

Proving the Value of Community Paramedicine

Presented by

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PennState Health
Milton S. Hershey Medical Center

Patient Story

- 30 year old female
- EMS/ED patient at least once per week
- Minimal insurance
- Noncompliance with diabetic care
- Noncompliance with heart failure care
- Significant drug abuse history
- Enabling family structure
- Poor communication efforts



Patient Story

- Community Paramedicine visited her four times in 30 days
- Improved diabetic self-care
- Heavily educated, and helped develop sustainable heart failure self-care habits
- Motivated family to help
- Coordinated care plan changes with Heart Failure clinicians
- Connected patient to local clinical and social resources



Patient Was Not Admitted for Over One Year



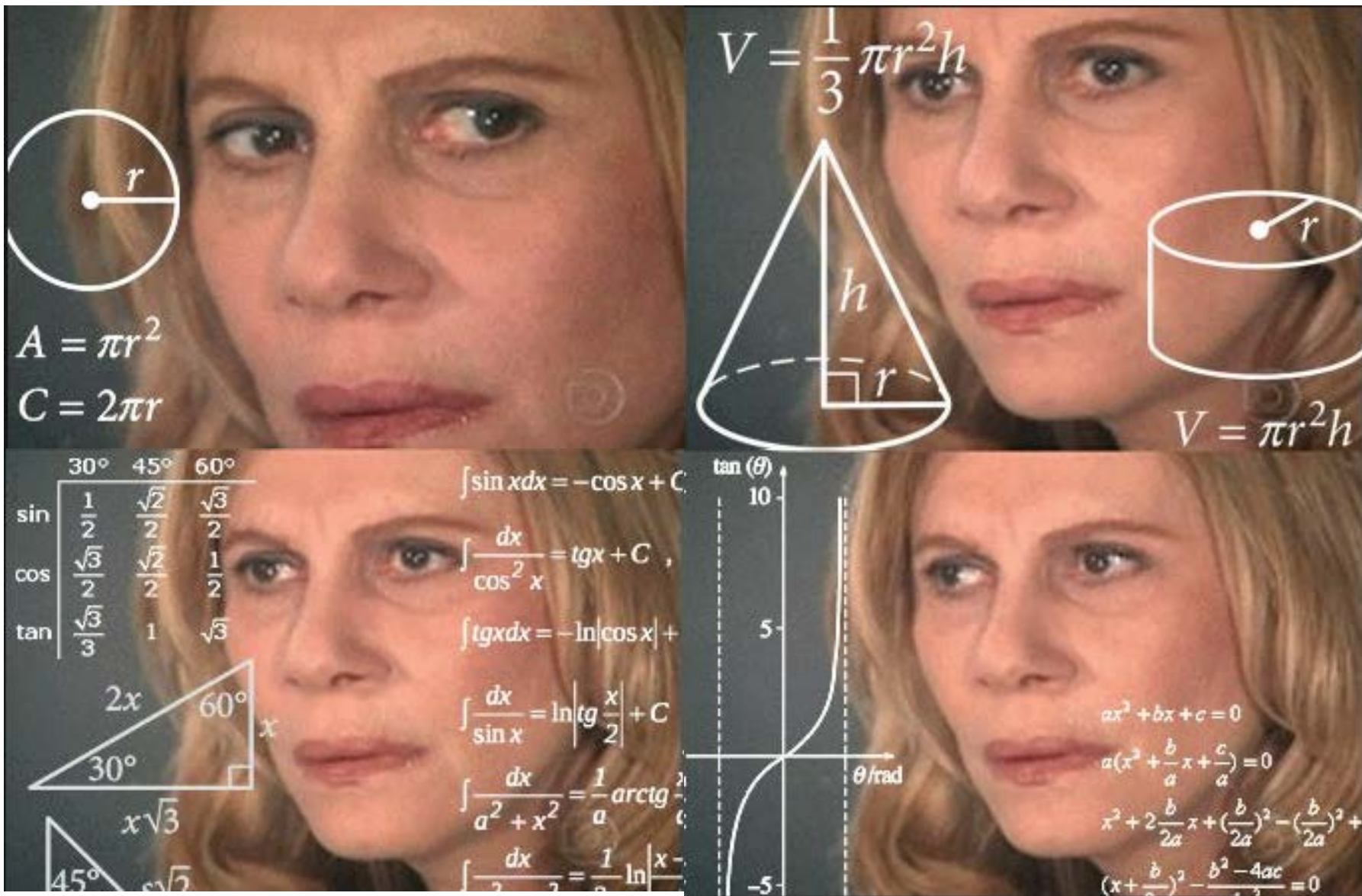
Hold On...

- How do we know Community Paramedicine improved her situation?
- Are other interventions at work?
- How many readmissions had she had prior?
- How much money did each one of her readmissions cost the hospital?
- Do all readmissions cost the same?
- Does billing revenue offset readmissions?
- Does this patient have non-healthcare related factors in play?
- How can it possibly be cost-effective to provide a free service?
- What other variables are in play?



- Were social determinants of health considered?
- How was she specifically coded?
- Should Home Health nursing have been involved?
- Was there a discharge issue?
- How long did the visits take?
- Did she qualify for Rehab?
- Was she enrolled in disease-specific processes?
- Does she have a PCP?
- Did she attend scheduled appointments?
- Who's on first?





Proving the Value of Community Paramedicine



Learning Objectives

- Recognize the clinical versatility of Community Paramedicine
- Apply basic analytical concepts in planning for Community Paramedicine
- Identify high-impact areas of opportunity for intervention
- Develop framework of process measures that allow for demonstration of effectiveness
- Identify conflating variables and understand the importance of normalization
- Describe the value of rapid process improvement
- Analyze the clinical impact of an existing CP program



Community Paramedicine's Strengths

- Emerging and developing
- Highly versatile
- Low-cost
- Expanding positive visibility with hospitals and payers
- Flexible staffing and process options
- Ability to interface with health systems



Community Paramedicine Pitfalls

- Vague implementation
- Non-committed structuring
- Limited community and healthcare system awareness
- Lack of reliably direct revenue stream
- *Lack of comprehensive data tracking and analysis*
- *Lack of healthcare partnerships*
- ***Inability to truly demonstrate value***



Universal Questions Surrounding “Value”

- Is Community Paramedicine safe for patients?
- Are these programs providing quality services recognized by external entities
- Do these programs positively impact other healthcare providers?
- Do these program generate savings by reducing total cost of care?



Value to Whom?



Key Concepts



Population

Group of all items of interest. Frequently very large, sometimes infinite.

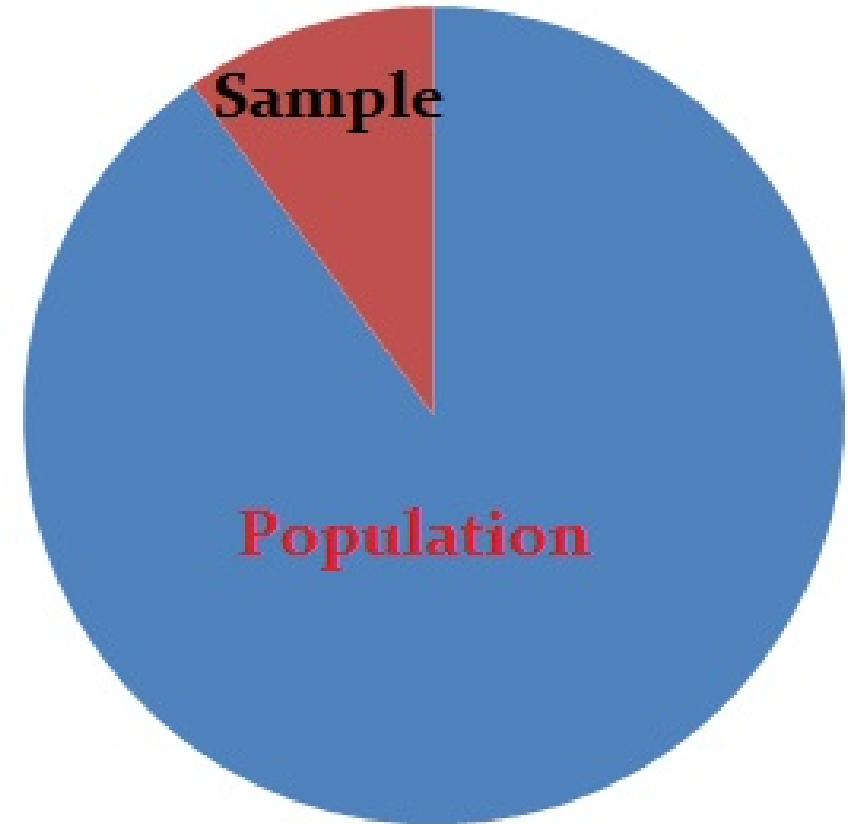
- E.g., All 300 million US voters, all customers of a company



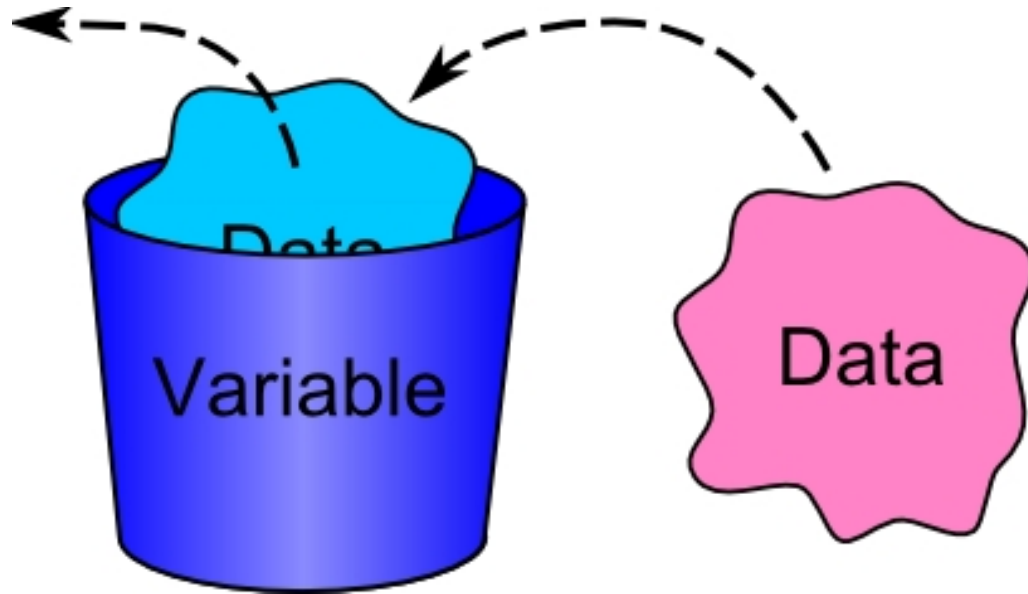
Sample

Set of data drawn from population

- Potentially large, but less than population



Variable



Any characteristic, number, or quantity that can be measured or counted

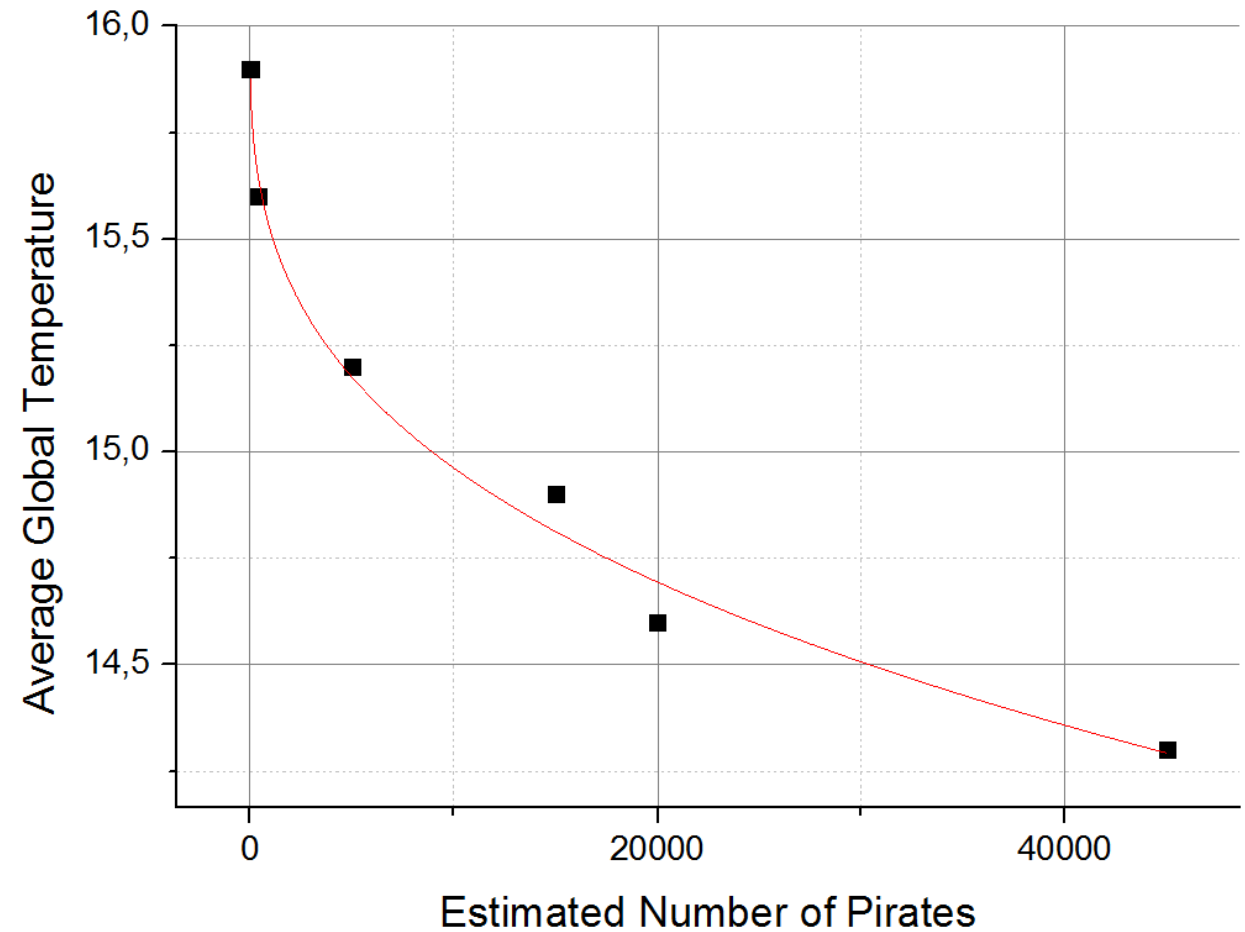
- i.e., “Data item”, “Data point”
- Quantity that takes different values in different situations



Causation

Relationship between cause and effect

Correlation \neq causation



Getting Started



PennState Health
Milton S. Hershey Medical Center

Step 1: Set a Goal



Step 1: Set a Goal

Providing a Quality Service

- What population(s) will we focus on?
- What are the challenges or unaddressed needs for these patients?
- What do we think we can measurably impact?
- What does the data for these patients look like?
 - *Before and after*



Step 2: Design the Intervention



Step 2: Design the Intervention

Is Community Paramedicine Safe?

- Work with medical direction
- Collaborate with external stakeholders
- Specific evaluations and interventions for this population

Providing a Quality Service

- Developing infrastructure and partnerships



Step 3: Plan the Tracking



Step 3: Plan the Tracking

What impact do these programs have on other healthcare system providers?

- Commit to thorough and consistent data tracking
- Work with medical direction on appropriate documentation
- Identify a significant array of variables that may be pertinent
 - E.g., distance, time, diagnosis, payer mix, demographics
- *Develop mechanism to evaluate core measure of impact*



Step 4: Analyze and Verify Data



Step 4: Analyze and Verify Data

Do these program generate savings by reducing total cost of care?

- Determine basic analytics (sums, averages, etc)
- Normalize data to isolate variables
- Define business impact of these findings

Breaking Through

- Is Community Paramedicine safe for patients?
- Are these programs providing quality services recognized by external entities?
- What impact do these programs have on other healthcare system providers?
- Do these program generate savings by reducing total cost of care?



Case Study: Life Lion Community Paramedicine



Case Study: Life Lion Community Paramedicine

- Small-scale pilot program in 2013
- Intriguing concept, but no obvious funding model
- Inspired by emerging Community Paramedicine concepts of reducing super-utilization and readmissions
- Hospital leadership became aware of capabilities
- Subsequent data analysis of challenging populations changed outlook



Case Study: Life Lion Community Paramedicine

Staffing

- 4 FTEs
- 3 paramedic field clinicians
- 1 supervisor

Resources

- 3 repurposed police vehicles
- Basic and specialty equipment load outs
- Cerner communication and documentation access



Goal: Reduce Readmissions

Why?

- Improves patient outcomes and experience
- Lowers healthcare costs
- Enhances population health

Business drivers

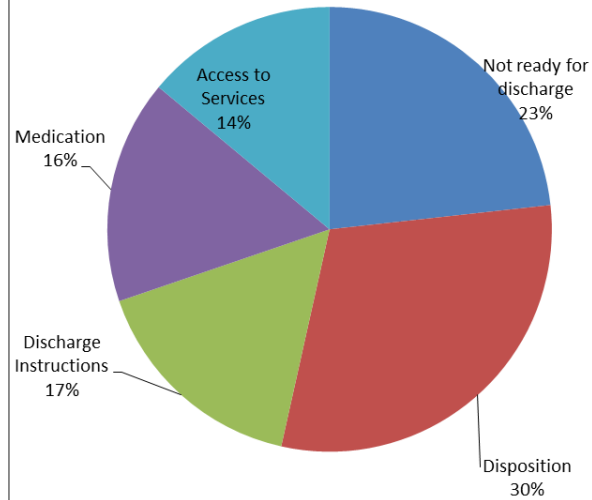
- CMS reducing payments for excess readmission rates
- Commercial payers may incentivize elevated performance

Shared savings contracts

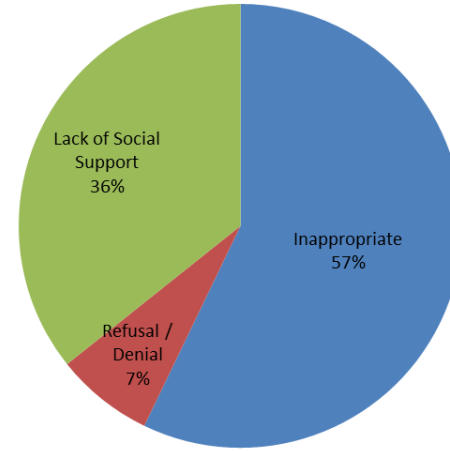
- Readmissions expense is substantial



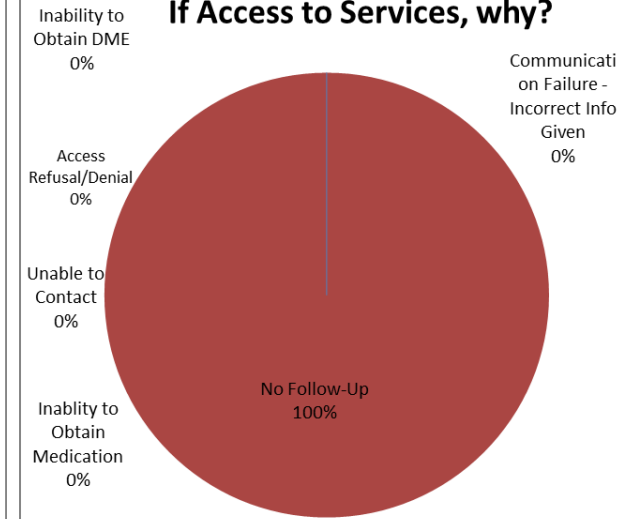
Readmission Drivers



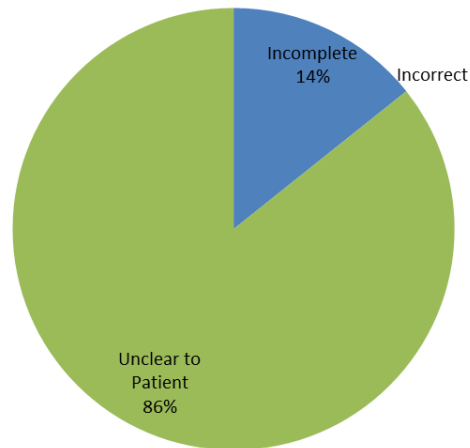
If Disposition, why?



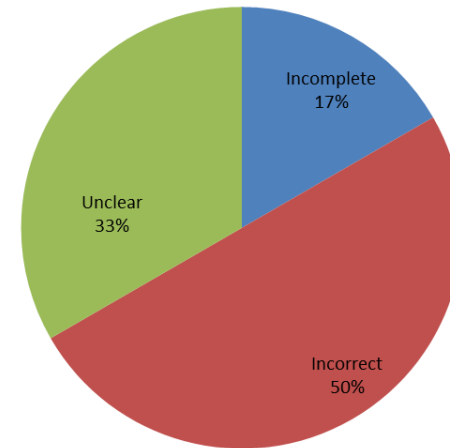
If Access to Services, why?



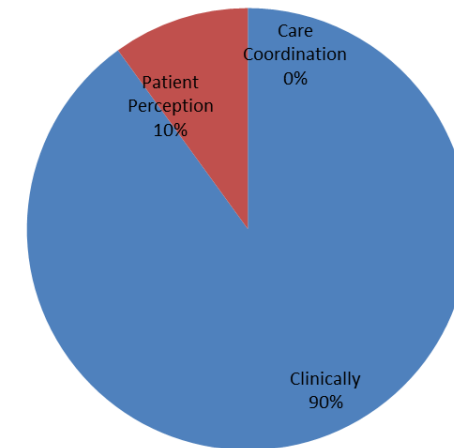
If Discharge Instructions, why?



If Medication, why?



If not ready for discharge, why?



Goal: Reduce Readmissions

Hospital capacity and cost considerations

- Poor reimbursement in patients readmitted within 30 days
- In saturated hospitals, higher-paying cases may not have access to these beds
- Dramatically increases cost to institution

Patient perspective

- Readmissions result in increased complications
- Overall experience and perception of care worsened

Significant impact on bundle care programs*



Designing the Intervention

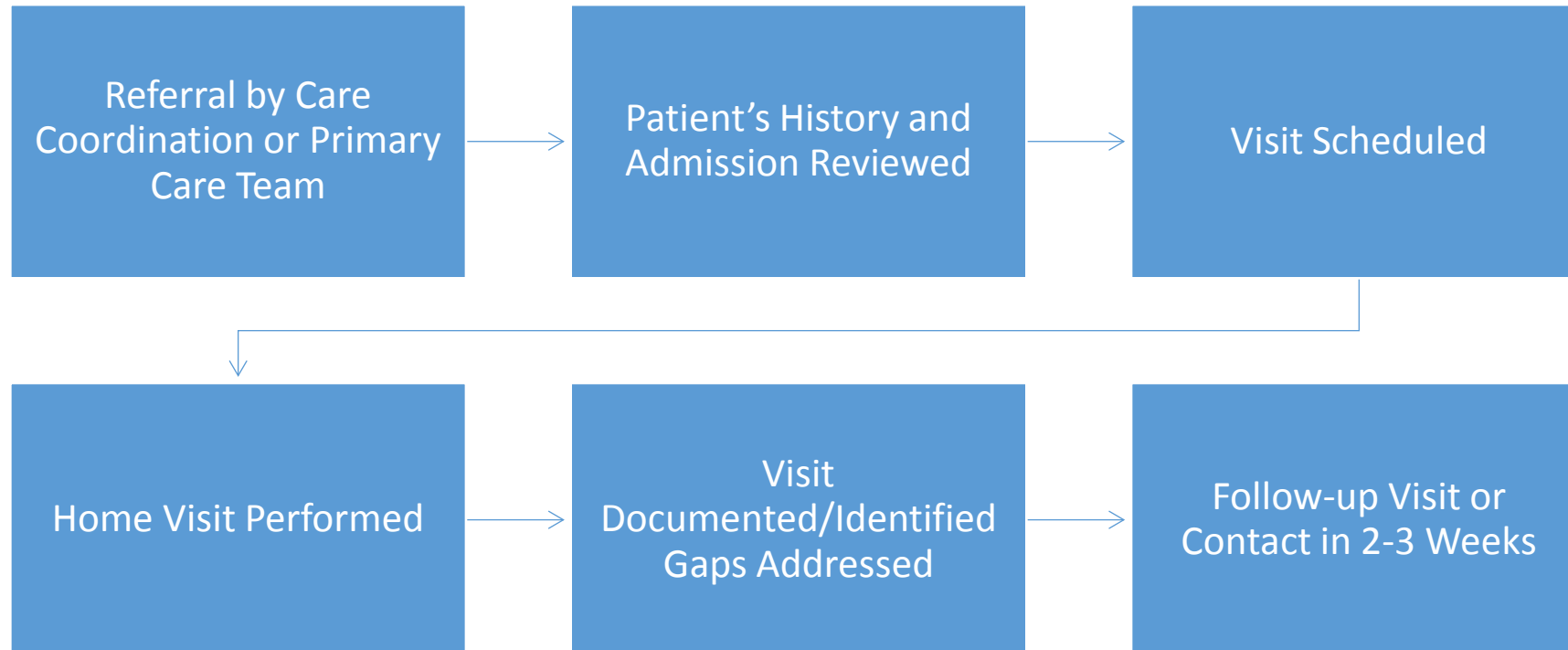
Target Population: All Primary Diagnosis Heart Failure Patients

Exclusions

- Discharge to Skilled Nursing Facility (SNF)
- Discharge to hospice services
- Lives >90 minutes from the Hershey Medical Center



Designing the Intervention



Designing the Intervention

Home Visit

- History leading to admission
- Reviewing and reinforcing discharge instructions
- Thorough physical exam
- Medication reconciliation
- Reinforce medication instructions/disease-specific guidelines
- Provide tools/education to help patients manage their care
- Reinforce communication options
- Provide interventions



Plan the Tracking

- ***Identify core measure of value***
- Maintain comprehensive record of all activity
 - Charting software or separate record
- Identify relevant operational metrics
- Add related clinical measures
- Expand as needed



Population Profile (Heart Failure)

Age

- Mean: 69.75
- Median: 72.00
- Std. Deviation: 14.47 (68% between 55.28 and 84.22)

Gender

- Male: 55.53%
- Female: 44.48%

Home Health/Bed-Bound

- 43.27%

Payer Mix

- 65%: Medicare, 20% commercial, 9% Medicaid



Population Profile (Heart Failure)

Acute congestive heart failure	1	.1	.1	16.1
Acute congestive heart failure	1	.1	.1	16.2
Acute Congestive Heart Failure	1	.1	.1	16.2
Acute congestive heart failure I50.9	2	.2	.2	16.3
Acute Congestive Heart Failure with Left Ventricular Diastolic Dysfunction	2	.2	.2	16.5
Acute cor pulmonale I26.09	1	.1	.1	16.6
Acute decompensated heart failure	1	.1	.1	16.6
Acute decompensated heart failure I50.9	2	.2	.2	16.8
Acute decompensated HF	2	.2	.2	16.9
Acute diastolic (congestive) heart failure	1	.1	.1	17.0
Acute diastolic (congestive) heart failure I50.31	3	.2	.2	17.2
Acute diastolic CHF (congestive heart failure)	1	.1	.1	17.3
Acute diastolic congestive heart failure	2	.2	.2	17.5
Acute diastolic heart failure	4	.3	.3	17.8
Acute diastolic heart failure I50.31	2	.2	.2	17.9
Acute diastolic HF	8	.6	.6	18.5
Acute diastolic HF (heart failure) I50.31	1	.1	.1	18.6
Acute encephalopathy	1	.1	.1	18.7
Acute encephalopathy G93.40	1	.1	.1	18.8
Acute exacerbation of	8	.6	.6	19.4

Acute exacerbation of CHF	8	.6	.6	19.4
Acute Exacerbation of CHF	25	1.9	1.9	21.2
Acute exacerbation of CHF (congestive heart failure)	6	.5	.5	21.7
Acute exacerbation of CHF (congestive heart failure) I50.9	20	1.5	1.5	23.2
Acute exacerbation of chronic obstructive pulmonary disease	1	.1	.1	23.3
Acute exacerbation of congestive heart failure	5	.4	.4	23.6
Acute exacerbation of congestive heart failure I50.9	14	1.1	1.1	24.7
Acute exacerbation of COPD with asthma	1	.1	.1	24.8
Acute GI bleeding K92.2	1	.1	.1	24.8
Acute heart failure	1	.1	.1	24.9
Acute heart failure I50.9	1	.1	.1	25.0
Acute heart failure exacerbation	1	.1	.1	25.1
Acute heart failure with normal ejection fraction	1	.1	.1	25.2
Acute HF	1	.1	.1	25.2
Acute HF (heart failure) I50.9	4	.3	.3	25.5



Making Sense of the Chaos

Determining Readmission Rates

1. Identify what patients constitute target population
2. Determine sample that received CP services
3. Separate patients that did not
4. Determine what patients in each category were readmitted
5. Rate: $\text{Readmits} / \text{Total Seen}$



Target Population

Primary Heart Failure	
I11.0	Hypertensive heart disease with heart failure
I13.0	Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
I13.2	Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease
I50.1	Left ventricular failure
I50.20	Unspecified systolic (congestive) heart failure
I50.21	Acute systolic (congestive) heart failure
I50.22	Chronic systolic (congestive) heart failure
I50.23	Acute on chronic systolic (congestive) heart failure
I50.30	Unspecified diastolic (congestive) heart failure
I50.31	Acute diastolic (congestive) heart failure
I50.33	Acute on chronic diastolic (congestive) heart failure
I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure
I50.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure
I50.9	Heart failure, unspecified



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	HF	Y															
2	CP	(All)															
3	Facility DC Disposition	(Multiple Items)															
4							FY2019 Normalized (CP)					FY2019 Normalized (NO CP)					FY2
5	Count of Account No.	Column Labels					Month	Readmits	Total Seen	Rate		Month	Readmits	Total Seen	Rate		Month
6	Row Labels	Y	#N/A	Grand Total			Jul	3	30	10.00%		Jul	5	32	15.63%		Jul
7	2019						Aug	3	20	15.00%		Aug	9	26	34.62%		Aug
8	Jan	8	43	51			Sep	3	21	14.29%		Sep	5	26	19.23%		Sep
9	Feb	13	43	56			Oct	3	21	14.29%		Oct	7	32	21.88%		Oct
10	Mar	7	51	58			Nov	4	23	17.39%		Nov	8	30	26.67%		Nov
11	Apr	12	40	52			Dec	3	17	17.65%		Dec	12	32	37.50%		Dec
12	May	9	62	71			Jan	0	20	0.00%		Jan	8	31	25.81%		Jan
13	Grand Total	49	239	288			Feb	1	20	5.00%		Feb	13	37	35.14%		Feb
14							Mar	1	22	4.55%		Mar	6	37	16.22%		Mar
15							Apr	1	19	5.26%		Apr	11	33	33.33%		Apr
16							Total	22	213	10.33%		Total	84	316	26.58%		Total
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24							PDX HF Apr17-Apr19 (CP, Normalized)					PDX HF Apr17-Apr19 (No CP, Normalized)					PDX HF
25		Financial Impact Model (FY 19-20)					Month	Readmit	Total	Rate		Month	Readmit	Total	Rate		Month
26		Principle Diagnosis Heart Failure (HF)	With CP (Normalized)	No CP (Normalized)			Apr	2	23	8.70%		Apr	2	14	14.29%		Apr
27							May	3	20	15.00%		May	5	36	13.89%		May
28		Total Patients	213	316			Jun	2	25	8.00%		Jun	14	33	42.42%		Jun
29		Readmission rate	10.33%	26.58%			Jul	1	17	5.88%		Jul	6	24	25.00%		Jul
30		Readmissions	22.0029	83.9928			Aug	4	19	21.05%		Aug	4	30	13.33%		Aug
31		Readmissions if opposite applied	56.62	32.64			Sep	2	22	9.09%		Sep	11	25	44.00%		Sep
32		Potential readmissions prevented	34.61	51.35			Oct	5	19	26.32%		Oct	4	23	17.39%		Oct
33		Average length of stay	6	6			Nov	4	18	22.22%		Nov	14	29	48.28%		Nov

PivotTable Fields

Choose fields to add to report:

☒ Account No.
☐ Acct. Format
☒ Readmit
☐ Fac Code
☐ Facility
☐ Patient Name
☐ Universal ID
☐ MRN
☐ Age
☐ Sex
☐ Zip Code
☐ Marital Status
☐ Language
☐ Citizenship
☐ Race
☐ Religion
☐ Readmitted Y/N

Drag fields between areas below:

FILTERS

HF

CP

Facility DC Di...

COLUMNS

Readmit

ROWS

Years

End Dt

VALUES

Count of A

LLEMS Community Paramedicine Readmission Impact

- April 2017-April 2019
- Compares PDX HF patients with CP services vs. those without
- Data extracted from MIDAS Readmission Toolpack reporting
- Verified against Vizient data

Cumulative PDX HF (With CP)			
Month	Readmits	Total Seen	Rate
Apr	1	24	4.17%
May	5	23	21.74%
Jun	2	28	7.14%
Jul	1	17	5.88%
Aug	4	19	21.05%
Sep	2	22	9.09%
Oct	5	22	22.73%
Nov	4	20	20.00%
Dec	2	24	8.33%
Jan	4	23	17.39%
Feb	4	29	13.79%
Mar	2	34	5.88%
Apr	3	24	12.50%
May	3	34	8.82%
Jun	2	24	8.33%
Jul	3	31	9.68%
Aug	3	22	13.64%
Sep	3	21	14.29%
Oct	3	22	13.64%
Nov	4	22	18.18%
Dec	4	19	21.05%
Jan		20	0.00%
Feb	1	22	4.55%
Mar	1	25	4.00%
Apr	1	19	5.26%
Total	67	590	11.36%

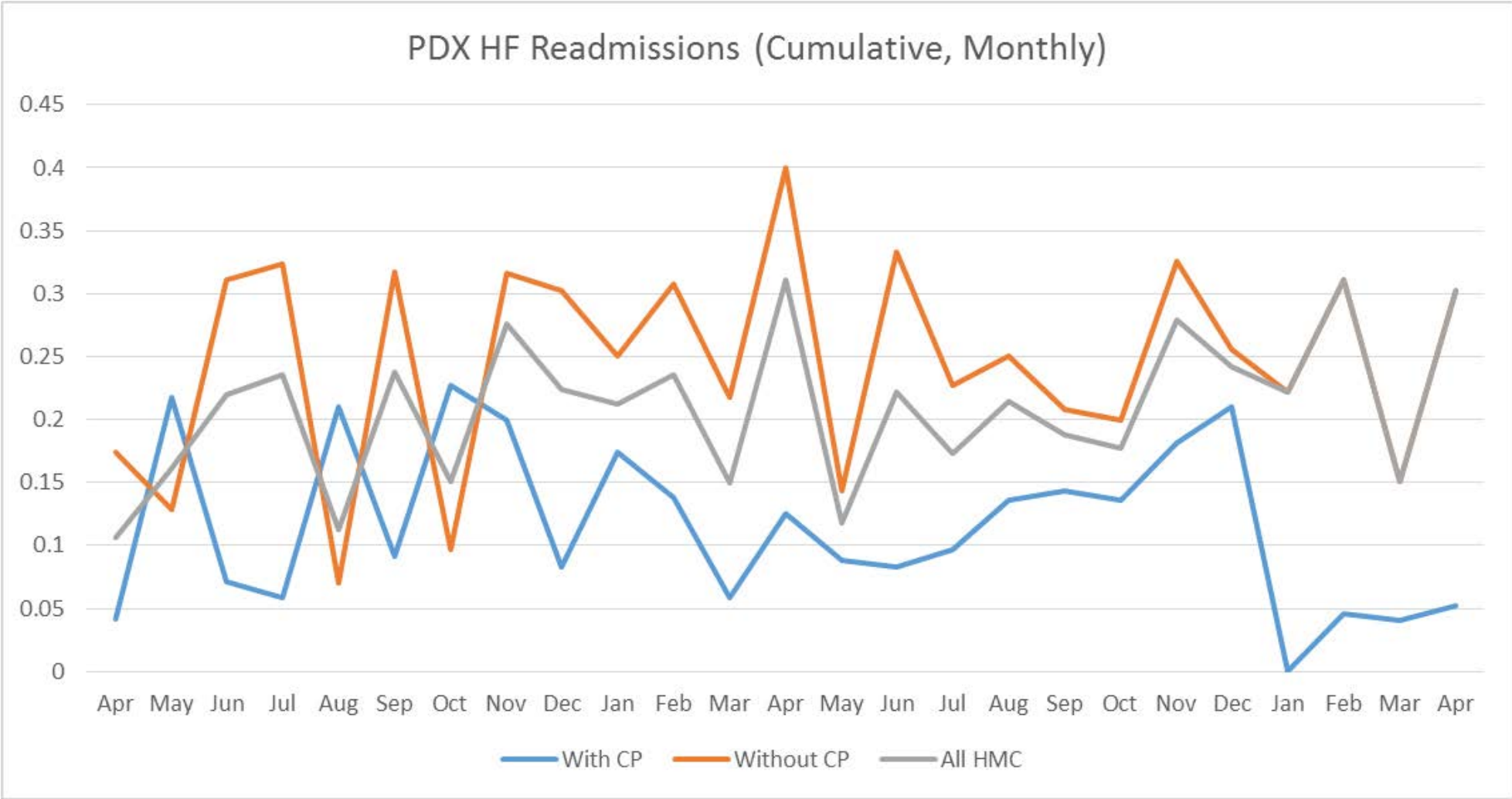
Cumulative PDX HF (NO CP)			
Month	Readmits	Total Seen	Rate
Apr	4	23	17.39%
May	5	39	12.82%
Jun	14	45	31.11%
Jul	11	34	32.35%
Aug	3	43	6.98%
Sep	13	41	31.71%
Oct	3	31	9.68%
Nov	12	38	31.58%
Dec	13	43	30.23%
Jan	6	24	25.00%
Feb	12	39	30.77%
Mar	10	46	21.74%
Apr	20	50	40.00%
May	6	42	14.29%
Jun	10	30	33.33%
Jul	10	44	22.73%
Aug	12	48	25.00%
Sep	10	48	20.83%
Oct	8	40	20.00%
Nov	15	46	32.61%
Dec	11	43	25.58%
Jan	12	54	22.22%
Feb	14	45	31.11%
Mar	8	53	15.09%
Apr	16	53	30.19%
Total	258	1042	24.76%

Cumulative PDX HF (All HMC)			
Month	Readmits	Total Seen	Rate
Apr	5	47	10.64%
May	10	62	16.13%
Jun	16	73	21.92%
Jul	12	51	23.53%
Aug	7	62	11.29%
Sep	15	63	23.81%
Oct	8	53	15.09%
Nov	16	58	27.59%
Dec	15	67	22.39%
Jan	10	47	21.28%
Feb	16	68	23.53%
Mar	12	80	15.00%
Apr	23	74	31.08%
May	9	76	11.84%
Jun	12	54	22.22%
Jul	13	75	17.33%
Aug	15	70	21.43%
Sep	13	69	18.84%
Oct	11	62	17.74%
Nov	19	68	27.94%
Dec	15	62	24.19%
Jan	12	54	22.22%
Feb	14	45	31.11%
Mar	8	53	15.09%
Apr	16	53	30.19%
Total	322	1546	20.83%

Source: MIDAS
Readmission Standard
Reporting

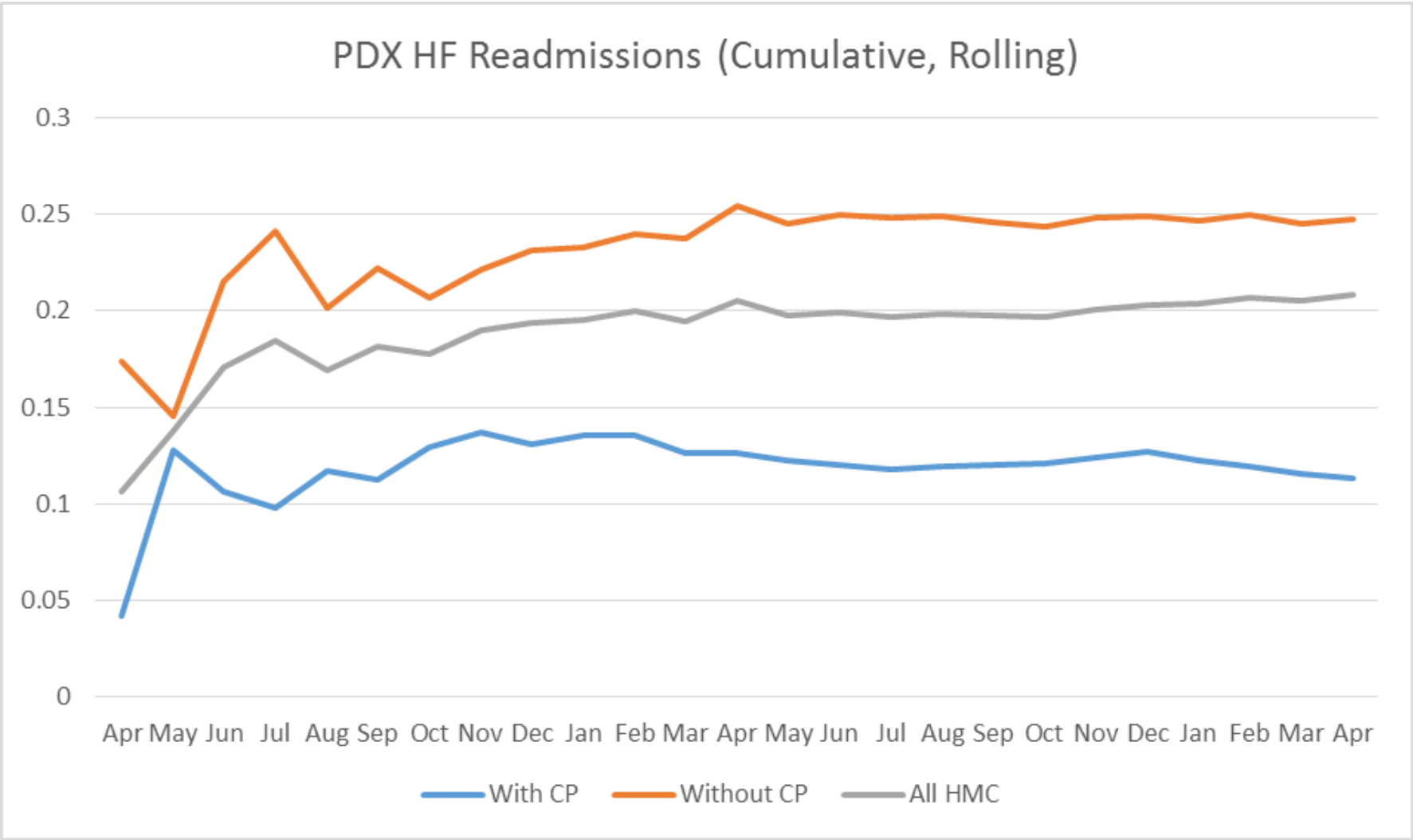


LLEMS Community Paramedicine
Readmission Impact



LLEMS Community Paramedicine

Readmission Impact



Normalization

Trends

- A substantial gap has been consistently observed between patients that have received CP services versus those that have not.
- Notable gap between patients not seen by CP and total HMC HF readmit rate

Variables

- Concern regarding if these two groups are truly comparable, or if other factors may be variables skewing the trends. (**CAUSATION**)

Normalization

- The following exercise focused on removing patients ineligible for CP services from the group of those that did not receive a visit, and ensured both groups had a comparable level of severity via a Case Mix Index score (CMI).
- Ultimately, the goal was to ensure that a CP home visit was the only major variable separating the two groups.



LLEMS Community Paramedicine

Normalization

Primary Diagnosis Heart Failure: April 2017-August 2018

PDX HF With CP To Date (Monthly)

Apr	2	24	8.33%
May	5	23	21.74%
Jun	2	28	7.14%
Jul	1	17	5.88%
Aug	4	19	21.05%
Sep	2	22	9.09%
Oct	5	22	22.73%
Nov	4	20	20.00%
Dec	2	23	8.70%
Jan	4	23	17.39%
Feb	4	29	13.79%
Mar	3	37	8.11%
Apr	3	23	13.04%
May	3	33	9.09%
June	2	24	8.33%
July	3	31	9.68%
Aug	3	22	13.64%
	52	420	12.38%

PDX HF WITHOUT CP To Date
(Monthly)

Apr	4	23	17.39%
May	6	39	15.38%
Jun	15	45	33.33%
Jul	11	33	33.33%
Aug	5	43	11.63%
Sep	14	41	34.15%
Oct	4	31	12.90%
Nov	15	38	39.47%
Dec	14	43	32.56%
Jan	6	24	25.00%
Feb	13	39	33.33%
Mar	10	47	21.28%
Apr	20	52	38.46%
May	6	43	13.95%
June	9	30	30.00%
July	10	44	22.73%
Aug	12	47	25.53%
	174	662	26.28%

PDX HF All HMC To Date (Monthly)

Apr	6	47	12.77%
May	11	62	17.74%
Jun	17	73	23.29%
Jul	12	50	24.00%
Aug	9	62	14.52%
Sep	16	63	25.40%
Oct	9	53	16.98%
Nov	19	58	32.76%
Dec	16	66	24.24%
Jan	10	47	21.28%
Feb	17	68	25.00%
Mar	13	84	15.48%
Apr	23	75	30.67%
May	9	76	11.84%
June	11	54	20.37%
July	13	75	17.33%
Aug	15	69	21.74%
	226	1082	20.89%



LLEMS Community Paramedicine

Normalization

- The below population adjustments include only discharge to home, comparable length of stay, demographics, and primary diagnosis heart failure.
- CMI values were identified through Vizient reporting, using acute inpatient encounter numbers of primary diagnosis HF patients.
- This establishes the logical model that can be translated into financial impact.

	Population Comparison	
	With CP Visit	Without CP Visit
Number of Encounters	274	296
CMI	1.4605	1.4728
Payer Mix	Commercial: 20% Medicare: 65% Medicaid: 9%	Commercial: 20% Medicare: 65% Medicaid: 9%
Age	60% >65	60% >65
Gender	F: 40%, M: 60%	F: 38%, M: 62%

Normalized Readmission Impact

- Only compares patients discharged to home
- Identical CMI
- Identical payer mix
- Identical demographics
- Identical length of stay
- Identical geographic spread

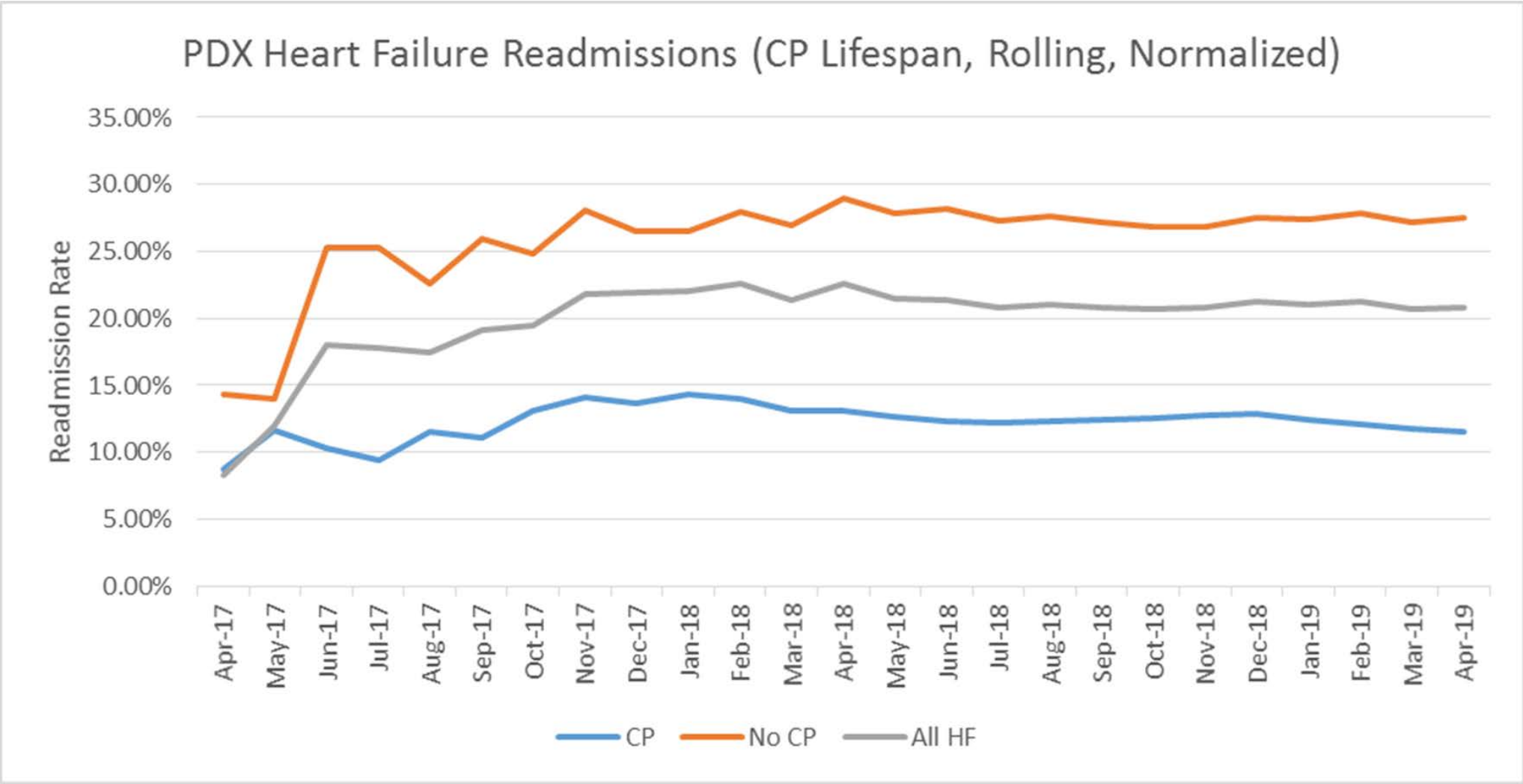
PDX HF Apr17-Apr19 (CP, Normalized)			
Month	Readmit	Total	Rate
Apr	2	23	8.70%
May	3	20	15.00%
Jun	2	25	8.00%
Jul	1	17	5.88%
Aug	4	19	21.05%
Sep	2	22	9.09%
Oct	5	19	26.32%
Nov	4	18	22.22%
Dec	2	20	10.00%
Jan	4	20	20.00%
Feb	3	25	12.00%
Mar	2	31	6.45%
Apr	3	23	13.04%
May	3	34	8.82%
June	2	24	8.33%
July	3	30	10.00%
Aug	3	20	15.00%
Sep	3	21	14.29%
Oct	3	21	14.29%
Nov	4	23	17.39%
Dec	3	17	17.65%
Jan	0	20	0.00%
Feb	1	20	5.00%
Mar	1	22	4.55%
Apr	1	19	5.26%
Total	64	553	11.57%

PDX HF Apr17-Apr19 (No CP, Normalized)			
Month	Readmit	Total	Rate
Apr	2	14	14.29%
May	5	36	13.89%
Jun	14	33	42.42%
Jul	6	24	25.00%
Aug	4	30	13.33%
Sep	11	25	44.00%
Oct	4	23	17.39%
Nov	14	29	48.28%
Dec	6	35	17.14%
Jan	5	19	26.32%
Feb	10	22	45.45%
Mar	5	29	17.24%
Apr	17	36	47.22%
May	3	26	11.54%
Jun	7	20	35.00%
July	5	32	15.63%
Aug	9	26	34.62%
Sep	5	26	19.23%
Oct	7	32	21.88%
Nov	8	30	26.67%
Dec	12	32	37.50%
Jan	8	31	25.81%
Feb	13	37	35.14%
Mar	6	37	16.22%
Apr	11	33	33.33%
Total	197	717	27.48%



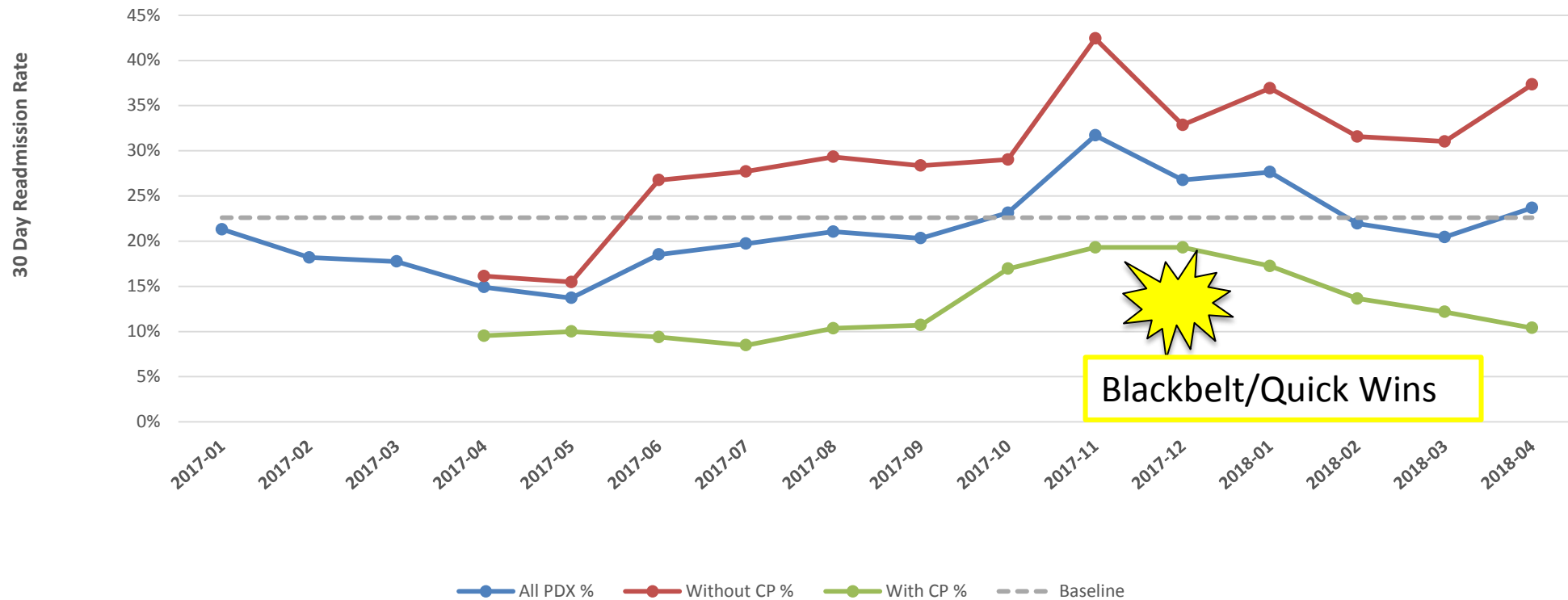
LLEMS Community Paramedicine

Normalized Readmission Impact



Course Corrections

30 Day Readmission Rates
Rolling 3 Months



Financial Impact



Changing Realities

- Originally launched with bundle care initiative dynamic
 - Value predicated on improved outcomes
- Same question, different approach
 - What direct impact does prevented readmissions have on hospital financial picture?

A New Approach

Hospital opportunity bed days



Financial Impact Model

	With Community Paramedicine		Without Community Paramedicine	
a) Total Patients	1a.		1b.	
b) Readmission Rate	2a.		2b.	
c) Readmissions	3a.	$(1a * 2a)$	3b.	$(1b * 2b)$
d) Readmissions if Opposite Applied	4a.	$(1a * 2b)$	4b.	$(1b * 2a)$
e) Potential Readmission Prevented	5a.	$(4a - 3a)$	5b.	$(3b - 4b)$
f) Average Length of Stay	6a.	(Provided)	6b.	(Provided)
g) Opportunity Bed Days	7a.	$(5a * 6a)$	7b.	$(5b * 6b)$
h) Average Estimated Cost of Opp. Day	8a.	(Provided)	8b.	(Provided)
i) Impact to Direct Contribution Margin	9a.	$(7a * 8a)$	9b.	$(7b * 8b)$

Opportunity



Financial Impact Model

Using Cumulative PDX HF Readmission Rates

	With Community Paramedicine	Without Community Paramedicine
a) Total Patients	553	717
b) Readmission Rate	11.57%	27.48%
c) Readmissions	63.9821	197.0316
d) Readmissions if Opposite Applied	151.96	82.96
e) Potent Readmission Prevented	87.98	114.07
f) Average Length of Stay	6	6
g) Opportunity Bed Days	527.89	684.45
h) Average Estimated Cost of Opp. Day	\$2,000*	\$2,000*
i) Impact to Direct Contribution Margin	\$1,055,780	\$1,368,900

Opportunity

*Cannot share specific figure. This is a theoretical value based on historical bundled readmission costs that demonstrate principle



Important Notes

- This is **ONE** possible goal and **ONE** definition of impact
- Only includes *primary diagnosis heart failure discharged home*
- Ongoing conversations surrounding other forms of impact
- Rapidly changing healthcare landscape may change this outlook and present other opportunities



Summary

- Community Paramedicine is a versatile clinical tool with many potential applications
- Comprehensive planning necessary to identify and demonstrate value
- Collaboration with health systems and payers has enormous opportunity
- Future evolutions in payer recognition of model likely to increase opportunities to develop and maintain Community Paramedicine initiatives



Questions?



Thank you!



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