorized in 2012 by the Maine Legislature.
- Legislative re-authorization in 2016 removed the maximum number of pilot projects, enabling the Board of EMS to renew existing projects.
- In Lincoln County, Boothbay Regional Ambulance Service (BRAS), Central Lincoln County Ambulance Service (CLC) and Waldoboro EMS were among the first EMS services to participate in the pilot.
- These three EMS providers/CP pilot sites have continuously provided community paramedicine services to people in Lincoln County since the initial pilot in 2012.

Lincoln County Community Paramedicine (CP) Service Area

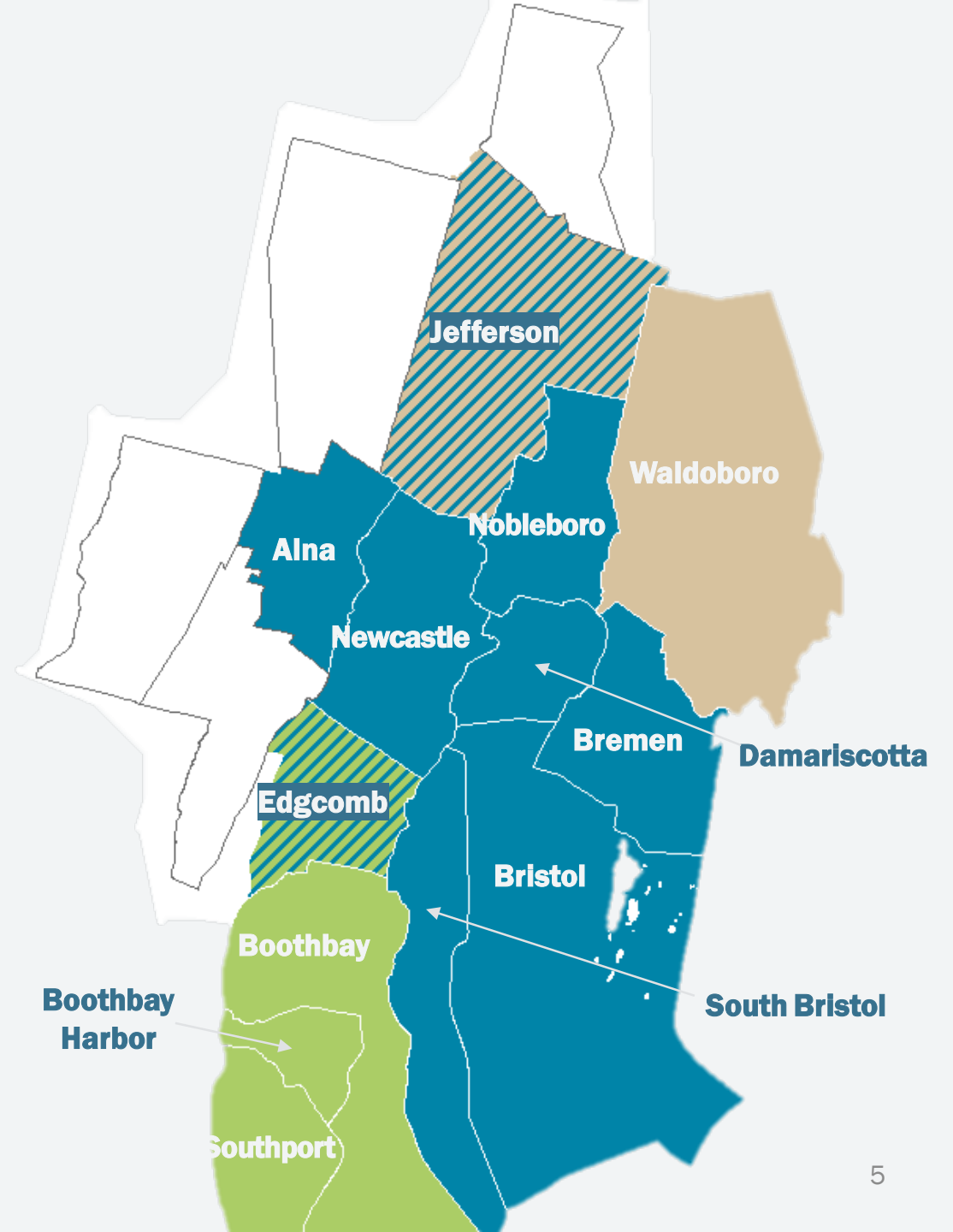
-  Boothbay Regional Ambulance Service (B.R.A.S.)* *population: 6,500*
-  Central Lincoln County Ambulance Service (CLC): *population: 14,400*
-  Waldoboro ** *population: 6,200*
-  Potential future service areas

Stripes indicate town is shared service area

Population is approximate combined service area, based on 2017 census.

*BRAS also services Monhegan, not shown

**Waldoboro also services Friendship, not shown



Background: Lincoln County CP Services

- Lincoln County CP services include the three EMS services: Boothbay, Central Lincoln County, and Waldoboro
- LincolnHealth applied for and was awarded funding to support the Lincoln County CP initiative and plays a leadership role in its operations.
- Support from LincolnHealth includes in-kind, dedicated staffing, workflow and administrative assistance, and dissemination efforts.

Program Overview: Lincoln County CP Services

Targeted Population: Persons with Chronic Conditions, the Elderly

Lincoln County CP services support elderly patients within the region by providing in-home CP services, including:

- blood draws,
- basic clinical assessments,
- medication compliance,
- patient education, and
- prevention assessment.

Recognizing that chronic diseases contribute to the high cost of health care, Lincoln County CP services focuses on individuals with any of the following chronic conditions:

- Diabetes
- Congestive Heart Failure (CHF)
- Chronic Obstructive Pulmonary Disease (COPD) or Asthma

Lincoln County's CP program goals:

- Reduce health care system costs
- Reduce patient costs by helping them monitor their chronic diseases
- Improve quality of care and health outcomes for patients

Missing Pieces: Data and Funding

- An evaluation of the implementation of Maine's EMS CP Pilot program found a need for more robust data collection from service providers and health systems, while acknowledging the dire lack of resources needed to create not just service infrastructure but also data collection standardization on patients and services (Pearson & Shaler, 2015).
- Absence of robust patient data affects the ability to obtain and retain local and statewide support for the reimbursement of services, in part because there is a lack of evidence of efficacy of CP services.
- While funding for a portion of Lincoln County CP services has been provided by Doree Taylor and other private funds, sustainability also depends on private and public insurers reimbursing these services; at this time, CP is not a reimbursable service from any payer.

Source: Pearson KB, Shaler G. *Maine EMS Community Paramedicine Pilot Program Evaluation*. Portland, ME: University of Southern Maine, Muskie School of Public Service; November 2015.

https://www1.maine.gov/ems/documents/cp_muskie_report.pdf

Doree Taylor and Lincoln County CP Data Collection Initiative

With funding and data collection for the Lincoln County CP program as the overarching drivers for sustainability, LincolnHealth applied for and was awarded a grant in late 2018 from Doree Taylor to:

- Continue CP patient visits
- Support aggregation of past CP visit data
- Support collection of future CP visit data

In addition to hiring staff to collect data and manage day-to-day work flows of CP, LincolnHealth contracted with the Cutler Institute to:

- Provide technical assistance and collaboration on relevant data collection points
- Clean, standardize, and analyze data
- Assist in cost analysis groundwork

Data Collection & Analysis: Methodology



Document Review

Reviewed hard copies for summaries from 2016, 2017, 2018 of:

- CP visit referrals
- CP visit records and reports



EMR Review

Using these systems:

- MEFIRS: Paramedicine visit data point records
- EPIC: up to date records of MaineHealth patients
- Arcadia: all records, including out of state, with 4 month lag time
- HealthInfoNet: up to date records for all of Maine, but can be 'opted out' of by patients



Data Collection Tools

Data elements were loaded into Excel spreadsheets, to include:

- Patient demographics
- High cost service use: ED visits and hospitalizations
- CP referral and service use

Data was analyzed for trends using SPSS and Excel on variables such as: visits, completion rates, service utilization data.

Data Collection & Analysis: Study Years

- Data was collected on patients in CP program years 2016, 2017, 2018, and the first 6-9 months of 2019.
- For the purposes of this presentation, only full data years (2016-2018) were used to determine trends.
- Future data analysis:
 - May include all of 2019 and future years
 - Retrospective analysis of 2015, pending resources and staffing

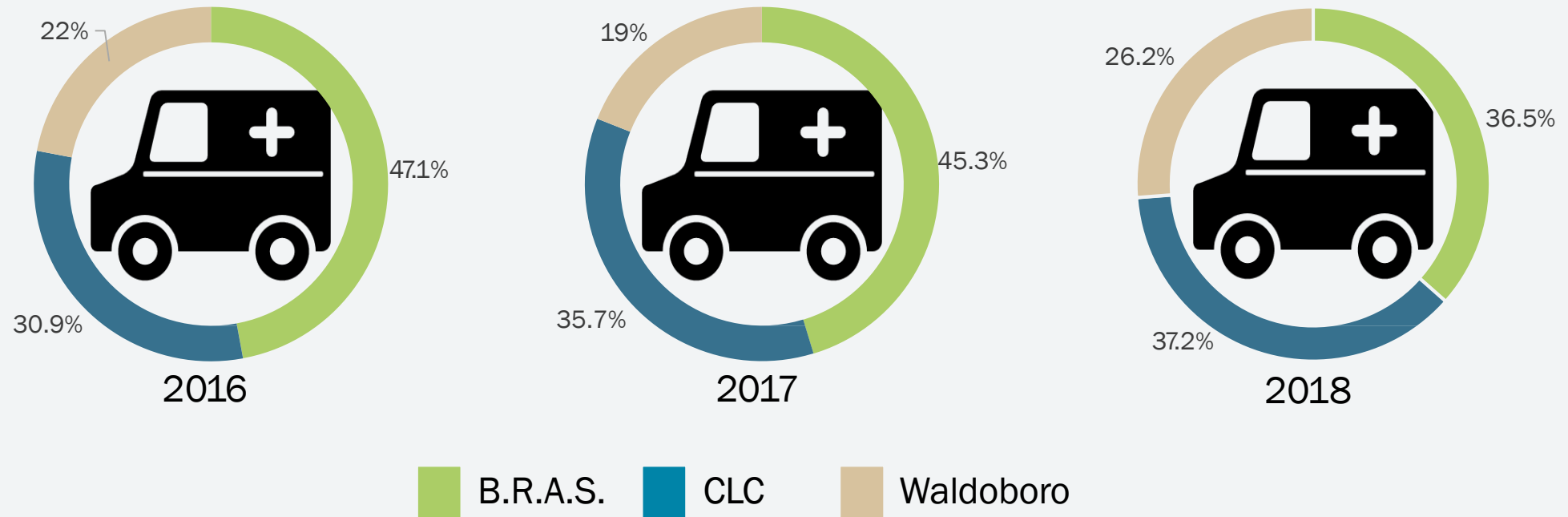
Results: Patient Data

On average, who is being referred to community paramedicine in Lincoln County?



- 63% female; 37% male
- Average age: 78.3
- 58.5% have at least one of the following chronic conditions: Diabetes, Congestive Heart Failure (CHF), Chronic Obstructive Pulmonary Disorder (COPD)

Distribution of Completed Visits Among EMS/CP Providers in Lincoln County



CP services are well distributed among the three EMS CP providers in Lincoln County.

A complete visit means that the interventions specified in provider referrals were completed with CP resources.

Patient Panel & Visits: Overview by Year

Notable Results for 2016

- Lowest number of patients referred
- Highest number of patients with complete visits
- Highest average number of complete visits per patient
- Highest rate of completion

	2016		2017		2018	
total number of patients referred	122		126		138	
total number of patients with complete visits	112		103		103	
mean # complete visits/patient	4.87		2.99		2.96	
avg referred patient age	78 years old		79 years old		78 years old	
referred patient gender	41% male	59% female	31% male	69% female	39% male	61% female

total visits	586	373	417
complete visits	545	308	305
incomplete visits	41	65	112
rate of completion	93%	83%	73%

Patient Panel & Visits: Overview by Year

Notable Results for 2017

- Higher number of referred patients
- Lower number of patients with completed visits
- Lower average number of complete visits per patient
- Lower rate of completion

	2016		2017		2018	
total number of patients referred	122		126		138	
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Patient Panel & Visits: Overview by Year

Notable Results for 2018

- Highest number of referred patients
- Number of patients with complete visits consistent with 2017
- Average number of complete visits per patient consistent with 2017
- Lowest rate of visit completion

	2016		2017		2018	
total number of patients referred	122		126		138	
total number of patients with complete visits	112		103		103	
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Take-Away Points: Patient Panel & Visits

It is not atypical for completion rates to decline when dealing with a growing referral population.

Number of patients with complete visits is consistent across all years.

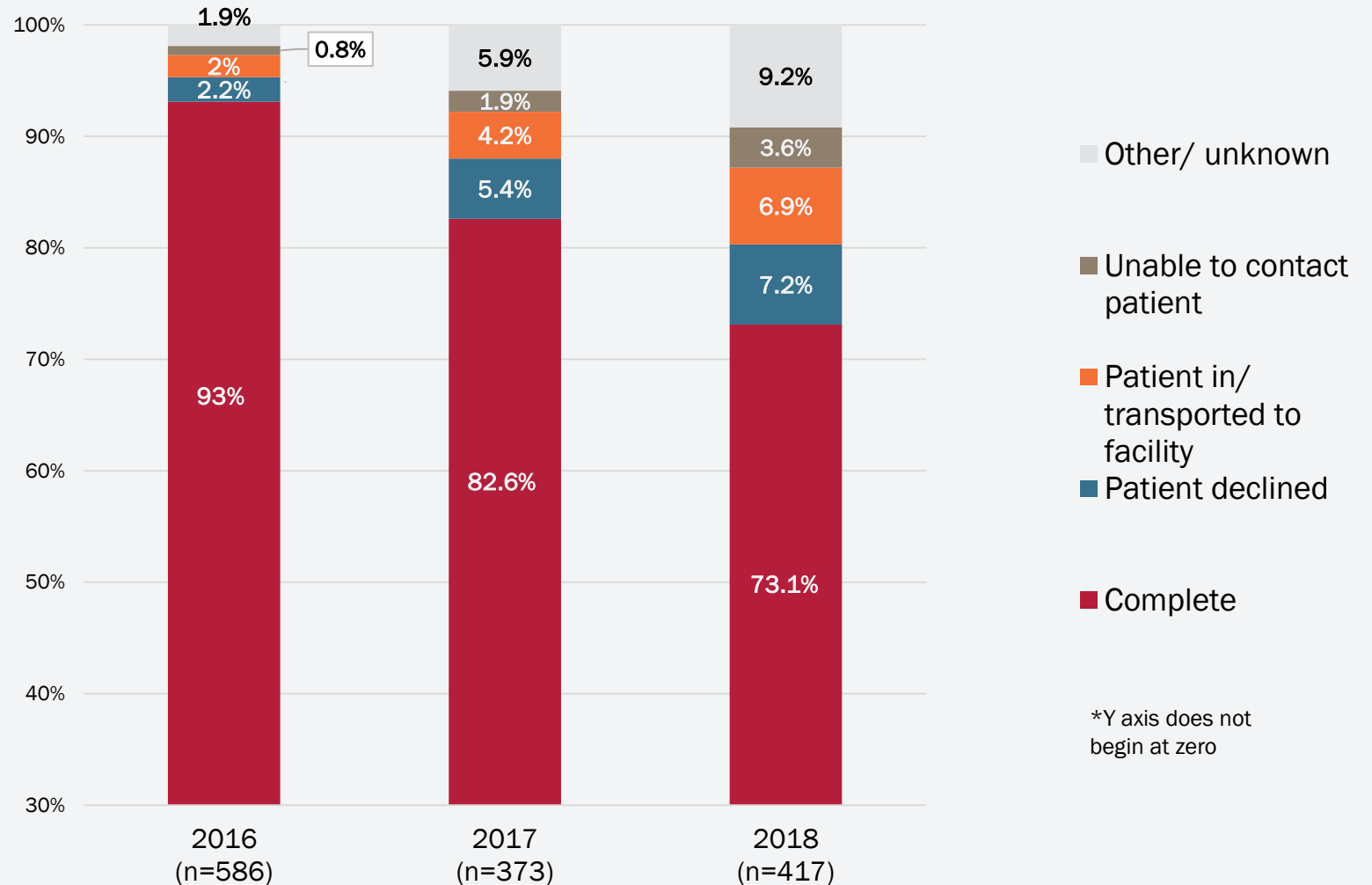
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Results: Intervention Outcomes and Reasons for Incomplete Visits

Preliminary discussions of the data indicate that the decrease in visits completed with CP resources in Lincoln County between 2016 and 2018 may be due to changes in referral workflows.

For example, patients may decline a CP visit if they report receiving services from another provider, such as Home Health.



Referral Type: What Does it Mean?



General Assessment

Includes: evaluation, vital signs, blood sugar, weight check, medication compliance or reconciliation, oxygen saturation, or other assessments



Clinical Care

Includes: CHF follow up, COPD follow up, diabetes follow up, dressing changes or wound checks, or other clinical care



Lab Collection

Includes: blood draw, POC A1c, POC INR, or other requested lab/blood tubes



Prevention Assessment

Includes: home safety or social assessment, or flu vaccination



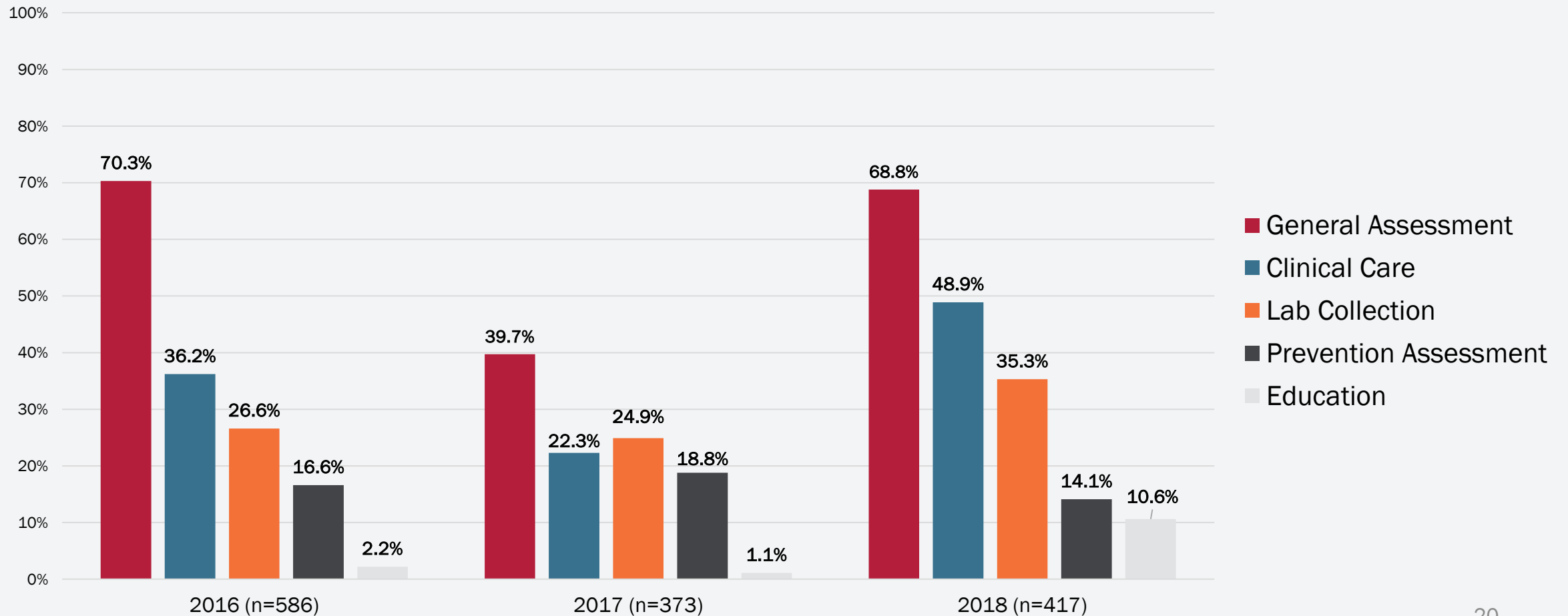
Education

Includes: Asthma medication education, COPD education, diabetes education, or inhaler use

A CP visit may have more than one referral 'type' based on services requested by referring provider. Referrals are made by providers (often PCP), hospital staff, and/or Home Health agency.

Results: Referral Type

Referral type by total visits
(note: visit may have more than one referral type)



Results: Home Health (HH) Services & CP

CP workflows aim to ensure appropriate use of service resources.

- Request workflows include reviewing home health (HH) eligibility
- Patients ineligible for HH at the time of hospital discharge may be referred to CP while awaiting HH eligibility
- LincolnHealth has been working to educate providers on how CP can help patients who may not be eligible for HH

In Lincoln County, the percentage of patients referred to CP who also actively receive home health services nearly doubled between 2016 and 2018.

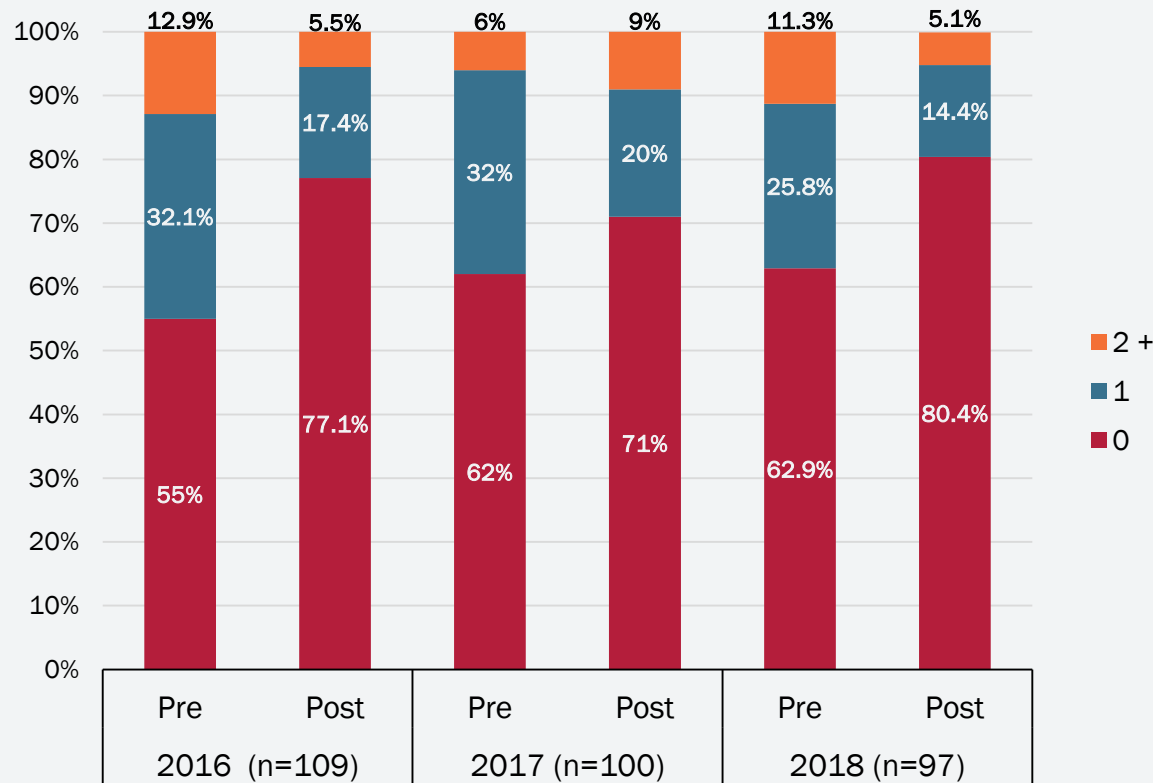
Close collaboration between CP and HH ensures patients receive robust, non-duplicative services.



Results: Emergency Department (ED) Utilization, All Patients

ED visits 30 days pre- and 30 days, post-CP visit 1

data available for patients with a complete first visit

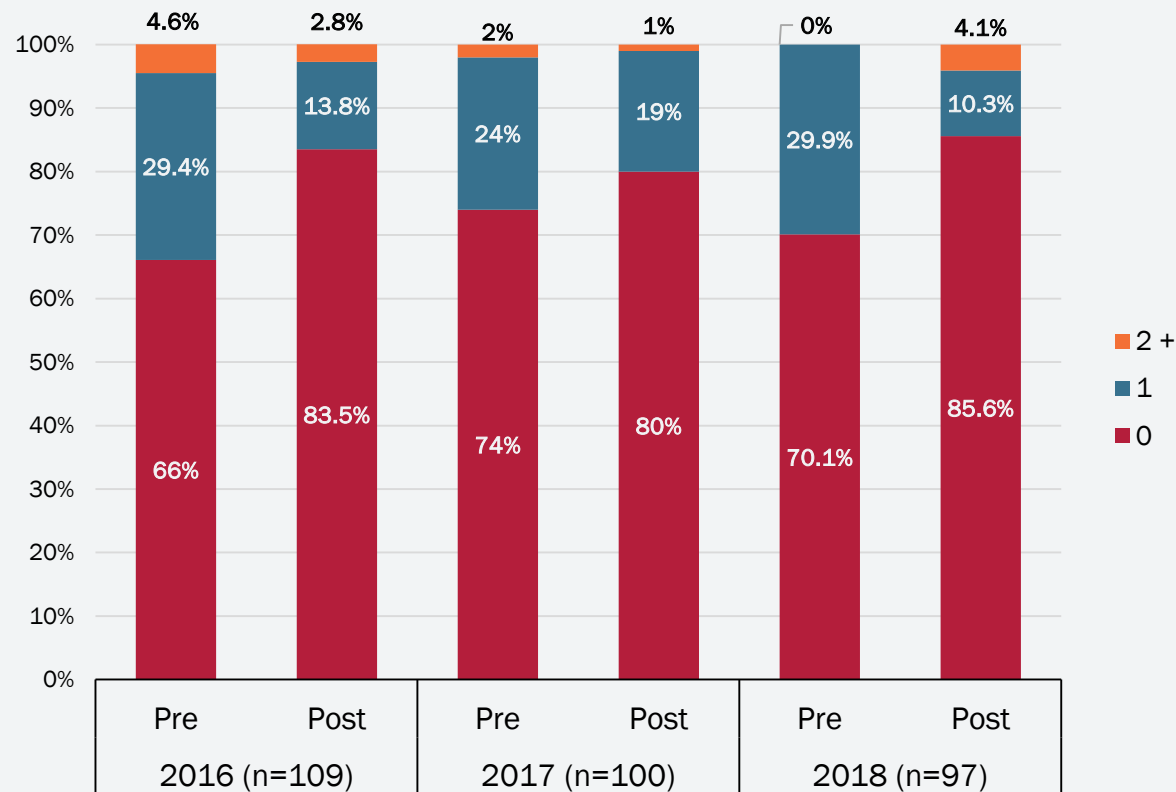


- Data on patient ED utilization was collected for the 30 day period before and after complete CP visit
- To standardize data, the graph depicts ED utilization in respect to patient's **first complete CP visit**
- Data indicate decline in ED utilization in the month after initial CP visit for all years 2016, 2017, 2018

Results: Hospital Utilization, All Patients

Hospitalizations 30 days pre- and 30 days post-CP visit 1

data available for patients with a complete first visit



- Data on patient hospitalization was collected for the 30 day period before and after CP visit
- To standardize data, the graph depicts hospitalization in respect to patient's **first complete CP visit**
- Similar to ED use, data indicate decline in hospital re-admissions in the month after initial CP visit for all years
- As a point of reference: nationally, in 2016 the 30-day all-cause readmissions for Medicare patients* was 17.1%; in 2016 for this CP study group it was 16.6%.

*Source: <https://www.hcup-us.ahrq.gov/reports/statbriefs/sb248-Hospital-Readmissions-2010-2016.jsp>; accessed February 2020.

Cost Avoidance Example Using CP Data Collected by LincolnHealth for Frequent ED Use, 2018

Generally, cost avoidance is defined as a representation of an avoided potential increase in expenses.

The following slides show examples of cost avoidance using Lincoln County CP data points and the cost avoidance formulas (below) developed by MedStar Mobile Healthcare (Ft. Worth, TX), and national & Maine averages for cost of care.

Emergency Department Cost-Avoidance Formula:

$$\text{Cost Avoided per patient} = \frac{(C_A + C_{ED}) * TA}{P}$$

$C_A + C_{ED}$: Average Transport Cost (Ambulance Cost + ED Cost)

TA : Number of Transports Avoided

P : Number of Patients Enrolled *

Hospitalization Cost-Avoidance Formula:

$$\text{Cost Avoided per patient} = \frac{(C_{RA}) * TA}{P}$$

C_{RA} : Average Hospital Readmission Cost

TA : Number of Transports Avoided

P : Number of Patients Enrolled *

* For our purposes, an enrolled patient is a patient with at least 1 complete CP visit

Emergency Department Cost Avoidance, Using 2018 Lincoln County CP Data

Using CP patient data collected by LincolnHealth and national/Maine averages, we can estimate cost avoidance in 2018 for patients' ED visits 30 days post- CP first visit.

Avoided emergency department visits:

$TA = 48$ ED visits pre-CP visit 1 - 25 ED visits post-CP visit 1 = 23 avoided ED visits in 2018

Average national cost of ED visit from 2017 MEPS: $C_{ED} = \$1482$

Average cost of Maine rural ambulance transport from *Ambulance Rate Study for ME DHHS, 2017*: $C_A = \$483^*$

Number of patients with complete visit: $P=103$

$$\text{ED Cost Avoided per patient} = \frac{(\$483 + \$1482) * 23 \text{ avoided transports}}{103 \text{ patients enrolled}} = \frac{\$45,195}{103} = \mathbf{\$438.79}$$

For our purposes, an enrolled patient is a patient with at least 1 complete CP visit

*Study used Indiana rates

Source: *MaineCare Ambulance Rate Study*. <https://www.maine.gov/dhhs/reports/2017/Maine-Ambulance-Rate-Study.pdf>; Jan. 9, 2017.

Hospitalization Cost Avoidance, Using 2018 Lincoln County CP Data

Using CP patient data collected by LincolnHealth and national averages, we can also estimate cost avoided for all visited patients' re-hospitalizations 30 days post- CP first visit.

Avoided re-hospitalizations:

$TA = 29$ hospitalizations pre-CP visit 1 - 18 hospitalizations post-CP visit 1 = 11 avoided hospitalizations in 2018

Average national cost of hospitalization from 2017 MEPS: $C_{RA} = \$20,031$

Number of patients with complete visits: $P = 103$

$$\text{Hospitalization cost avoided per patient} = \frac{(\$20,031) * 11 \text{ avoided hospitalizations}}{103 \text{ patients enrolled}} = \frac{\$220,341}{103} = \$2,139.23$$

For our purposes, an enrolled patient is a patient with at least 1 complete CP visit

High Utilizer Cost Avoidance:

2018 Example Case from Lincoln County CP Data

- 72 year old male
- None of the targeted chronic diseases (Diabetes, CHF, COPD)
- Utilized ED three (3) times in the month prior to his first complete CP visit
- Actively receiving HH at the time of CP referral
- Insurer: Medicare
- CP visit referral was for lab collection
- **ZERO** ED visits in the month following his first complete CP visit
- Estimated ED costs in the month prior to CP visit: **\$5895**
- ED costs in the month post-CP visit: **\$0**

Lincoln County CP Services: Focus on Patients with Chronic Diseases

Recognizing that persons with chronic diseases contribute to higher utilization rates of higher-cost services and poorer health outcomes than those without these diagnoses, Lincoln County CP services focus on individuals with any of the following three chronic conditions:

- Diabetes
- Congestive Heart Failure (CHF)
- Chronic Obstructive Pulmonary Disease (COPD) or Asthma

To better understand their service utilization, Cutler Institute staff conducted subanalyses of CP patients in Lincoln County with these three chronic conditions.

Targeted Chronic Diagnoses and CP

This table provides an overview of the CP patients with diagnoses of diabetes, CHF, and COPD and their visits in 2016-2018.

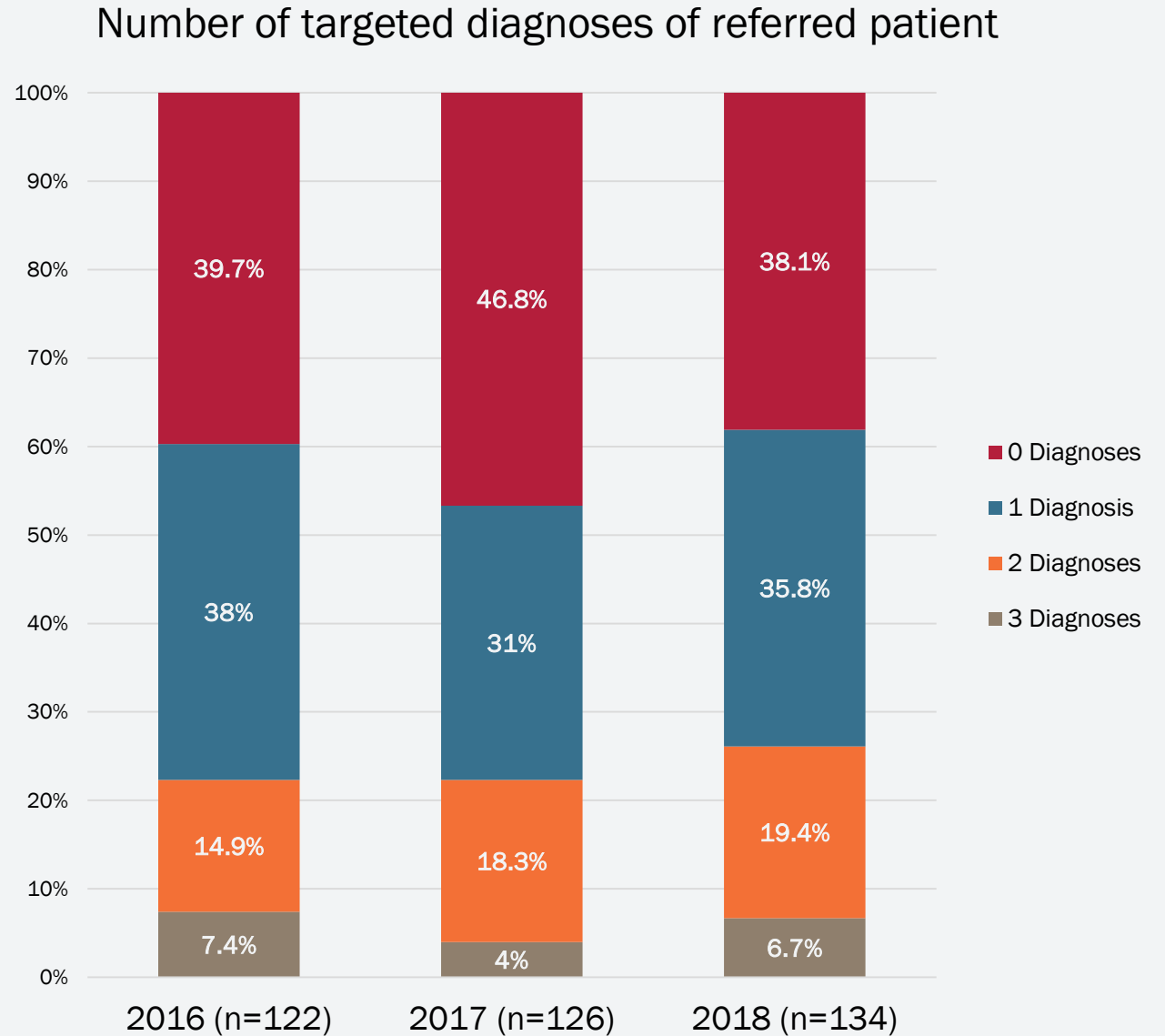
The last, stand-alone row represents all patients across those years.

- In all but one year for one condition (highlighted), average completed visits for patients with targeted chronic conditions exceed the average number of visits for all patients, indicating that Lincoln County CP is focusing efforts on patients with these chronic conditions.
- 2018 has the highest number of patients with these diagnoses compared to previous years.
- Across years 2016-2018, 58.5% of all CP patients have at least one of these target diagnoses (*not depicted in table*)

	2016	2017	2018
Diabetes			
Diagnosed patients	40	32	41
Visits with diagnosed patients	217	82	133
Average # visits per diagnosed patient	5.4	2.6 ↓	3.2
CHF			
Diagnosed patients	38	35	51
Visits with diagnosed patients	199	121	217
Average # visits per diagnosed patient	5.3	3.5	4.3
COPD			
Diagnosed patients	31	33	37
Visits with diagnosed patients	191	124	145
Average # visits per diagnosed patient	6.2	3.8	3.9
Average # visits per patient (regardless of diagnosis), 2016-2018	4.87	2.99	2.96

Chronic Diagnoses, Lincoln County CP Patients

- In 2018, 35.8% of referred patients had a diagnosis of one of the targeted chronic conditions (diabetes, CHF, COPD).
- In 2018, 26.1% of referred patients had a diagnosis of more than one of the targeted chronic conditions.
- **2018 had the most referred patients diagnosed with targeted chronic conditions compared to prior measurement years.**



Results: Targeted Chronic Diagnoses, 2018

In order to depict diagnoses and service utilization across the three target chronic diagnoses of diabetes, CHF and COPD, 2018 data was isolated. 2018 was selected because:

- 2018 is the most recent complete year
- 2018 saw the most referred patients diagnosed with targeted chronic diagnoses than years prior

Lincoln County CP: Targeted Chronic Diagnoses, 2018

3 in 10 referred patients had a diabetes diagnosis



4 in 10 referred patients had a CHF diagnosis



3 in 10 referred patients had a COPD diagnosis



Lincoln County CP 2018 Targeted Chronic Disease Comorbidities

18 in 50 of referred patients have ONE of the targeted chronic diseases

9 in 50 of referred patients have TWO of the targeted chronic diseases

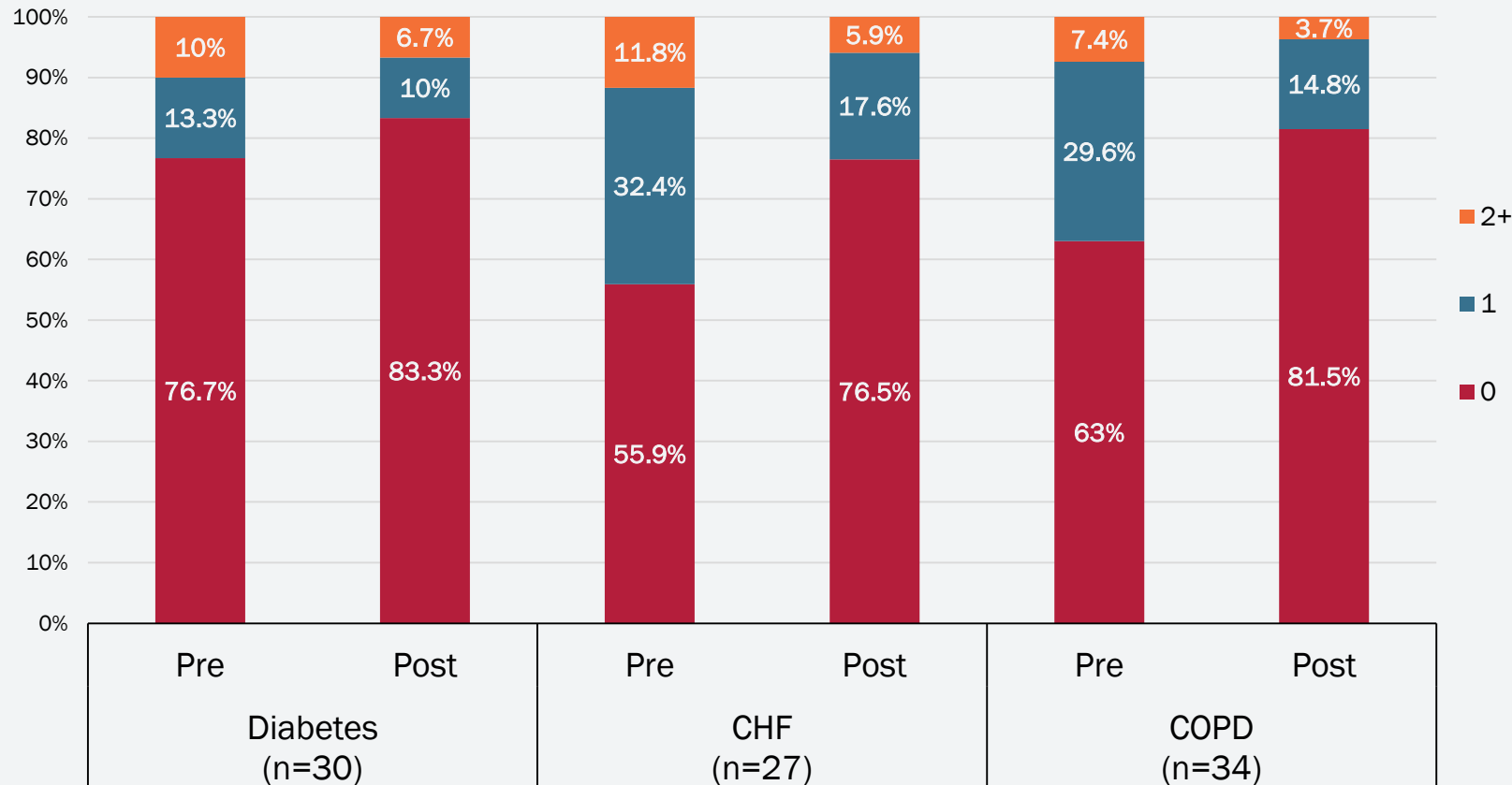
3 in 50 of referred patients have ALL THREE of the targeted chronic diseases

20 in 50 of referred patients will not have any of these target chronic diagnoses



Results: Targeted Chronic Diagnoses and ED Utilization, 2018

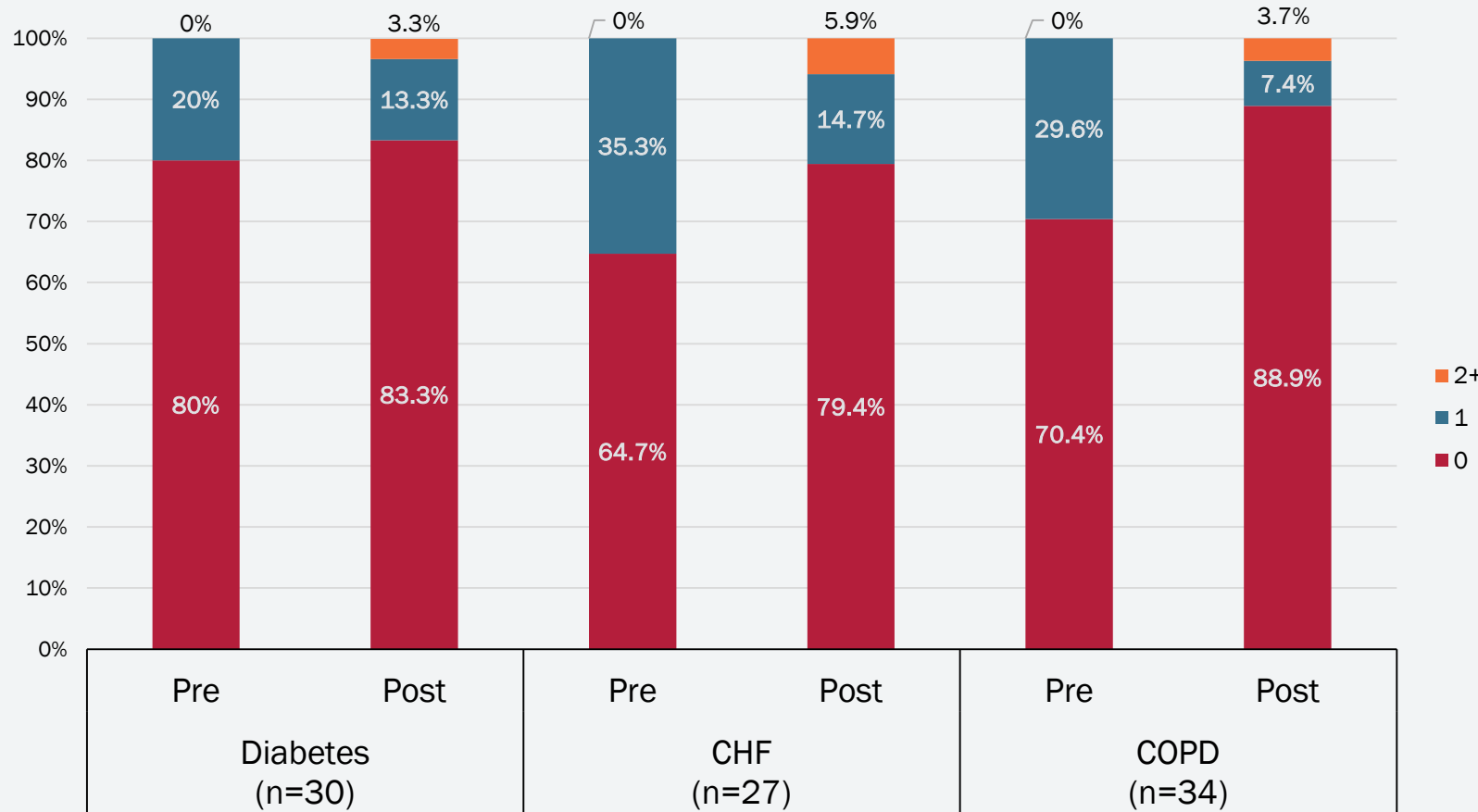
2018 ED visits 30 days pre- and 30 days post-CP visit 1, by target chronic diagnosis



- Data was collected for the 30 day period before and after CP visit
- To standardize data, the graph depicts ED utilization in respect to patient's **first complete** CP visit
- Data indicate decline in ED utilization for CP patients with any of the three targeted diagnoses, which parallels the ED utilization decline for the whole patient panel

Results: Targeted Chronic Diagnoses and Hospitalizations, 2018

2018 Hospitalizations 30 days pre- and 30 days post-CP visit 1, by target chronic diagnosis



- Data was collected for the 30 day period before and after CP visit
- To standardize data, the graph depicts hospitalizations in respect to patient's **first complete CP visit**
- Data indicate decline in hospital re-admissions for CP patients with any of the three targeted diagnoses, which parallels the re-admissions decline for the whole patient panel

Limitations

- The data collection process is vulnerable to human error.
- This is not an evaluation or study with a comparison group, rather, a summary of data collection.
- Standard national measure specifications were not used; for example, data collected on hospitalizations and ED use focused on the 30 days before and after first completed CP visit for each patient, and not throughout year. Comparing re-admissions to a national benchmark is for reference/discussion purposes only.
- Cost avoidance formula was not utilized as published (ie, Lincoln County CP does not enroll patients, which is the denominator in the formula).
- This initiative does not include analysis of programmatic/administrative costs of community paramedicine services.
- Small sample sizes can lead to a higher variability in findings.
- No statistical testing was conducted.

Summary of Key Findings

- With this project, Lincoln County CP and LincolnHealth followed published recommendations to track patients served by the program and collect/aggregate data in order to show trends and progress across patient groups, years, and diagnosis.
- Data shows that the CP service providers in Lincoln County are seeing and treating the target population: people with chronic diseases (diabetes, CHF, COPD) that are typically high-cost service users.
- For all patients included in the data collection, ED visits and hospitalizations declined after the first complete CP visit.
- Preliminary cost avoidance estimates indicate cost avoidance at the system level for all Lincoln County CP patients.

Looking to the Future

Public and private insurance reimbursement is key for the sustainability of this CP program, moving beyond funding from charitable gifts and grants and in-kind donations for administrative support and EMS patient visits.

These ongoing efforts and activities support this goal:

- Establishing clear definitions of CP services by working with the Maine State Community Paramedicine Committee.
- Standardizing the role and responsibilities of the medical director position for CP programs.
- Continuing to show the programmatic and cost effectiveness of CP in Lincoln County helps sustainability and provides a model for other CP pilot sites and/or CP programs across Maine.
- Standardizing data collection and cost analyses for CP programs is key to determining statewide CP effectiveness, and requires the engagement of the State EMS Office.

Ideas for Future Data Collection, Research & Data Analysis

Continue standardized data collection, potentially mining for 2015 data



Matched study with control group



In-depth cost analysis with EMS provider cost data



Sub-population analysis with patients with targeted chronic diagnoses



Qualitative interviews with CP stakeholders and patients



Patient case studies

Questions, Comments on Data Collection Initiative?

LincolnHealth Project Team:

Anni Pat McKenney

Ellen McFarland

Lindsay Sproul

annipat.mckenney@lchcare.org

ellen.mcfarland@lchcare.org

lindsay.sproul@lchcare.org

Cutler Institute Project Team:

Katie Rosingana, Research Associate

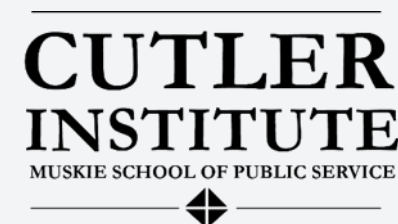
Karen Pearson, Policy Associate

Evelyn Ali, Research Assistant

katherine.rosingana@maine.edu

karen.pearson@maine.edu

evelyn.ali@maine.edu



CP Providers in Lincoln County- For more information:

Boothbay Regional Ambulance Service:

Scott Lash, Service Chief

slash@brasems.org



Central Lincoln County Ambulance Service:

Nick Bryant, Service Chief

servicechief@clcambulance.org



Waldoboro EMS:

Mike Poli, Deputy Director

emsinfo@waldoboromaine.org

