Using Data to Inform Community Paramedicine Sustainability: A Pilot Study
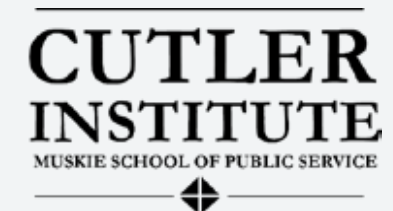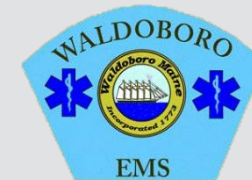
Rural EMS & Care Virtual Conference
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Lincoln County Community Paramedicine
Data Collection Initiative

Acknowledgements

The Project

In 2019, with funding from a private foundation, LincolnHealth hospital and healthcare system embarked on data collection and analysis of patients in Lincoln County, Maine who use Community Paramedicine Services (CP).

This project provided evidence of the value of Community Paramedicine services, particularly regarding
- patient health outcomes,
- reduction in emergency department (ED) use
- reduction in hospital re-admissions, and
- cost effectiveness

Project Goals

- Standardize collection of patient data from all previous and current participants of the CP program, during the data collection time frame of 2016-2019

- Analyze data for trends in patient population, patient care, and high-cost service use

- Create a user-friendly report that can be shared with policymakers and stakeholders, to help garner support for reimbursement of CP services

Background: Community Paramedicine

Community Paramedicine 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 in Maine

- 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 and expand the pilot.

- Boothbay Regional Ambulance Service (BRAS), Central Lincoln County Ambulance Service (CLC) and Waldoboro EMS sites have continuously provided community paramedicine services to people in Lincoln County since the initial pilot in 2012.
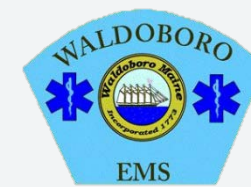
Missing Pieces: Data and Funding

- 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 foundation grants and other private funds, sustainability also depends on private and public insurers reimbursing these services; at this time, CP is not a reimbursable service in Maine 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

Pilot Study 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
- Prevention assessment

Recognizing that chronic diseases contribute to the high cost of health care, Lincoln County CP services focus 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 healthcare system costs
- Reduce patient costs by helping them monitor their chronic diseases
- Improve quality of care and health outcomes for patients

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

MAINE

Jefferson
Waldoboro
Nobleboro
Alna
Newcastle
Bremen
Damariscotta
Edgcomb
Bristol
Boothbay
South Bristol
Boothbay Harbor
Southport

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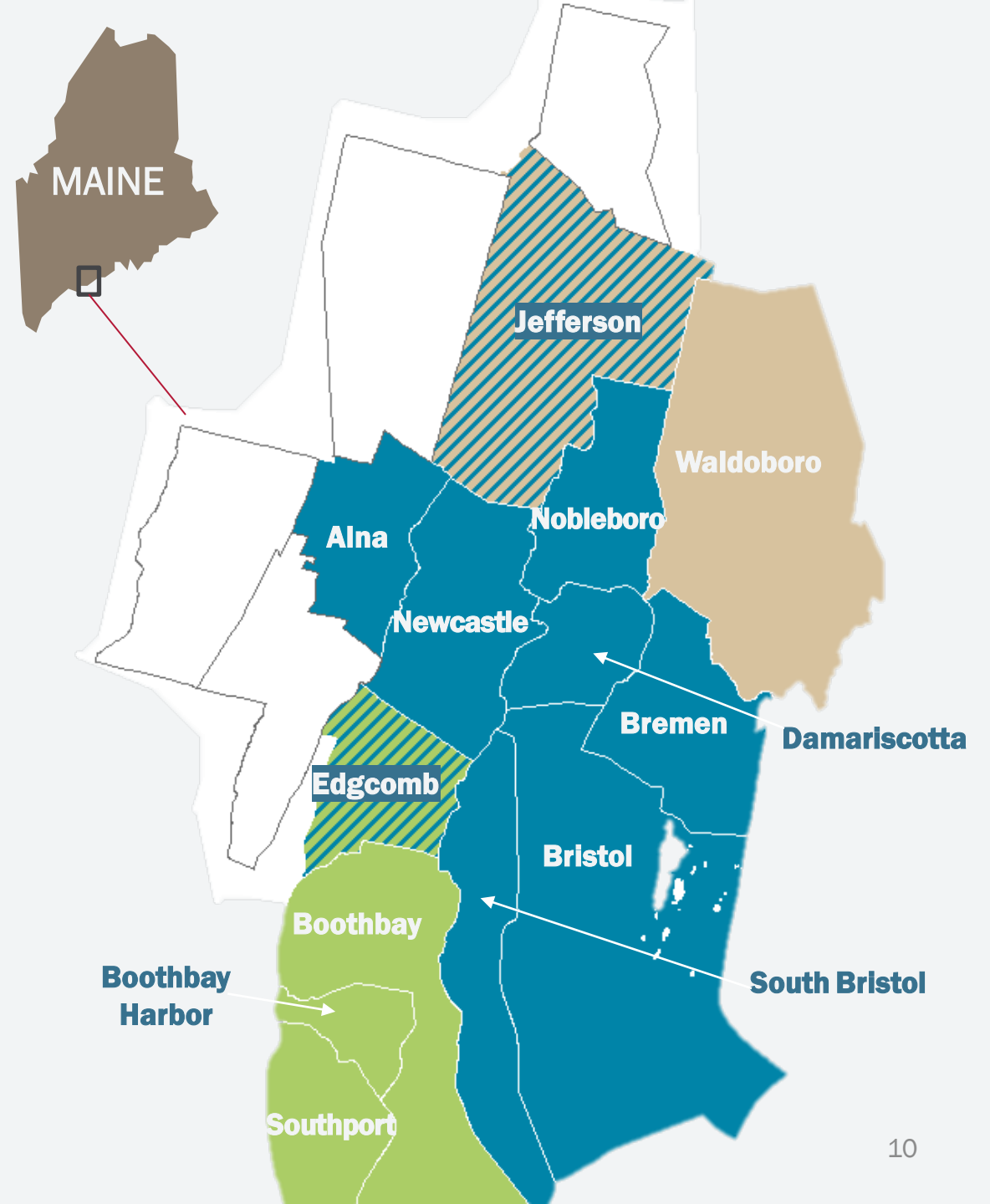
Data Collection & Analysis: Methodology

Document Review

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

- CP visit referrals
- CP visit records and reports

EMR Review

Conducted 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: CP visits, completion rates, and service utilization data.

Data Collection & Analysis

Data was collected on patients in CP program years 2016, 2017, 2018, and the first 6-9 months of 2019.

For this analysis and summary report, only full data years (2016-2018) were used to determine trends.

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), or Chronic Obstructive Pulmonary Disorder (COPD)

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Take-Away Points: Patient Panel & Visits

The number of patients with complete visits is consistent across all years.

	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
average age of referred patient	78 years old	79 years old	78 years old
referred patient gender	41% male / 59% female	31% male / 69% female	39% male / 61% female

	2016	2017	2018
Total visits	586	373	417
Complete visits*	545	308	305
Incomplete visits	41	65	112
Rate of completion	93%	83%	73%

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

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.
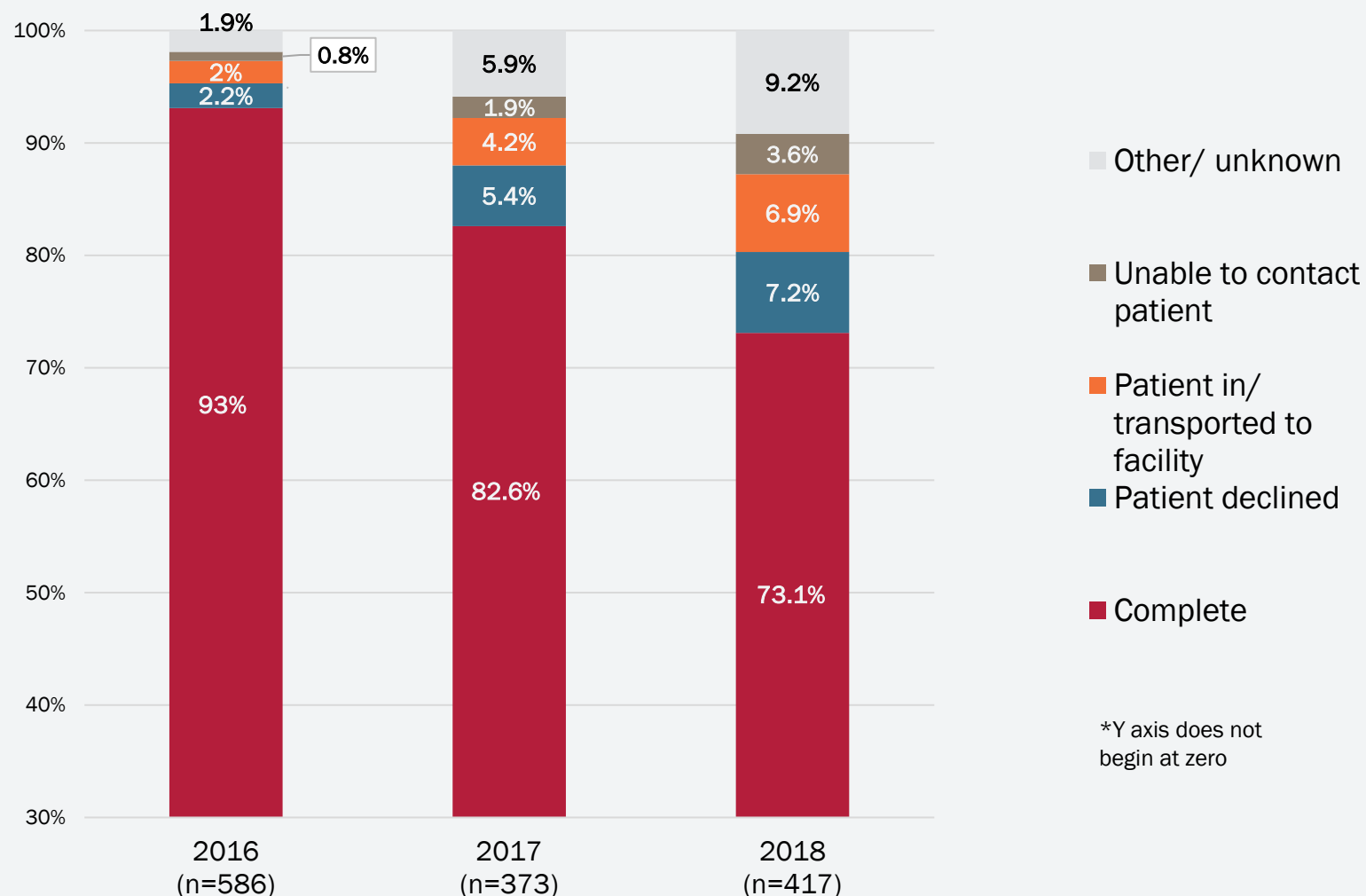
Referral Type: What Does it Mean?

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

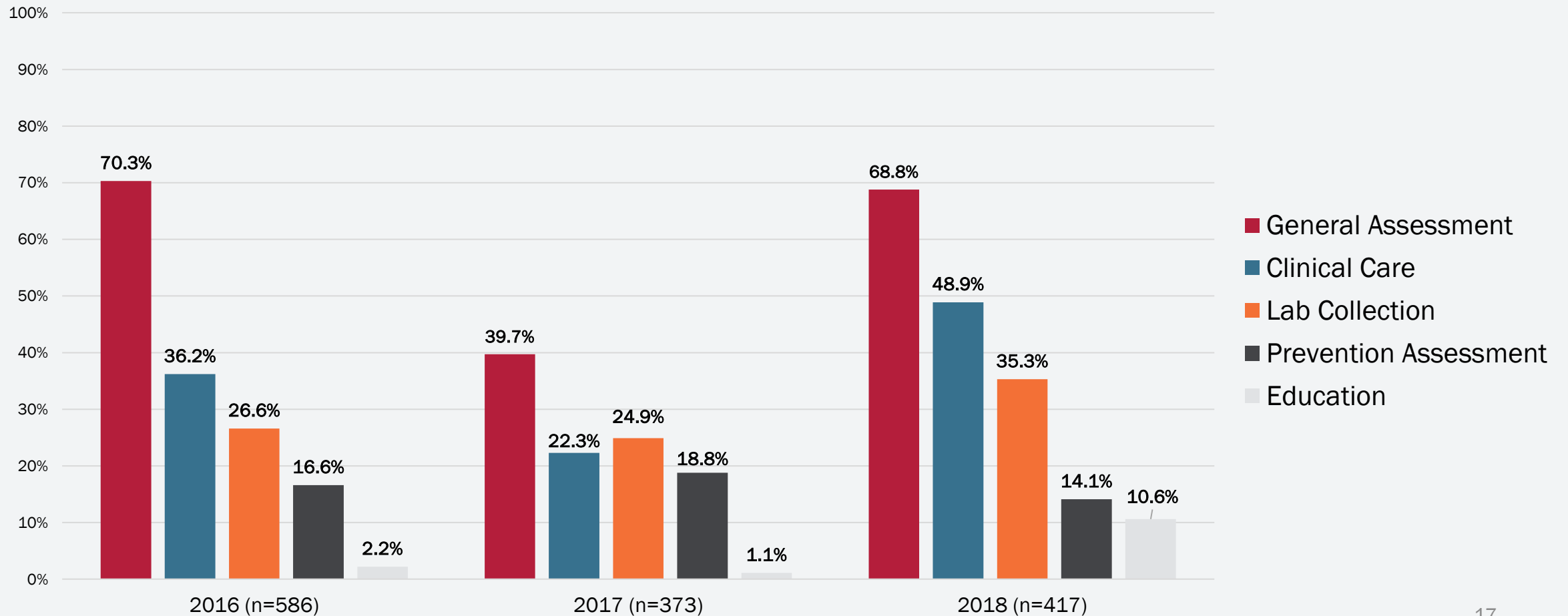Includes: home safety or social assessment, or flu vaccination

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)

Legend:
- General Assessment
- Clinical Care
- Lab Collection
- Prevention Assessment
- Education

2016 (n=586):
- General Assessment: 70.3%
- Clinical Care: 36.2%
- Lab Collection: 26.6%
- Prevention Assessment: 16.6%
- Education: 2.2%

2017 (n=373):
- General Assessment: 39.7%
- Clinical Care: 22.3%
- Lab Collection: 24.9%
- Prevention Assessment: 18.8%
- Education: 1.1%

2018 (n=417):
- General Assessment: 68.8%
- Clinical Care: 48.9%
- Lab Collection: 35.3%
- Prevention Assessment: 14.1%
- Education: 10.6%

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Results: Home Health (HH) Services & CP

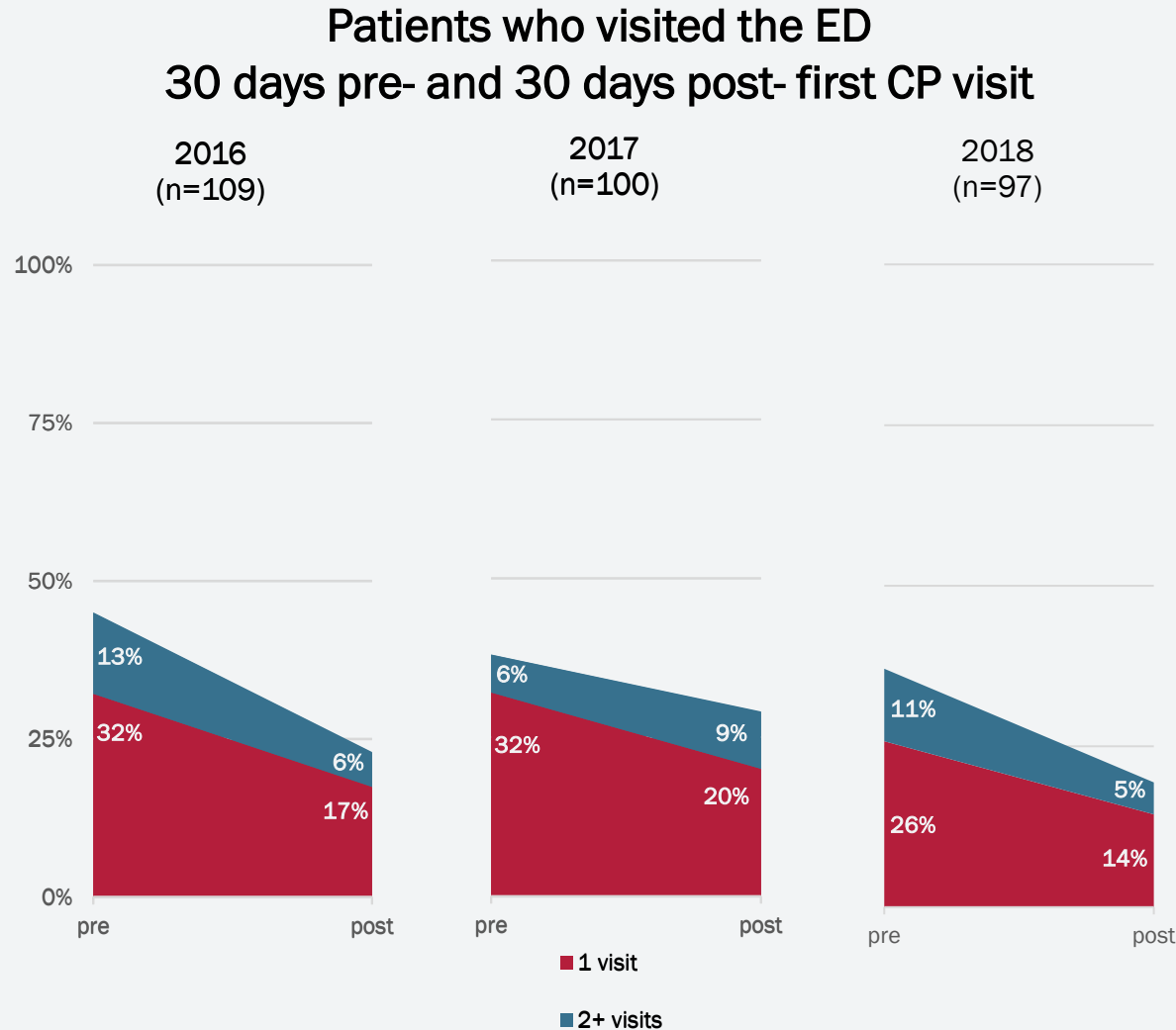CP workflows aim to ensure appropriate use of service resources.

- 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.
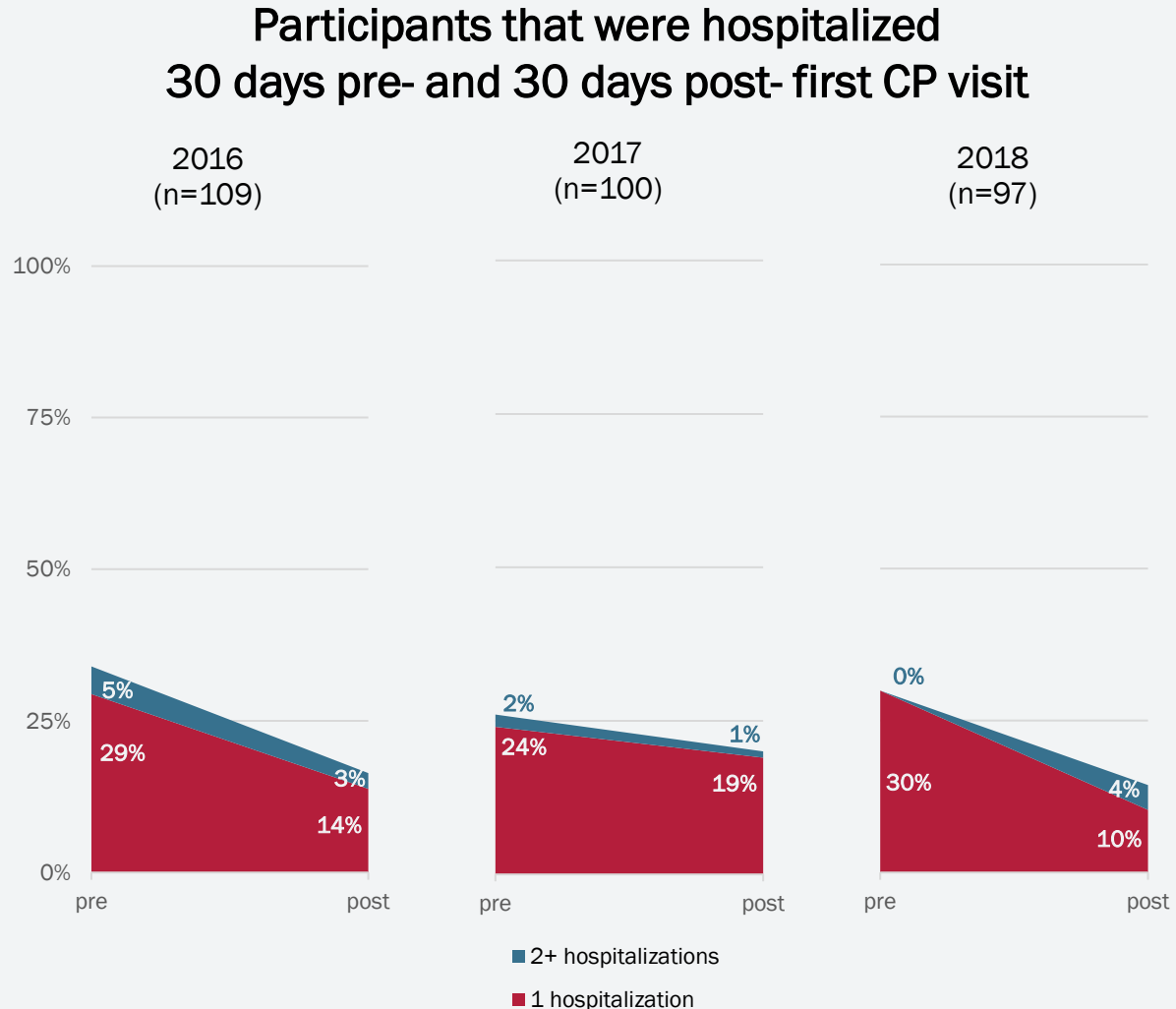
2016 — 22%
2017 — 35%
2018 — 40%

Results: Emergency Department (ED) Utilization, All Patients

**Patients who visited the ED
30 days pre- and 30 days post- first CP visit**

2016
(n=109)

2017
(n=100)

2018
(n=97)

- 1 visit
- 2+ visits

- Data on patient ED utilization was collected for the 30-day period before and after completed 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 30 days after initial CP visit for all years 2016, 2017, 2018

Results: Hospital Utilization, All Patients

Participants that were hospitalized 30 days pre- and 30 days post- first CP visit

2016 (n=109)   2017 (n=100)   2018 (n=97)
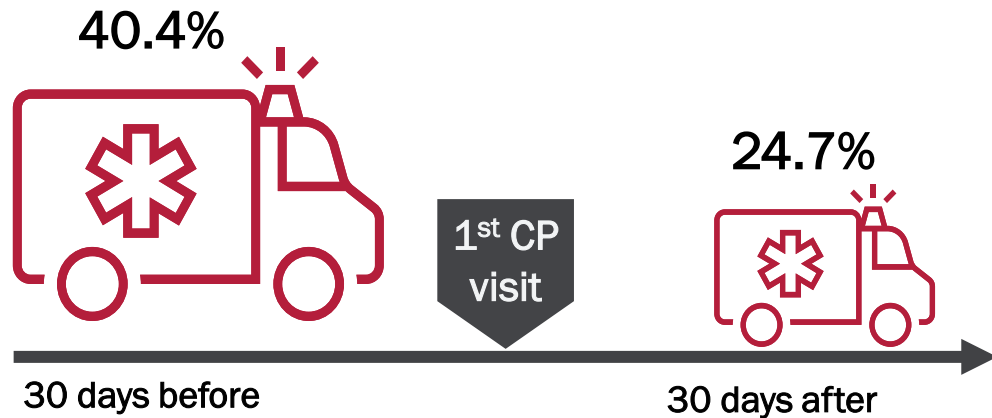

- 2+ hospitalizations
- 1 hospitalization

- Data on patient hospitalization was collected for the 30-day period before and after completed 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 30 days after initial CP visit for all years

- 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%.

Results: Service Utilization

Data indicate a decline in both ED and hospital utilization for patients in the month after their initial CP visit for all years 2016, 2017, 2018

Percent of patients with ED visits — 40.4% (30 days before), 1st CP visit, 24.7% (30 days after)

Percent of patients with hospitalizations — 30.6% (30 days before), 1st CP visit, 17.7% (30 days after)

Cost Avoidance Examples
Using CP Data Collected by LincolnHealth

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:	Hospitalization Cost-Avoidance Formula:
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 *	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 and Maine averages, we can estimate cost avoidance in 2018 for patients' ED visits 30-days post- CP first visit.

Avoided emergency department visits:

$TA = \underline{48}$ ED visits pre-CP visit 1 – $\underline{25}$ 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: $P = 103$

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

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 re-hospitalizations 30-days post- CP first visit for all patients.

Avoided re-hospitalizations:

$TA =$ <u>29</u> hospitalizations pre-CP visit 1 – <u>18</u> 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: $P=103$

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

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

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.
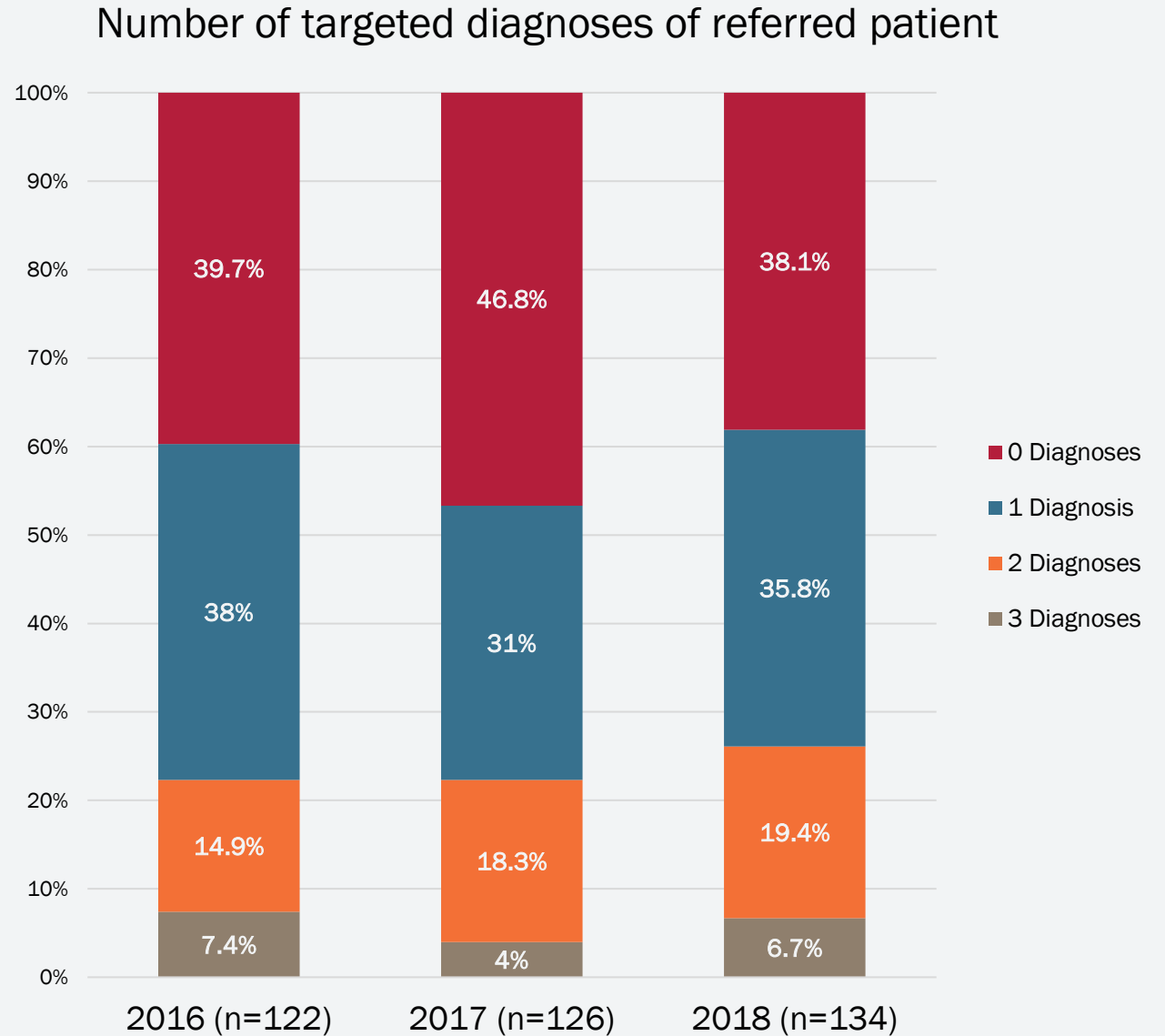
The last, stand-alone row represents all patients across 2016-2018.

- 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.**

Number of targeted diagnoses of referred patient

	2016 (n=122)	2017 (n=126)	2018 (n=134)
0 Diagnoses	39.7%	46.8%	38.1%
1 Diagnosis	38%	31%	35.8%
2 Diagnoses	14.9%	18.3%	19.4%
3 Diagnoses	7.4%	4%	6.7%

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

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

**9** in 50 of referred patients had TWO of the targeted chronic diseases

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

20 in 50 of referred patients did not have any of these target chronic diagnoses
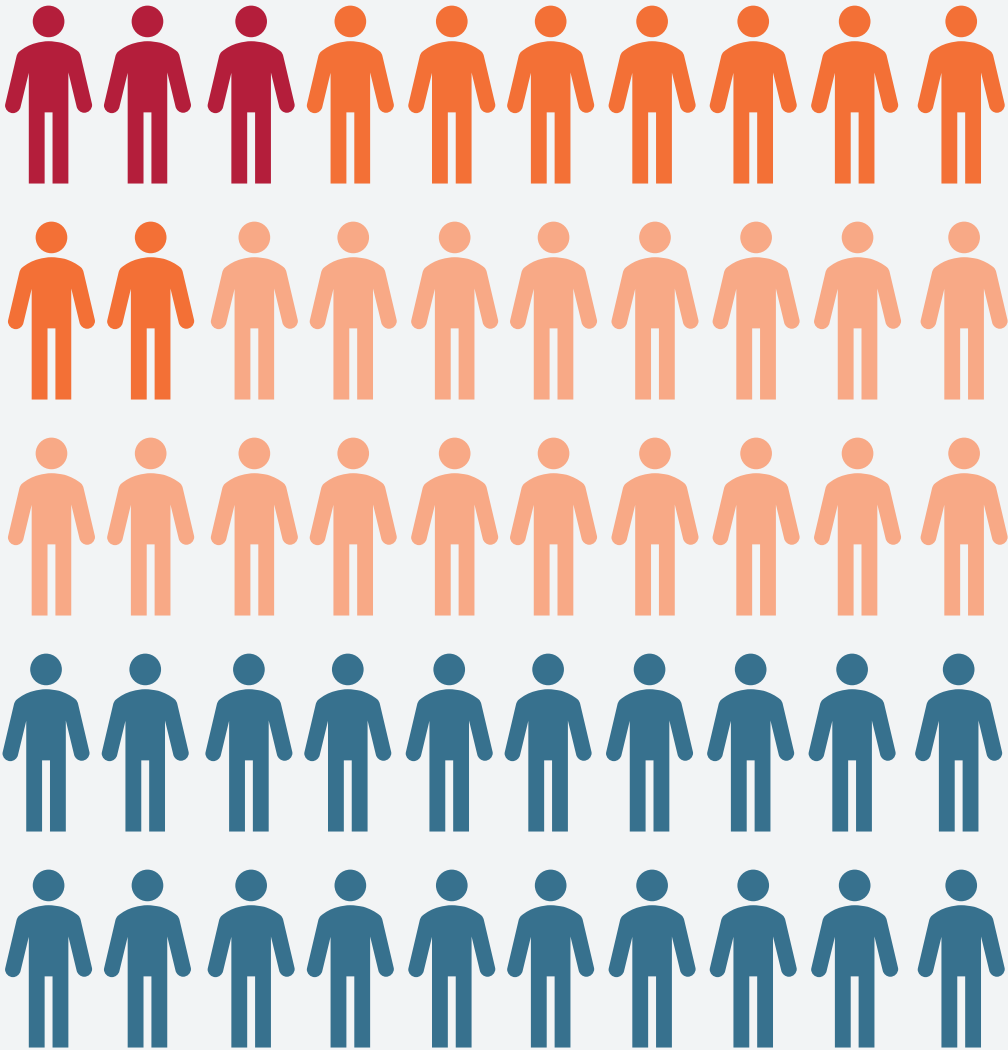
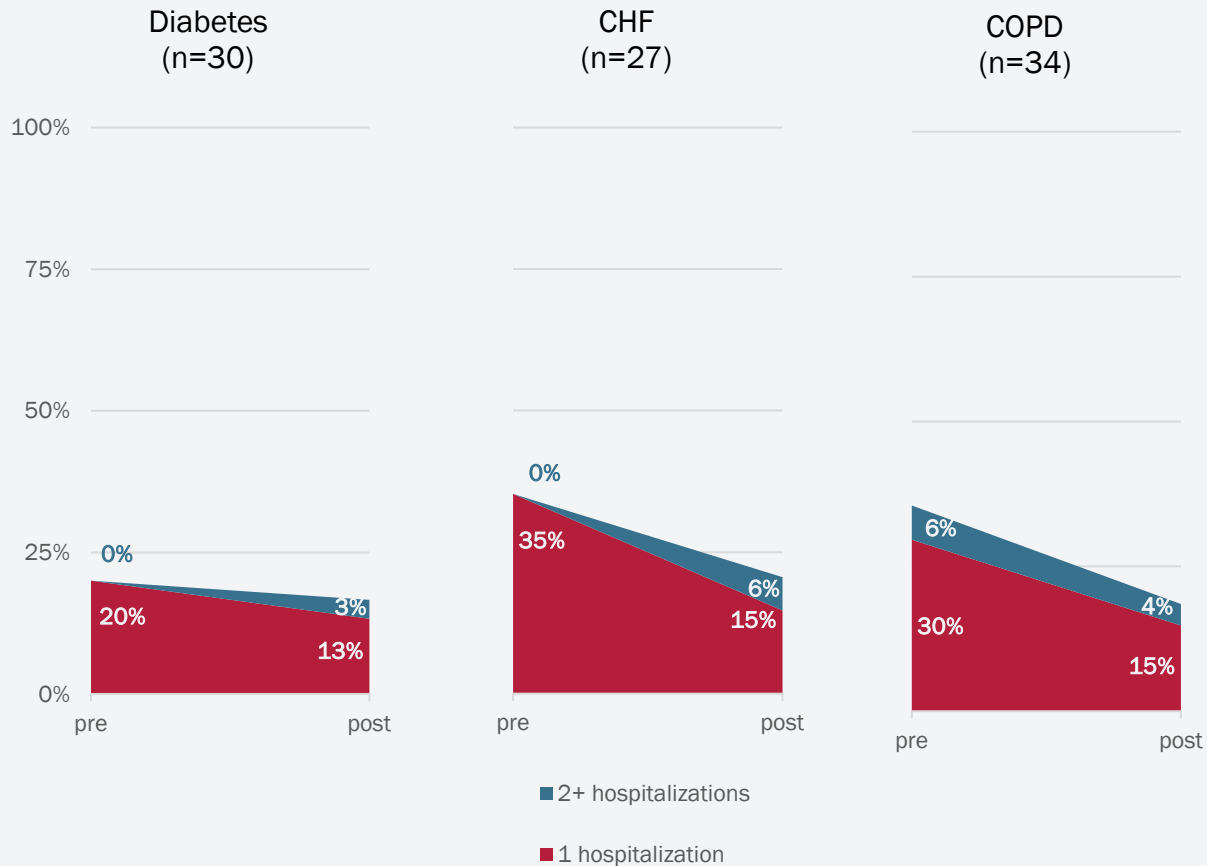# Results: Targeted Chronic Diagnoses and ED Utilization, 2018

Participants with chronic diseases that visited the ED 30 days pre- and 30 days post- first CP visit
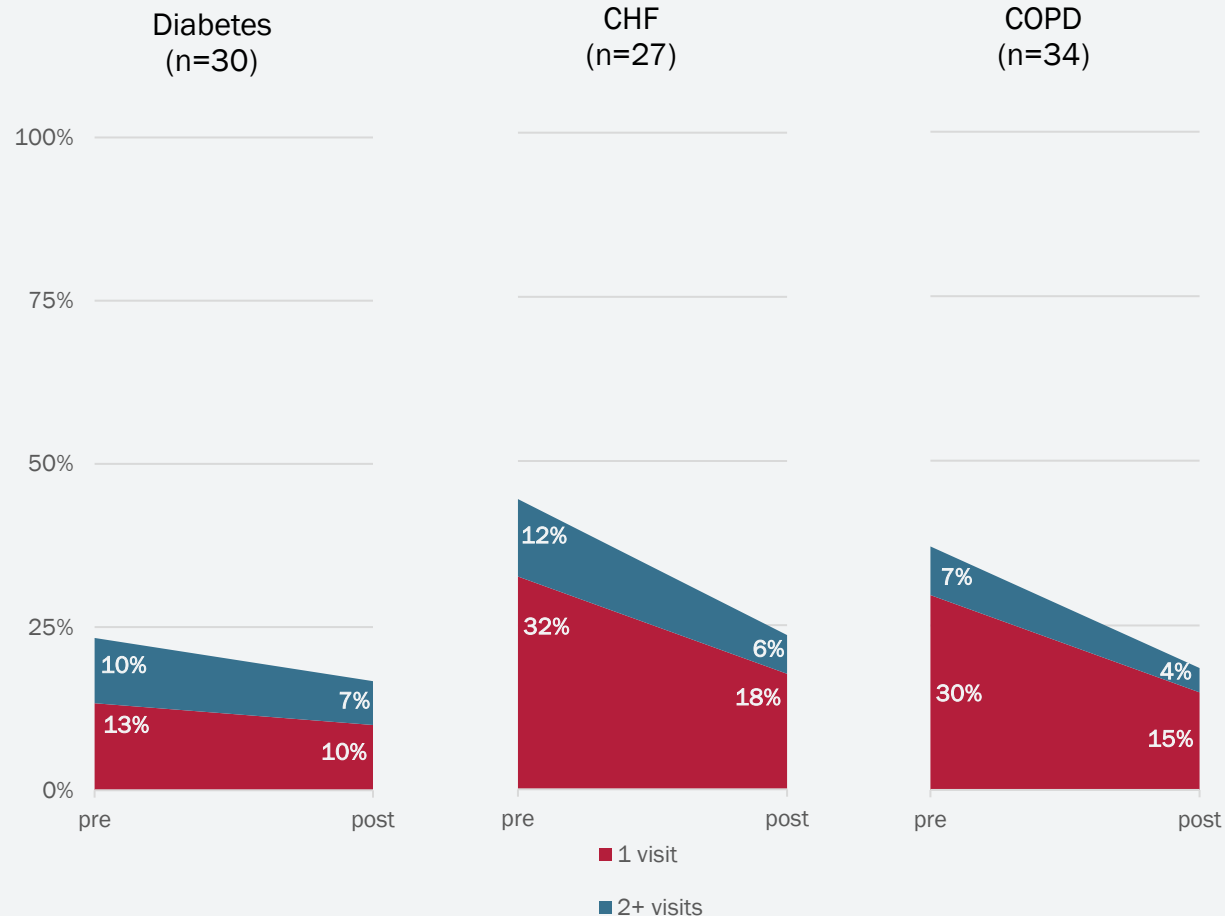
- Data was collected for the 30-day period before and after CP visit

- 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

Participants with chronic diseases that were hospitalized 30 days pre- and 30 days post- first CP visit

Diabetes (n=30) — pre: 0% / 20%, post: 3% / 13%
CHF (n=27) — pre: 0% / 35%, post: 6% / 15%
COPD (n=34) — pre: 6% / 30%, post: 4% / 15%

Legend: ■ 2+ hospitalizations ■ 1 hospitalization

- 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 readmissions for CP patients with any of the three targeted diagnoses, which parallels the readmissions decline for the whole patient panel

Limitations

- The data collection process is vulnerable to human error.

- This was not an evaluation or study with a comparison group, but 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 the <u>first completed CP visit</u> for each patient, and not throughout the year. Comparing re-admissions to a national benchmark is for reference and discussion purposes only.

- Cost avoidance formulas were not utilized as published (i.e., Lincoln County CP does not *enroll* patients, which is the denominator in the formula).

- This initiative did not include analysis of programmatic and/or administrative costs of community paramedicine services.

- Small sample sizes can lead to a higher variability in findings.

- No statistical testing was conducted.

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Summary of Key Findings

- With this project, Lincoln County CP and LincolnHealth followed published recommendations to track patients served by the Community Paramedicine program and collected and aggregated data in order to show trends and progress across patient groups, years, and diagnosis.

- Data show 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 indicated 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, grants and in-kind donations for administrative support and EMS patient visits.

These ongoing efforts and activities support the goal of reimbursement:

- 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 will help sustainability and provide 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.

Taking the Pilot Study Statewide

In 2022, Maine EMS contracted with the Cutler Institute to expand this pilot study and undertake an evaluation of the CP programs in Maine, with the following goals:

- Document the value and sustainability of community paramedicine programs in Maine
- Develop model for MaineCare (Medicaid) reimbursement
- Develop standardized data collection tools (patient care; operational)

Continuation of standardized data collection

Qualitative interviews with CP and EMS stakeholders

In-depth cost analysis with EMS provider and hospital cost data

Questions? Comments?

Our team would love to hear from those of you who are currently working on community paramedicine projects!

Please reach out with any information, questions or comments to the evaluation project team:

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THANK YOU!

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