The Value of Analytics in Supporting a New Primary Care Based Care Management Model

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Center for Healthcare Quality & Analytics

My Background

- Clinical data analyst in the Center for Healthcare Quality and Analytics (CHQA) at the Children's Hospital of Philadelphia (CHOP)

- Employed at CHOP for 3 years

- Dedicated to Care Management (CM) service line, a new service line at CHOP

- Support all analytic needs of the service line, including many CM quality improvement initiatives

Mowgli Dye after a healthy dose of zoomies

- Fun fact: my dog and I are both color blind, but in very different ways

In April 2017, CHOP partnered with a Medicaid payor to pilot a new primary care based CM model

- This program was piloted at CHOP's largest inner-city primary care site

- Primary goal: reduce acute care utilization, with a particular focus on inpatient (IP) and emergency department (ED) utilization

- Secondary goal: ensure that patients received recommended primary and secondary care

- CHOP and payor made upfront investment to hire 7 FTE's, including Care Managers, Community Health Workers, and a social worker

- A quality improvement (QI) framework supported by analytics was used to implement the following interventions:
  1. Inpatient discharge follow-up (2 business days)
  2. ED discharge follow-up (3 business days)
  3. Proactive outreach for well visit scheduling
  4. Proactive outreach for influenza vaccinations

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The team utilized a multi-faceted analytics approach to overcome barriers to each phase of the QI process

QI Phase	Barriers	Analytic Solutions
Define/Diagnose	• Inability to proactively enroll patients in CM services	• Self-service dashboard
Test/Implement	• Manual processes to identify opportunities for intervention	• Real-time analytics
	• Lack of streamlined information to track intervention adherence and changes in outcomes	• Longitudinal metric tracking
Sustain	• Inability to proactively enroll patients in CM services	• Self-service dashboard
	• Lack of streamlined information to monitor intervention adherence and changes in outcomes	• High risk patient reports
		• Longitudinal metric tracking
Spread	• Insufficient data around longitudinal impact of CM programs at CHOP	• Evaluative analytics (ongoing)

An internally developed **self-service dashboard** helped identify initial cohort of patients eligible for CM services

- Tool was developed in Qlikview

- Allowed providers to apply clinical, utilization, demographic, and financial filters to all patients with a CHOP EMR to determine target cohort for intervention

- ~450 patients fulfilled final cohort criteria and were enrolled at baseline

Final Cohort Criteria
- 2+ complex chronic conditions (CCC)
- Asthma high utilizer
- $75,000+ charges & 3+ ED visits in past year
- 1 CCC & tech dependence
- Neuro CCC & 2+ ED visits in past year
- Neuro CCC & 2+ admissions in past year

CHOP Self Service Dashboard

Epic Healthy Planet tools provided **real-time analytics** to Care Managers to identify opportunities for targeted intervention without manual chart review

- Care Managers used documentation in each patient's chart to enroll the patients identified by the self-service dashboard or PCP referral into an Epic registry

- Healthy Planet reports pulled data from this registry and other areas in the EMR to generate various EMR-integrated reports in real-time

- Reports were run on a nearly daily basis to identify patients requiring CM services in a timely manner

- Examples Epic reports: PCP appointment, ED discharge, & IP discharge

Image that shows example of healthy planet report is not able to be hosted on a website due to restrictions set by Epic

Sample Healthy Planet Report from Test Patient

We created **longitudinal metric tracking** views in the program's dashboard to track intervention adherence and outcome measures over time

- Tool was developed in Qlikview

- Team members reviewed process and outcome measures weekly to inform quality improvement cycles

- Care Managers were able to filter the data for only patients attributed to their panel so that they could review their individual performance

- We used Statistical Process Control (SPC) charts to identify special cause variation vs. normal variation to inform program decision making
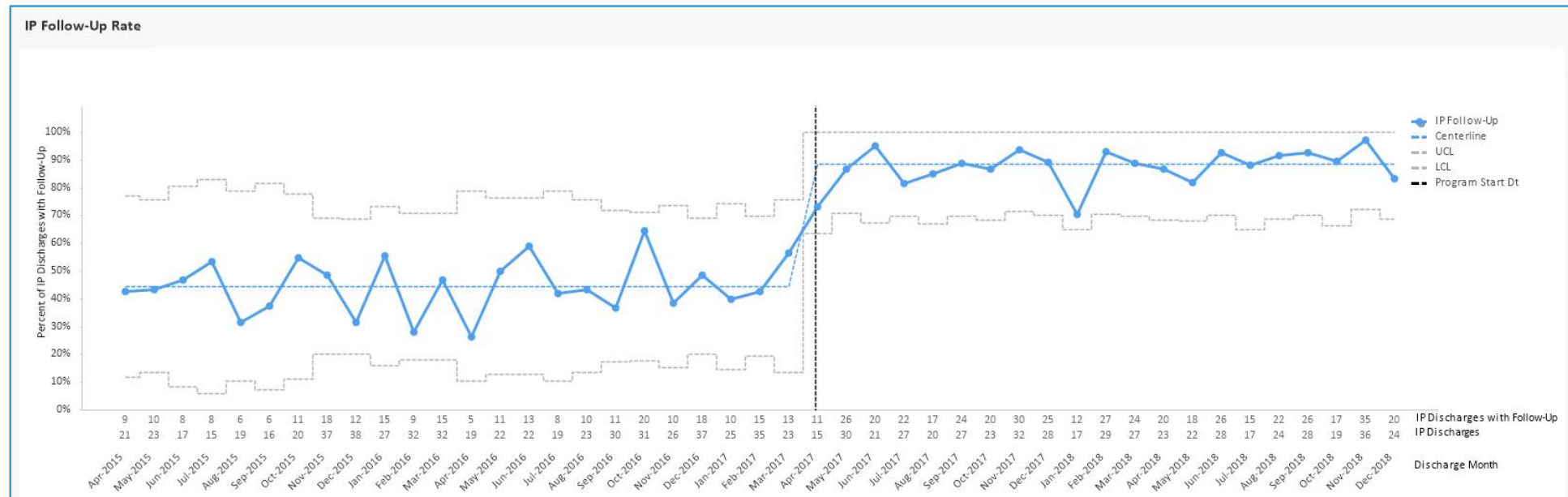
Example SPC Chart from dashboard

We created **longitudinal metric tracking** views in the program's dashboard to track intervention adherence and outcome measures over time

- We've demonstrated meaningful improvements in all targeted areas of the QI project: IP and ED follow up rates, IP and ED utilization, annual well visit adherence, and flu vaccines

Process Measures:

Metric	Baseline Value	Performance Value
IP Follow-Up Rate	44%	88%
ED Follow-Up Rate	32%	80%

Outcome Measures:

Metric	Baseline Value	Performance Value
IP Admission Rate	64 per 1000	48 per 1000
ED Discharge Rate	97 per 1000	84 per 1000
Annual Well Visit Adherence	79%	88%
Flu Vaccination Coverage	79%	89%

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A combination of self-service analytics, high risk patient reports, and longitudinal metric tracking support sustained improvement

- The final cohort criteria are applied quarterly to our internal self-service dashboard to minimize gaps in enrollment over time

- Additional "high risk" patient reports are sent to the clinical team on a quarterly basis to determine enrollment eligibility

- "High risk" is determined by an internally developed Care Management risk score that was created after project kick-off

- Longitudinal metrics are continuously monitored by the team to ensure that improvements in process and outcome metrics are sustained over time

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Evaluative analyses compare the cohort's population to patients with similar risk who were not eligible for the program

- Evaluative analyses were conducted using R Studio

- Initial analyses suggest that decreases in inpatient utilization observed in the project cohort may not be typical of other high risk patients at CHOP ; spreading the intervention to other primary care sites may be appropriate

- More robust statistical analyses are warranted to better understand intervention's impact on utilization

Admission Rate by Cohort
(High Risk as of Apr, 2017)

Although both groups exhibit decreases in IP utilization, the decrease observed in the project cohort is greater than the comparison cohort
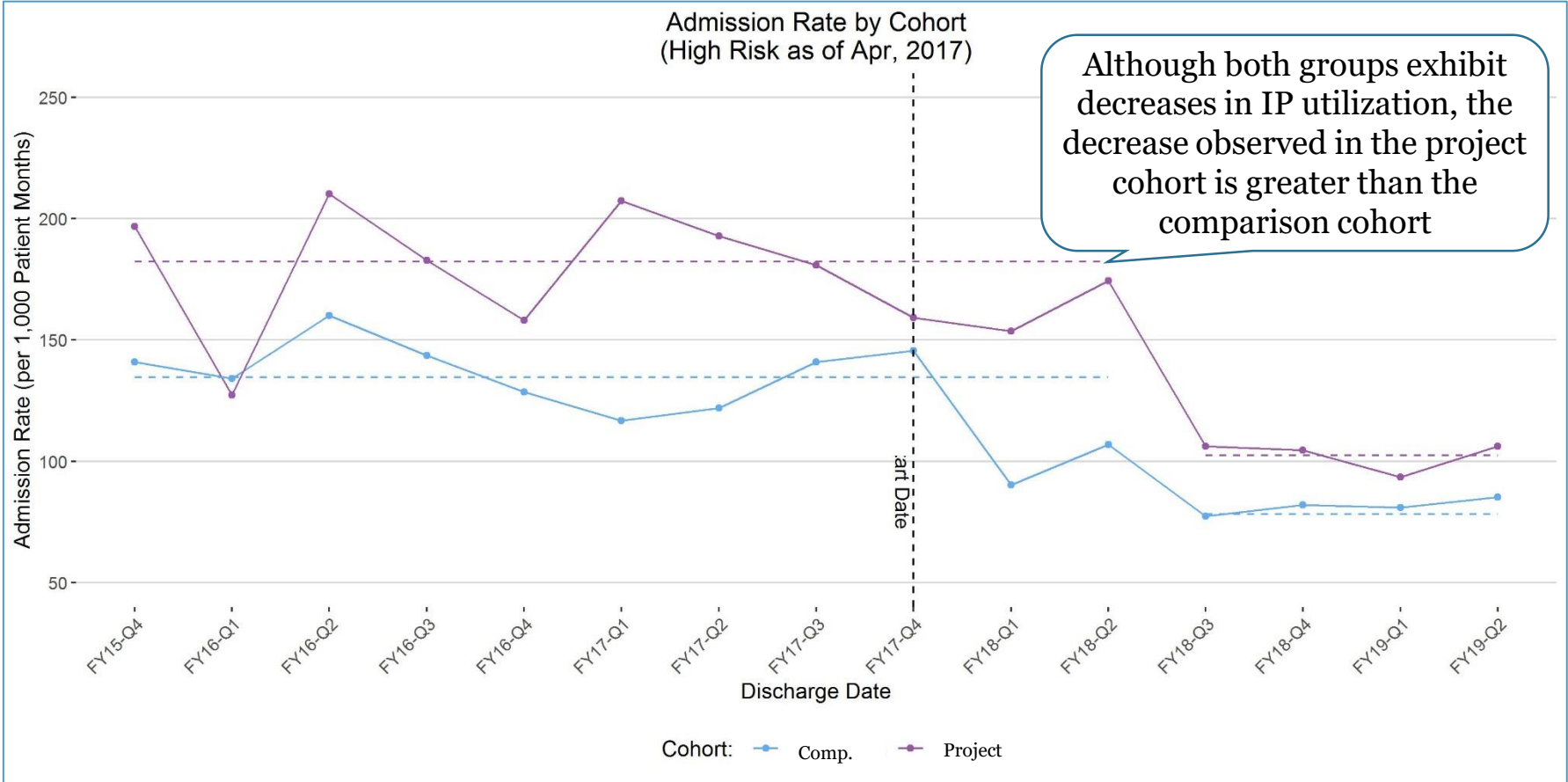
This program demonstrates that a multi-disciplinary CM model supported by multi-faceted analytics may be an effective strategy to manage the intense needs of complex patients

- Self-service tool, real-time analytics, and longitudinal metric tracking provided the information needed for the CM team to implement changes

- Additional statistically robust evaluative analyses are needed to better understand the intervention's impact on outcome measures

- Although analytics breaks down programmatic barriers, people are still the most important asset to a CM model

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Questions?

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APPENDIX

Introduction

- In April, 2017 CHOP partnered with a Medicaid payor to transform our largest primary care site's Care Management (CM) model

- A variety of analytic tools supported a quality improvement (QI) approach to implement various interventions to meet the unmet health needs of medically complex children at our largest primary care site

- This program has demonstrated improvements in all process and outcome measures

- This program suggests that a multi-faceted analytics approach that supports a multi-disciplinary CM team may be an effective strategy to manage the intense needs of medically complex children

Children with medical complexity are a particularly vulnerable population with a diverse set of needs that may be fulfilled by CM programs

- Medically complex children often receive substandard primary and secondary care due to diverse unmet health needs

- These patients also account for disproportionate healthcare spending that burdens our healthcare system

- There is substantial evidence that robust CM programs can improve these patients' quality of care by meeting unmet needs and right-sizing healthcare utilization

- Although there are a variety models to operationalize CM programs, the focus of this presentation will be a primary care based CM model

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CHOP's QI framework approaches projects in three phases and each requires analytics to answer a different question

QI Phase	Question
Define/Diagnose	• Who are our patients? • How can we track them over time?
Test/Implement	• How do we make the intervention easy to adhere to? • How can we visualize this information to make it actionable?
Sustain	• How can we ensure improvements made sustain over time?
Spread	• How confident are we that the project was successful? • Who was the program successful for?

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CHOP provides care management through various models that are tailored to the specific needs of their patients

Longitudinal Complex Care for CHOP PCP Patients

- Patient-centered Medical Home for regional and practice-based care management

Focus of this presentation

Longitudinal Complex Care for Non-CHOP PCP Patients

- Domestic, consultative care management

- International, consultative care management

Longitudinal Specialized Care Management

- Specialty disease

- Palliative care

- Adult transition

Intermittent Acute Care

- Case management

- Discharge planning

- Complex care teams

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CM RISK SCORE OVERVIEW

Risk Score Point Allocation		
Criteria	**Definition**	**Points**
Medical Complexity	>= 2 CCC's OR 1 CCC + Tech	4
ED Visits	>= 3 ED visits in past year	1
	>= 3 ED visits each year for past two years	2
Admissions	2 admissions in past year with cumulative LOS < 14 days	1
	>= 3 admissions in past year	2
	>= 14 days cumulative LOS in past year	2
	>= 2 admissions per year in past 2 years with cumulative LOS < 14 days in either year	3
	>= 3 admissions per year in past 2 years	4
	>= 14 day cumulative LOS per year in past 2 years	4
Specialists	>= 3 unique specialists in past year	2
	>= 3 unique specialists in the past year AND >= 8 visits to specialists in past 1 year	3
	>= 3 unique specialists in the past year and >=8 visits per year in past 2 years	4
BH/ID	ID/BH on active problem list or encounter diagnosis in past year	2
Language Barrier	Not have English documented as one of their spoken, written, or preferred lanugages	1

Risk Score Categories	
Category	**Point Range**
Low	0-5
Medium	6-9
High	10-17

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Further evaluative analyses suggest that this program has impacted inpatient admission rates for this cohort regardless of primary care appointment adhere in baseline time period

IP Admission Rate by Cohort
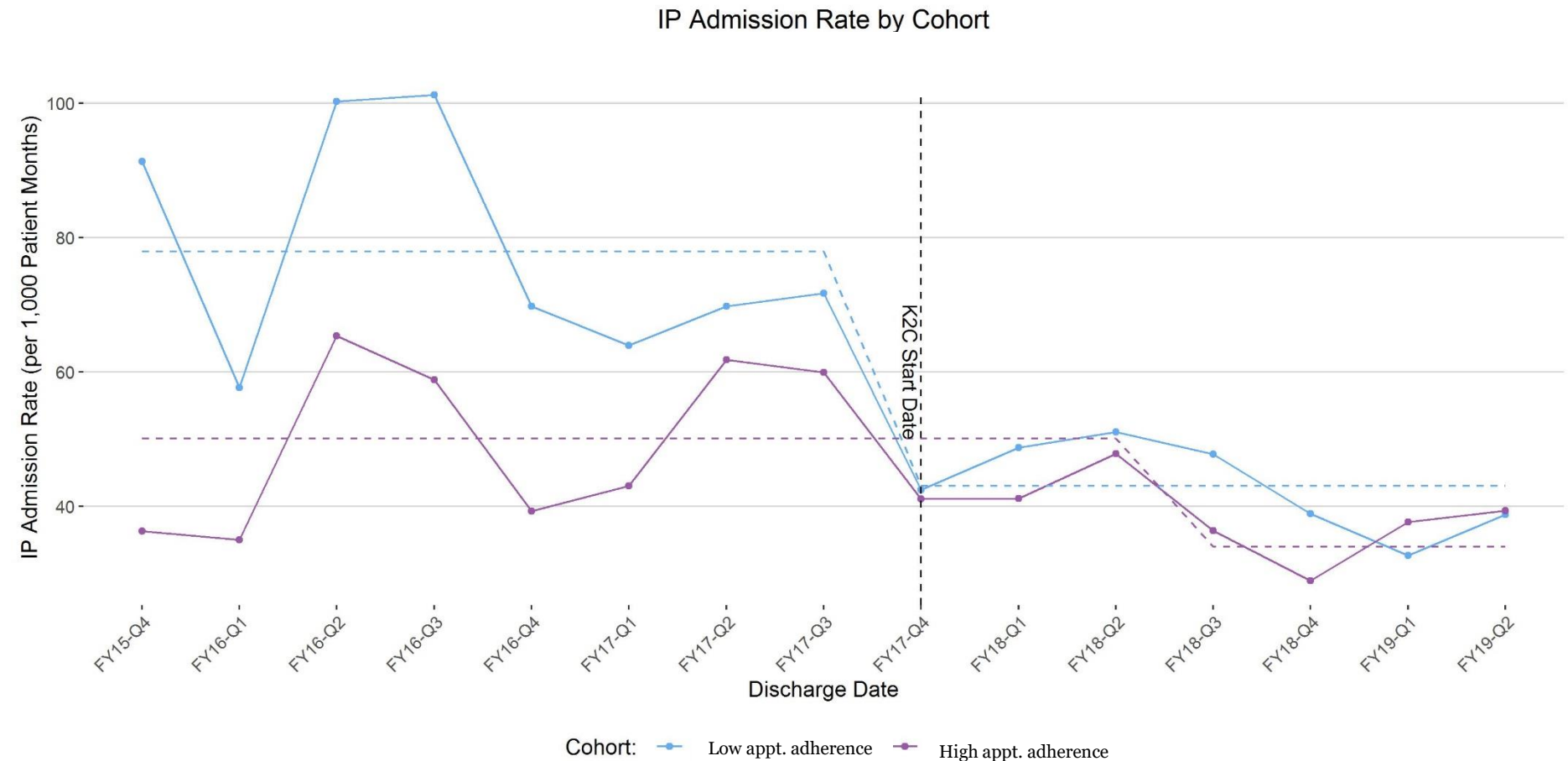
*Low appointment adherence was defined as no showing or late canceling more than 20% of PCP office visits during baseline time period

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There are several limitations to this program that should be considered when developing a primary care based CM model

- Patients enrolled in this program may not be representative of other primary care cohorts
  - All patients are covered by a Medicaid insurer
  - All patients seek primary care at an urban primary care site
  - Although all patients are complex, there is much heterogeneity within the group regarding acuity and disease characteristics

- Due to the QI nature of this project, meaningful improvements made in this cohort may not be entirely attributed to the intervention
  - Robust statistical analyses are needed to better understand the intervention's impact on outcome metrics (next step)

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