MASSACHUSETTS GENERAL HOSPITAL

SRG TECHNOLOGY

Population Health Management: Expanding from Clinical to Whole Patient Insight

Adrian Zai, MD PhD MPH

Clinical Director of Population Informatics
Laboratory of Computer Science, Massachusetts General Hospital

Faculty at Harvard Medical School

Chief Medical Informatics Officer
SRG-Technology

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Instead I will focus on…

Population Health IT: 10 Lessons Learned

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10 Lessons Learned

1. Optimizing processes is important
2. Focus on precise population identification
3. It's ok to (sometimes) take the physician out of the equation
4. Question your measures
5. Driving outcomes doesn't have to be expensive
6. Interoperability between all IT components is critical
7. Don't target high-risk patients only, look at how quickly low-risk patients are becoming high-risk
8. Use multi-interventions to optimize outcomes
9. Match the right high-risk patients to the appropriate interventions
10. Have an effective PHM IT system to compare effectiveness of your interventions

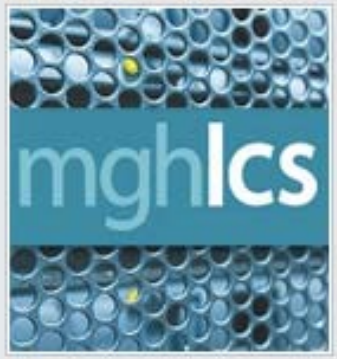
Cleveland - 2001

MetroHealth

(County Hospital affiliated to Case Western Reserve University)

“PHM is about driving population outcomes upward”

Boston - 2004



Laboratory of Computer Science

The Laboratory of Computer Science at Massachusetts General Hospital—the Clinical and Research Informatics Division of the Department of Medicine—explores innovative applications of clinical technology in health care.

- Contact the Laboratory of Computer Science by email
- Visit our website
- Collaborate with us

OVERVIEW | GROUP MEMBERS | RESEARCH PROJECTS | CONTACT

For more than half a century, the Laboratory of Computer Science (LCS) at Massachusetts General Hospital has been transforming health care delivery through biomedical informatics research and the rapid development of innovative health information systems. LCS advancements have enabled Mass General and other hospitals to provide better, more efficient service and have improved patient outcomes and quality of care.

Founded in 1964 by Dr. G. Octo Barnett, LCS played an active role in shaping the modern health informatics field. LCS is the birthplace of MUMPS (Massachusetts General Hospital Utility Multi-Programming System) programming language, which remains the basis of clinical systems at many large hospitals today, and was involved in the development of some of the earliest electronic medical records and clinical systems.

Current projects in the lab explore novel applications of computer technology to enhance patient engagement, information management, decision support, provider workflows, medical education and clinical research.

Visit our website

Example

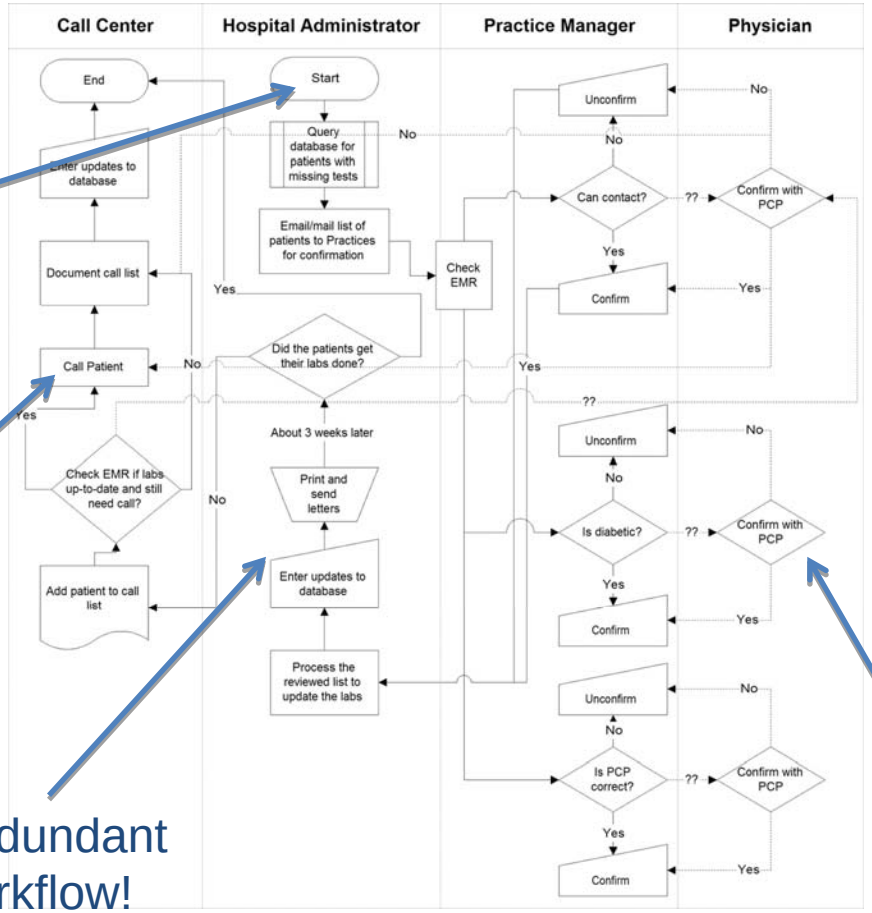
Which diabetic patients need a letter reminder?

Why process Initiated by admin?

Can we automate via letters?

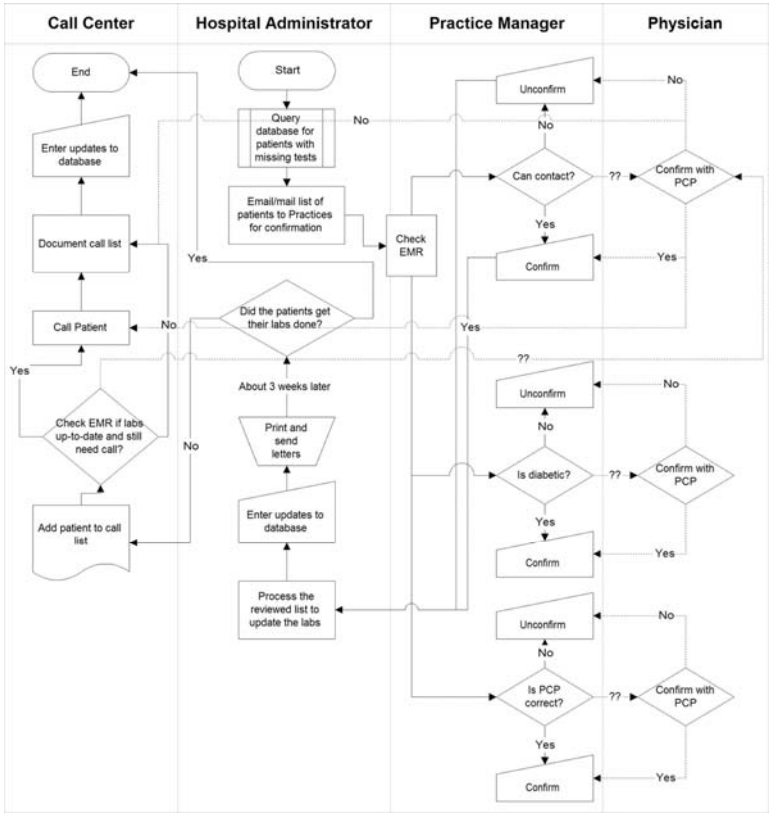
Redundant workflow!

Is this step necessary?

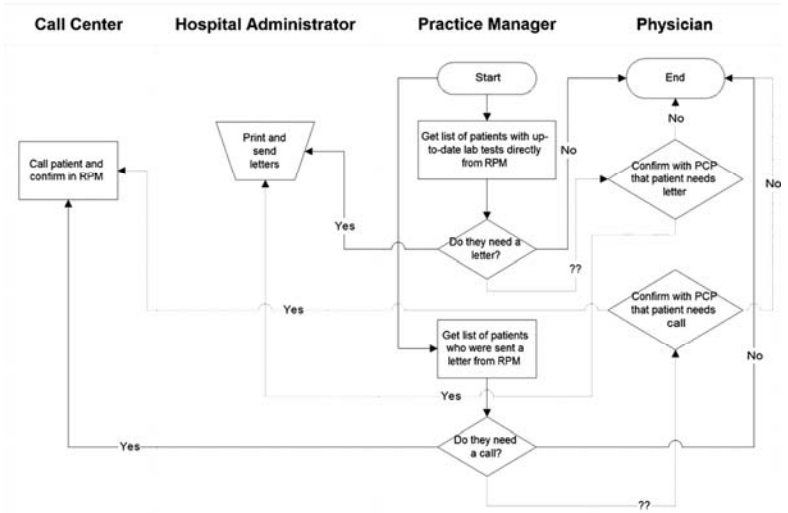


Diabetes Workflow Redesign

Before:



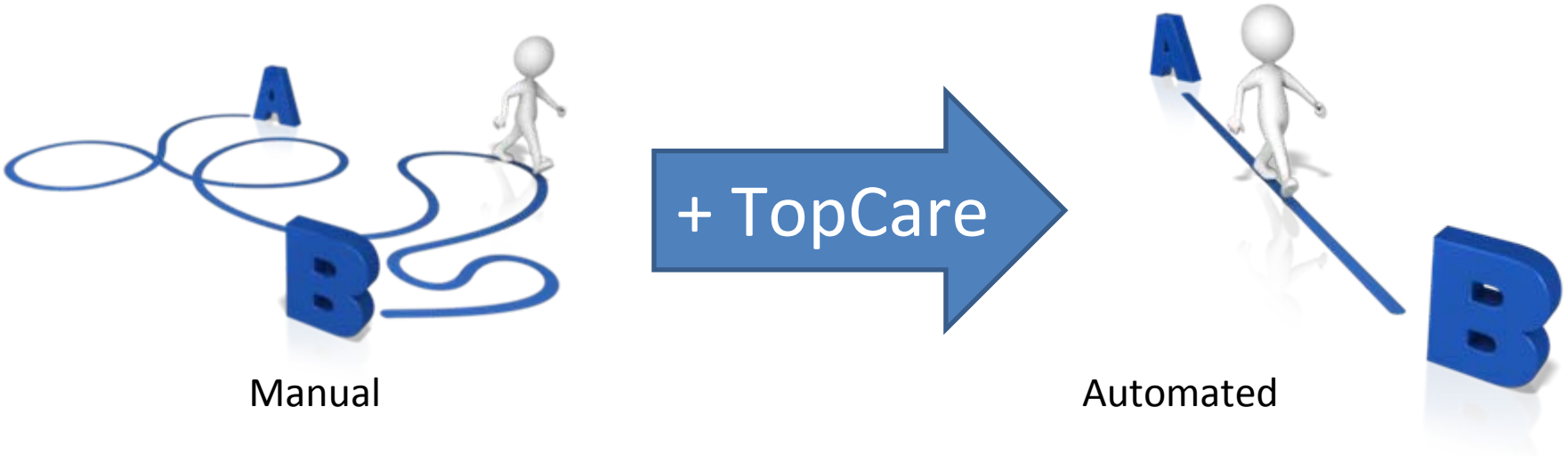
After:



Zai AH, Grant RW, Estey G, Lester WT, Andrews C, Yee R, Mort E, Chueh HC. Lessons from implementing a combined workflow-informatics system for diabetes management. Journal of the American Medical Informatics Association: JAMIA (2008) vol. 15 (4) pp. 524-33.

Speed-to-Value:

Efficiency gain in identifying which patients to send letter reminders



Manual

Automated

4 months to implement

>70x efficiency gain/nurse*

* Time needed to identify need for diabetes letter reminder went from 14.4 min/patient to 12.3 sec/patient with TopCare implementation. Zai AH, Grant RW, Estey G, Lester WT, Andrews CT, Yee R, Mort E, Chueh HC. Lessons from implementing a combined workflow-informatics system for diabetes management. J Am Med Inform Assoc. 2008 Jul-Aug; 15(4):524-33.

Is this “my” patient?

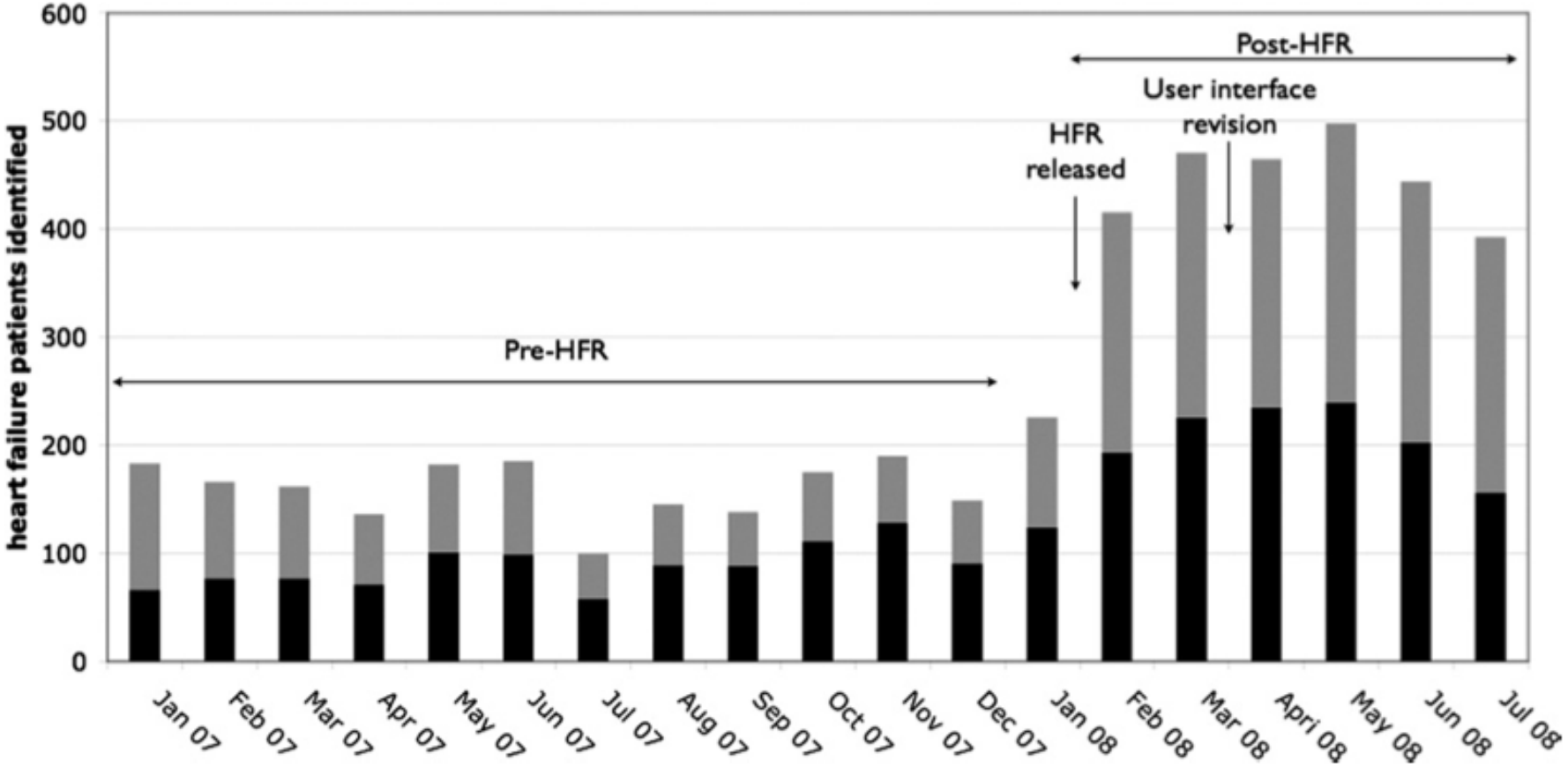
In 2005…

A payer-agnostic attribution model? Who needs that?

Atlas SJ, Chang Y, Lasko TA, Chueh HC, Grant RW, Barry MJ. Is this "my" patient? Development and validation of a predictive model to link patients to primary care providers. J Gen Intern Med. 2006 Sep; 21(9):973-8.

In 2006-2008…

Identifying Heart Failure Inpatients



Zai AH, et al. "Queuing theory to guide the implementation of a heart failure inpatient registry program." Journal of the American Medical Informatics Association 16.4 (2009): 516-523.

Linking electronic health record-extracted psychosocial data in real-time to risk of readmission for heart failure

Alice J. Watson, MD MPH[1], **Julia O'Rourke, PhD MS**[2], **Kamal Jethwani, MD MPH**[1], **Aurel Cami, PhD**[3], **Theodore A. Stern, MD**[4], **Joseph C. Kvedar, MD**[1], **Henry C. Chueh, MD MS**[2], and **Adrian H. Zai, MD PhD MPH**[2]

[1]Center for Connected Health, Partners Healthcare, Boston, MA

[2]Laboratory of Computer Science, Massachusetts General Hospital; Boston, MA

[3]Children's Hospital, Boston, MA

[4]Department of Psychiatry, Massachusetts General Hospital; Boston, MA

Abstract

Background—Knowledge of psychosocial characteristics that helps to identify patients at increased risk for readmission for heart failure (HF) may facilitate timely and targeted care.

Objective—We hypothesized that certain psychosocial characteristics extracted from the electronic health record (EHR) would be associated with an increased risk for hospital readmission within the next 30 days.

Methods—We identified 15 psychosocial predictors of readmission. Eleven of these were extracted from the EHR (six from structured data sources and five from unstructured clinical notes). We then analyzed their association with the likelihood of hospital readmission within the next 30 days among 729 patients admitted for HF. Finally, we developed a multivariable predictive model to recognize individuals at high risk for readmission.

Watson AJ, O'Rourke J, Jethwani K, Cami A, Stern TA, Kvedar JC, Chueh HC, Zai AH. Linking electronic health record-extracted psychosocial data in real-time to risk of readmission for heart failure. Psychosomatics. 2011 Jul-Aug; 52(4):319-27.

Zai AH, Ronquillo JG, Nieves R, Chueh HC, Kvedar JC, Jethwani K. Assessing hospital readmission risk factors in heart failure patients enrolled in a telemonitoring program. Int J Telemed Appl. 2013; 2013:305819.

task was successfully deleted

apprentice
Hospitalist

notebook | edit lists | subscriptions | pfr

email | print | purge

Options

Private mode off | on
Expand signouts off | on

New

06.04.2014 New eBridge groups are now available.

08.08.2012 Testing something

Full changelog

Feedback/Help

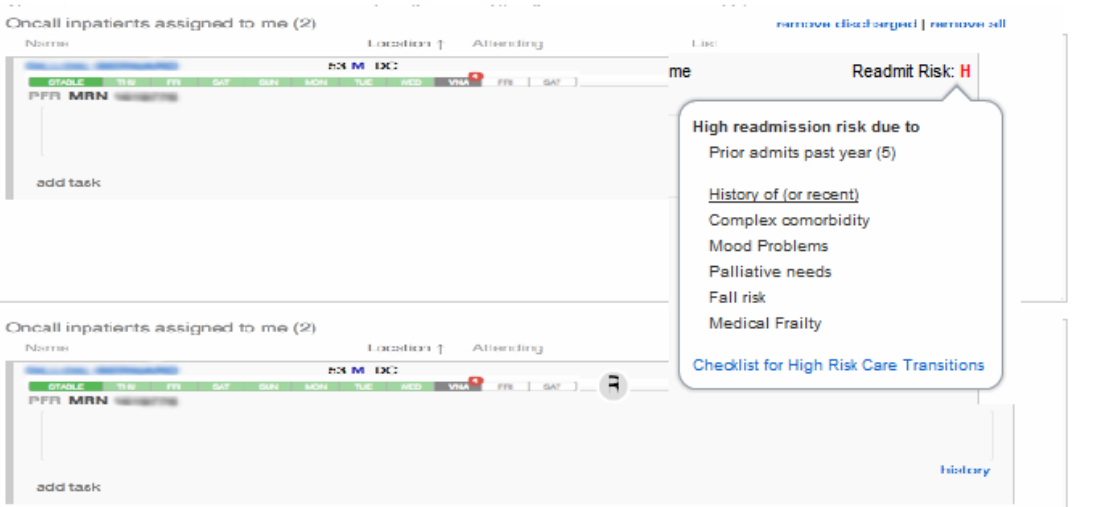
Frequently Asked Questions
Contact us
eBridge Training Portal

mojo 2 for iOS

Oncall inpatients assigned to me (0) remove discharged | remove all

Your responsibility: **My Inpatients** does not contain any patients

My subscriptions (14)



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- OR tomorrow

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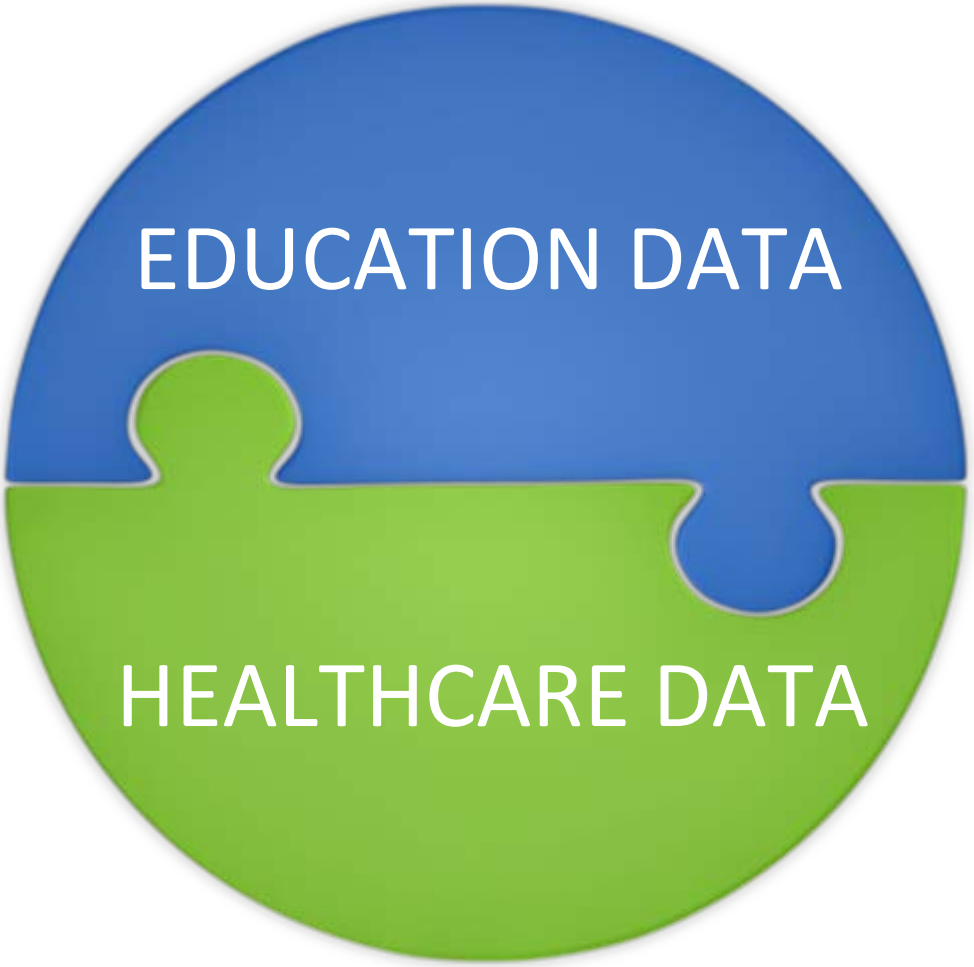
Dayton Public School Project



In 2011…

Determine whether or not physicians need to be part of the workflow

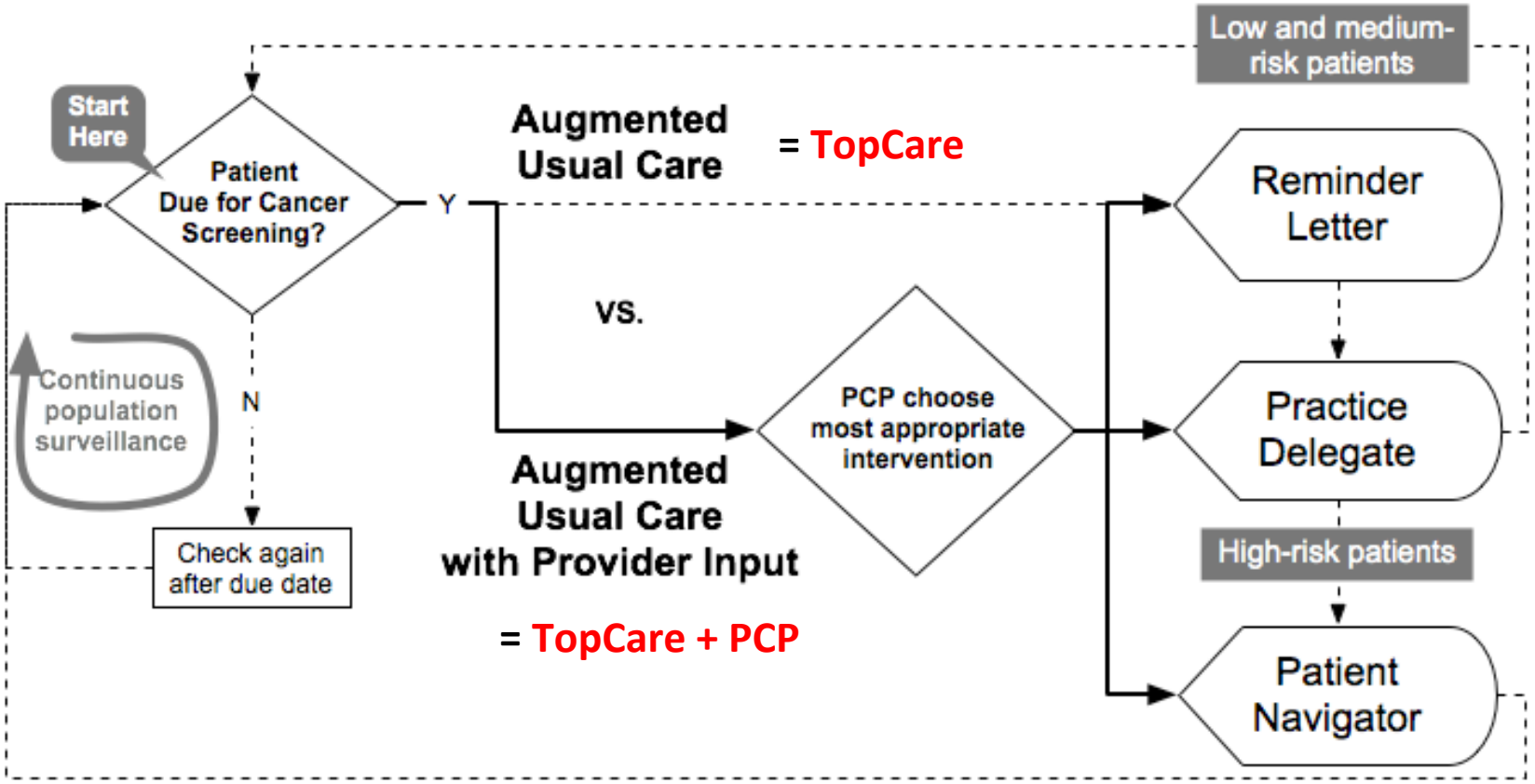
TopCare

is the name of an AHRQ-funded clinical trial:

Technology **o**ptimized for **p**opulation

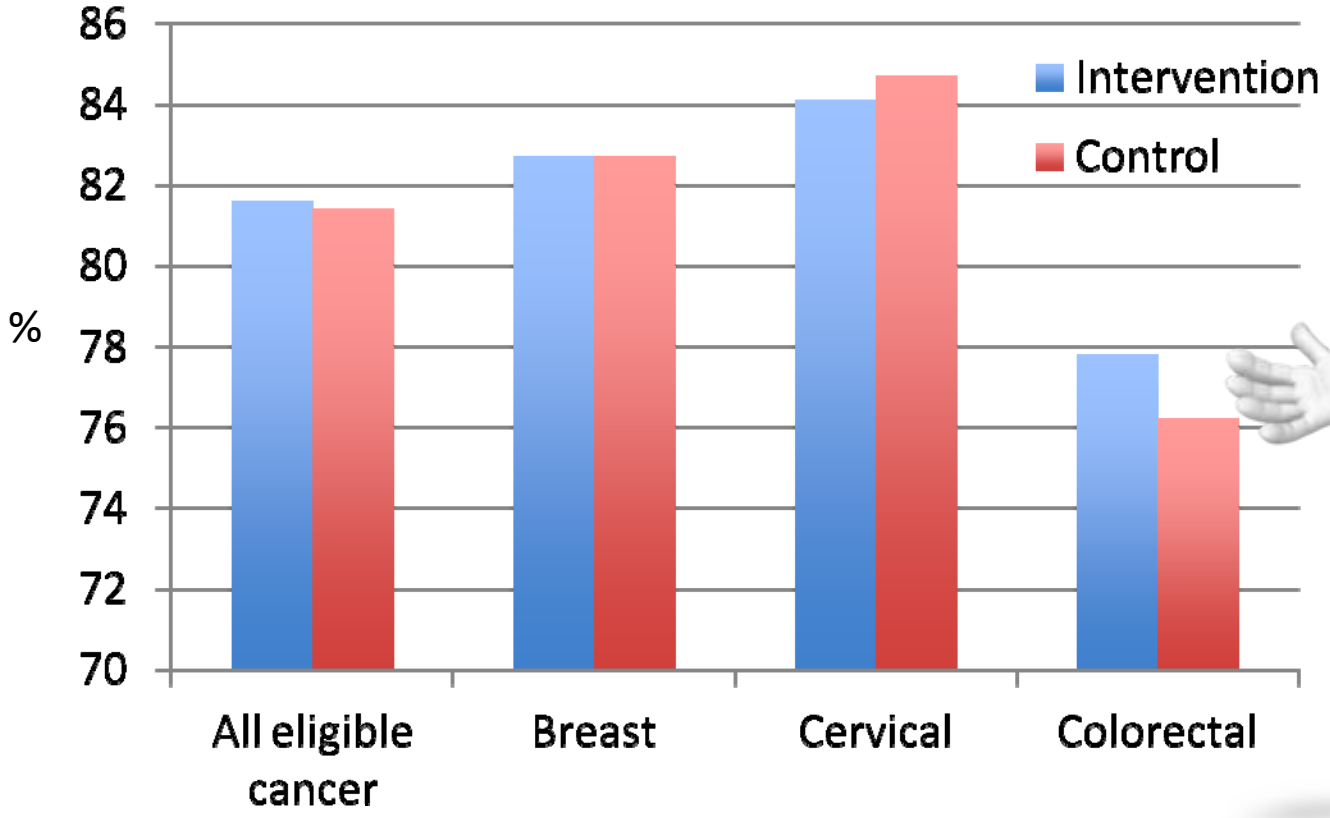
Care in **a** **r**esource-limited **e**nvironment

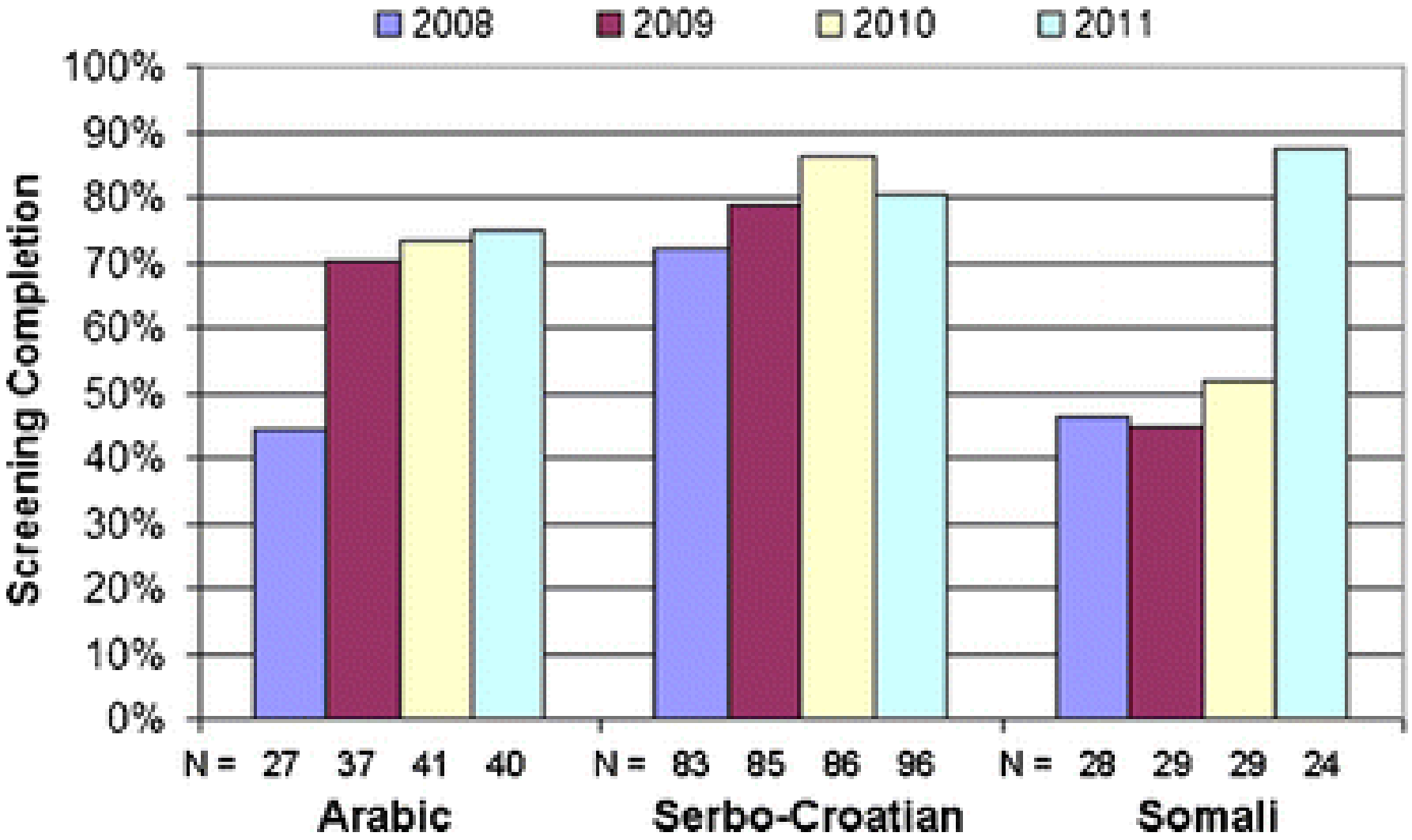
Workflow of intervention and control groups



Atlas SJ, Zai AH, Ashburner JM, Chang Y, Percac-Lima S, Levy DE, Chueh HC, Grant RW. The Journal of the American Board of Family Medicine : JABFM 07/2014; 27(4):474-85. DOI: 10.3122/jabfm.2014.04.130319

“TopCare + PCP” vs. “TopCare”



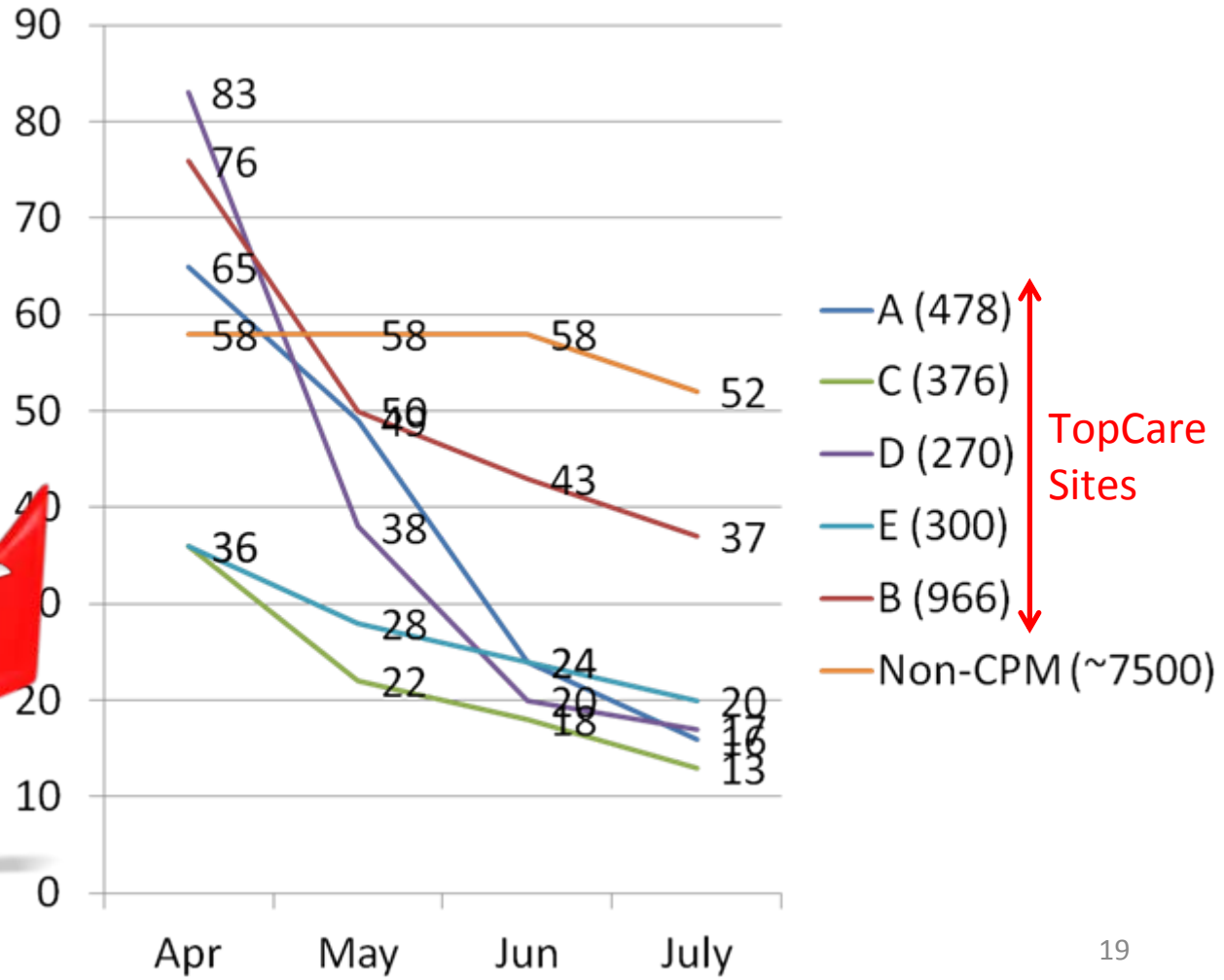


Sanja Percac-Lima MD, P. H. D., et al. "Decreasing Disparities in Breast Cancer Screening in Refugee Women Using Culturally Tailored Patient Navigation." *Journal of general internal medicine* (2013): 1-6.

Percent of BWH Diabetics with No Pending Visit

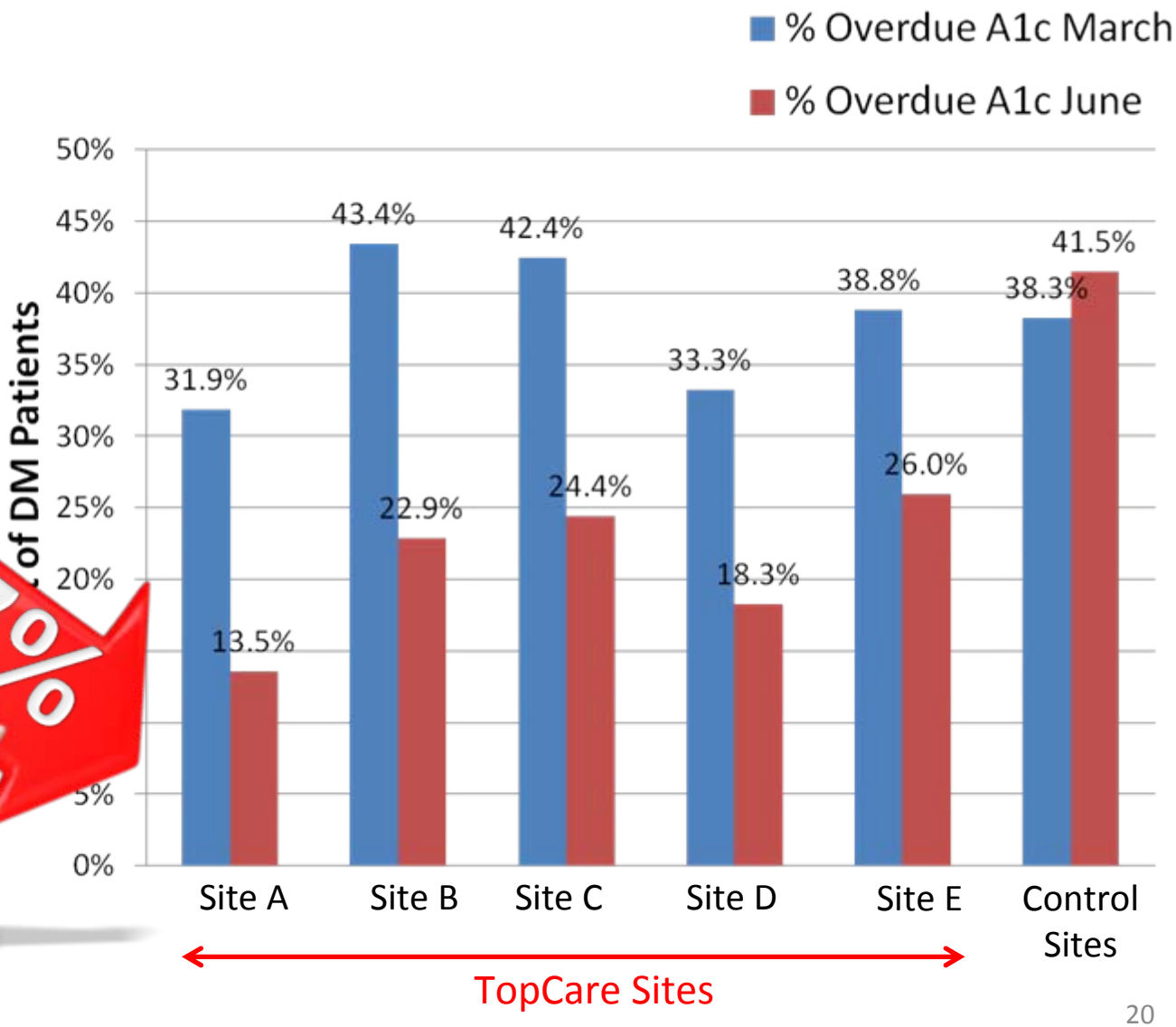
Charles Morris MD, Mary Merriam RN, Tanya Zucconi MBA

Practices with TopCare (A-E) = ~2500 DM patients
Practices without TopCare (Non-CPM) = ~7500 DM patients



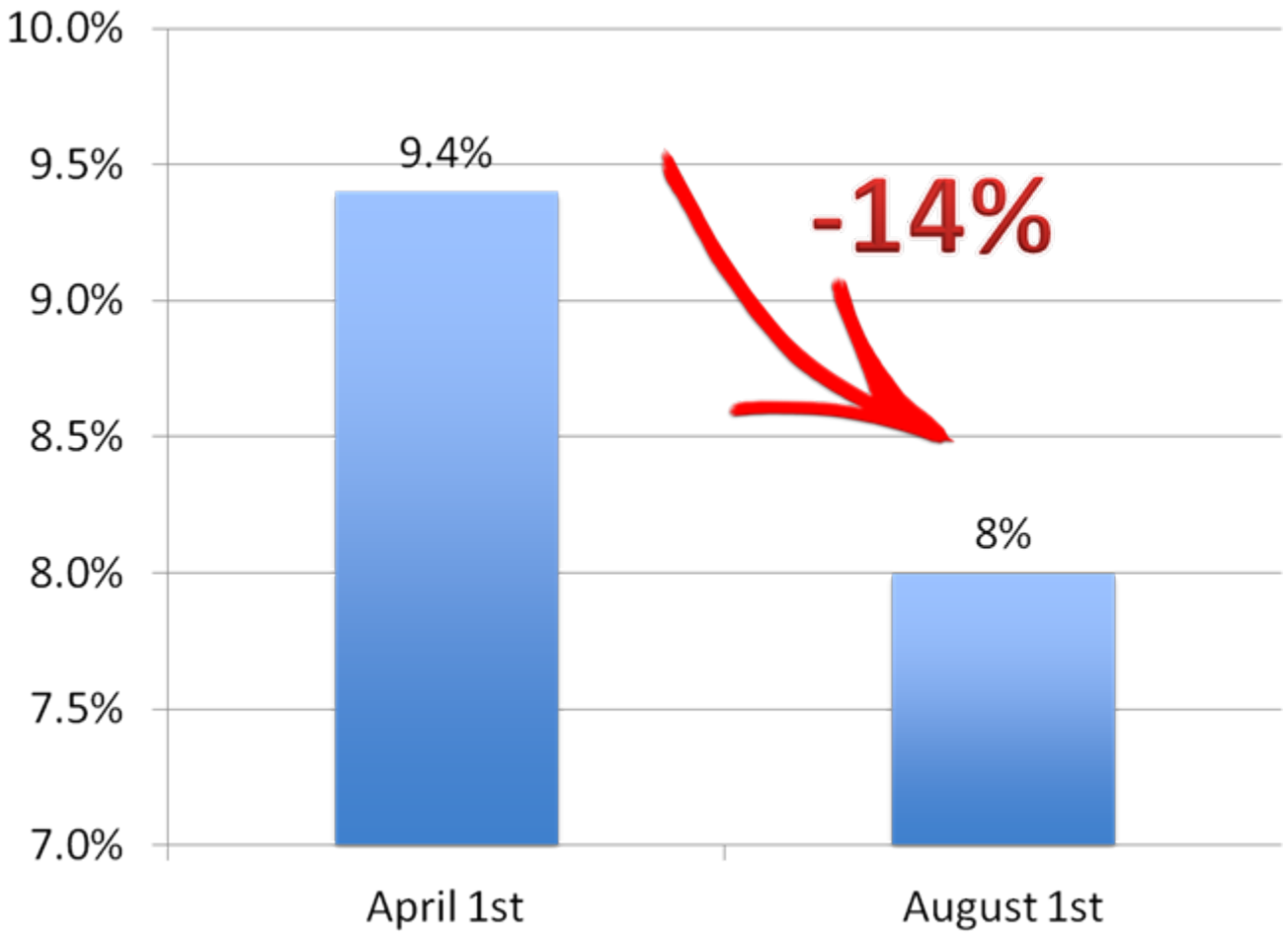
Percent of Overdue DM Labs

Charles Morris MD, Tanya Zucconi



% of patients with HbA1c > 9

Charles Morris MD, Mary Merriam, Tanya Zucconi



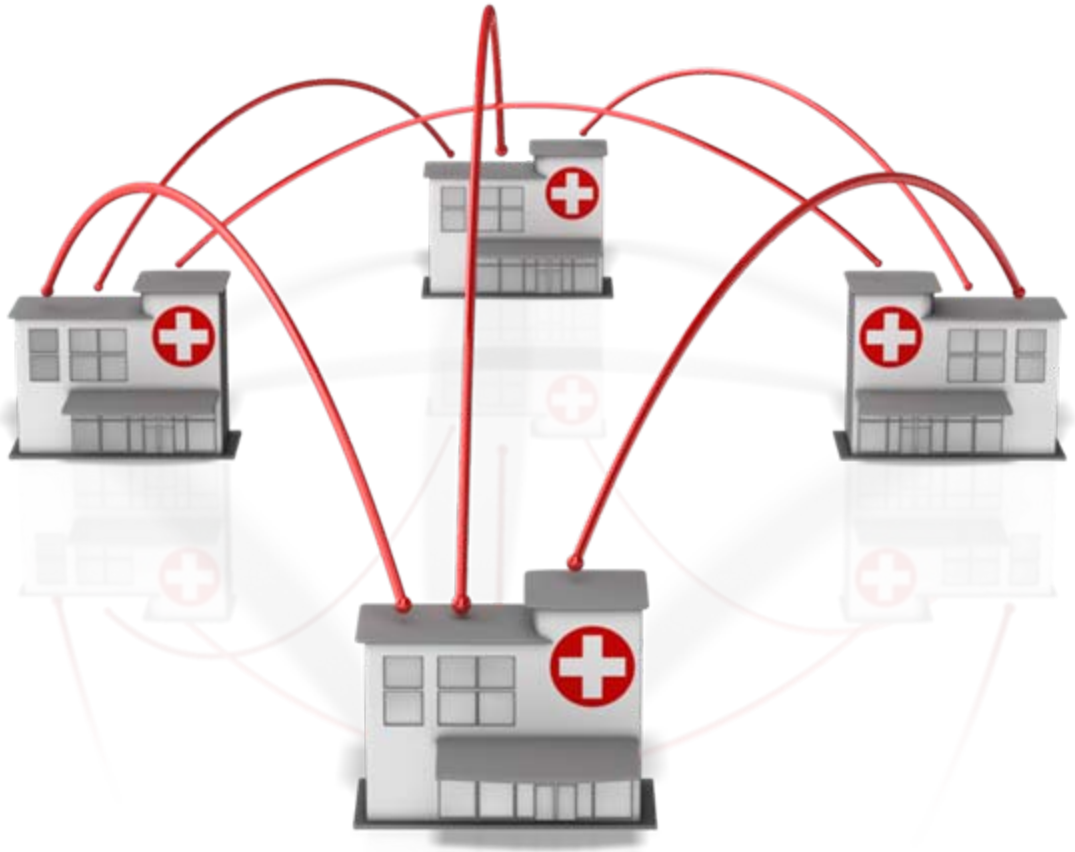
Charles Morris, MD.,MPH1; Mary Merriam, RN1; Jessica Dudley, MD2; Joseph Frolkis, MD., PHD1; Tanya Zucconi2, Adrian Zai, M.D.,MPH3; Faithful Baah1, *A Centralized Approach to Population Health Management Across A Network of 14 Primary Care Practices*. Presented at the 7th Annual Conference on the Science of Dissemination and Implementation: Transforming Health Systems to Optimize Individual and Population Health, December 2014.

In 2012…

PARTNERS HEALTHCARE

searches for a Pop Health Tool

Decide on a population health management model



Central

Distributed

3 Interventions

1. Development of measures that are more clinically meaningful
2. Creation of a central Population Health Coordinator (PHC) program
3. Implementation of TopCare, an enterprise population health management IT system

Intervention 1

We developed measures that are more clinically meaningful so that we no longer have to deal with the discrepancies of payor contracts

ACO

BCBS

HP

Partners Healthcare

Internal Performance Framework (IPF)

Docs are much happier too!

Massachusetts General Hospital

Brigham & Women's Hospital

19 Primary Care Practices

14 Primary Care Practices

As part of our effort to create more clinically meaningful quality measures, we listened to our physicians, and asked them why they called the “old” measures “STUPID”

The Taxonomy of “Stupid”

A. Not a clinically important/correct idea
   - e.g. Mammography for women 40-50

B. Clinically important idea, but measure is not an appropriate proxy
   - e.g. Antibiotics for bronchitis

C. Attribution Error
   - e.g. “These aren’t my patients.”

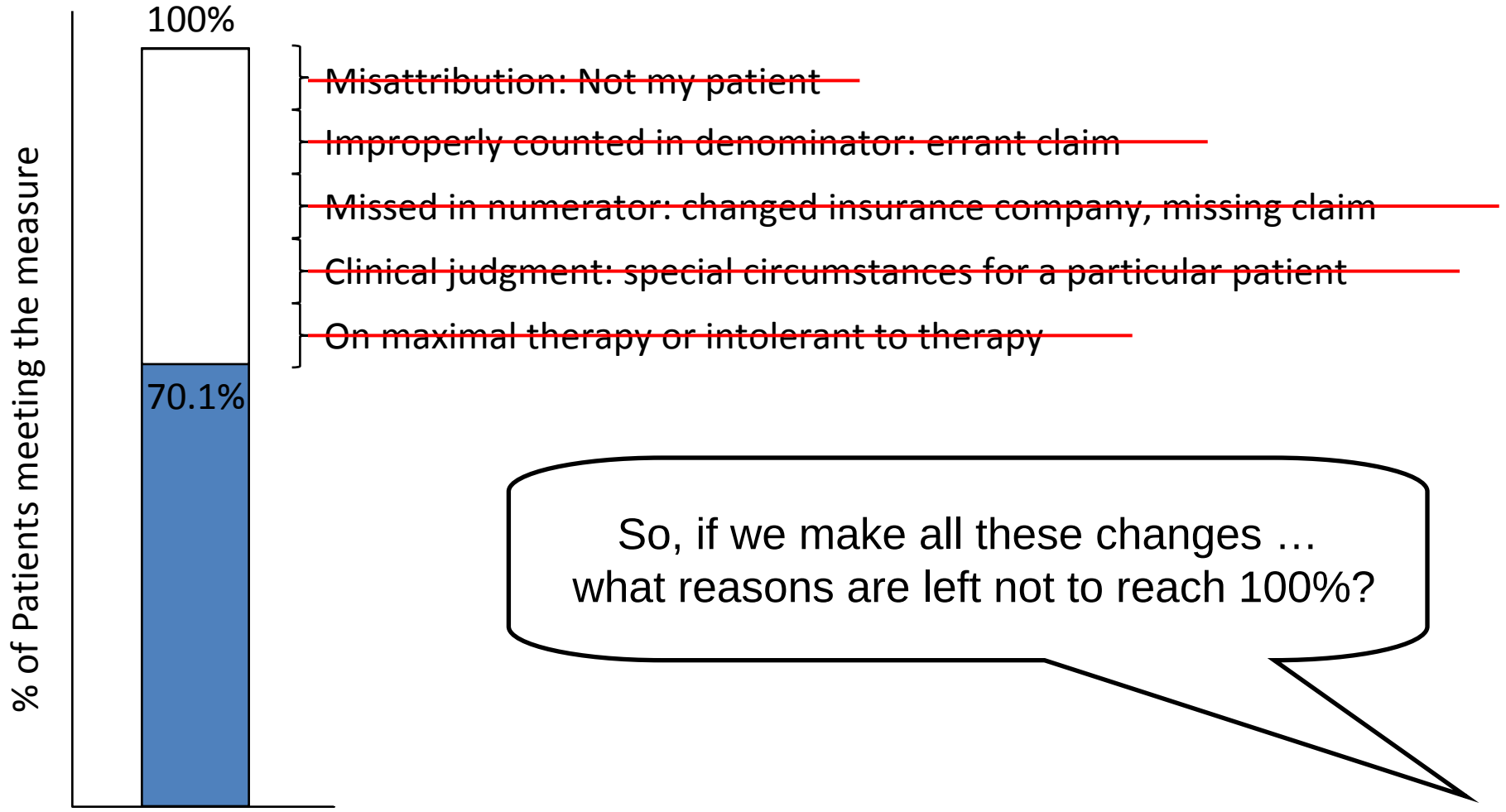
D. Payer-Specific
   - e.g. “I treat all my patients the same regardless of payer.”

E. Denominator improperly measured
   - e.g. not diabetic: gestational diabetes, PCOS on metformin, diabetes coded by podiatrist

F. Numerator improperly measured
   - e.g. Colorectal Cancer Screening

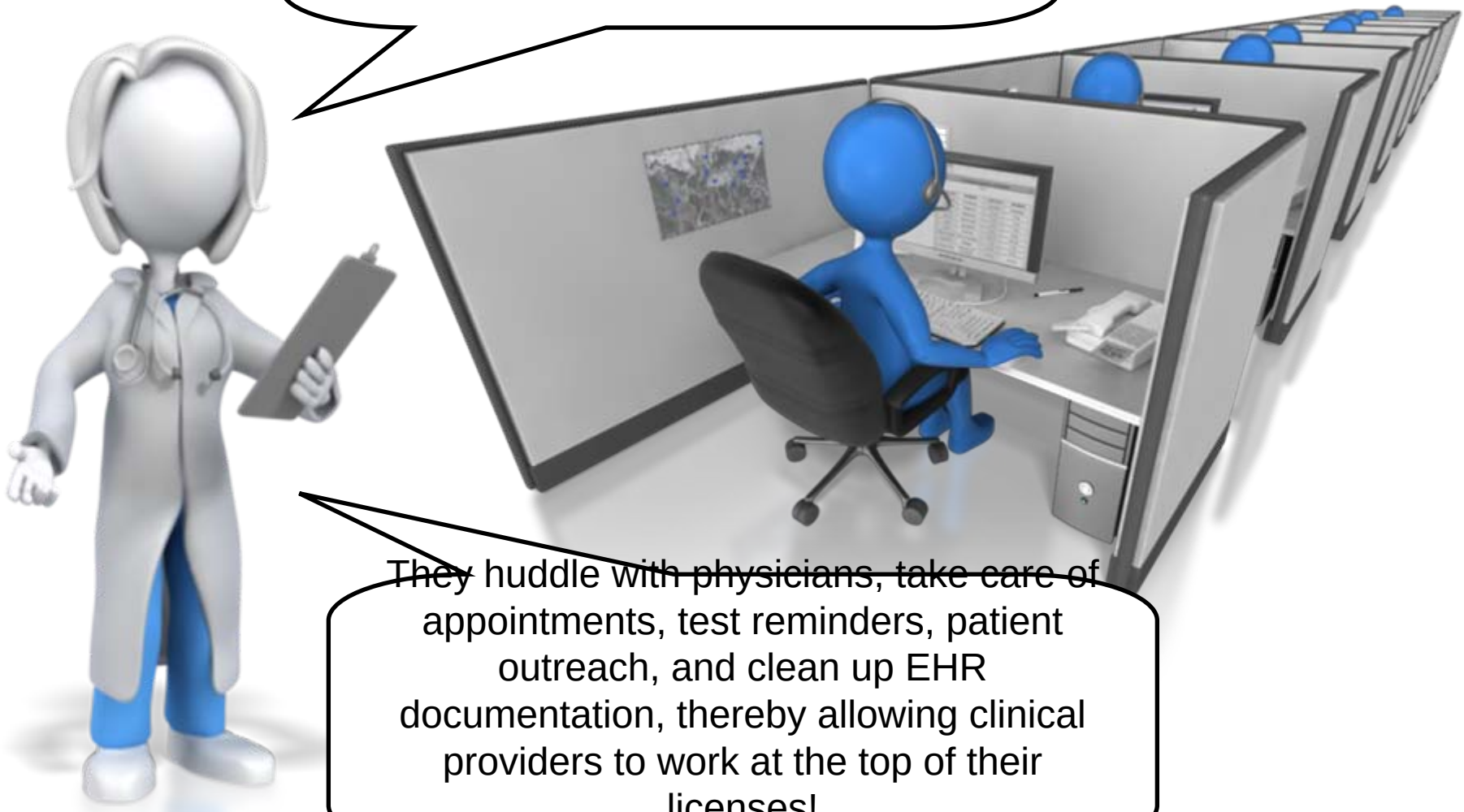
G. Measurement process cumbersome/complicated/doesn’t allow for remediation
   - e.g. Antidepressant Medication Management

No Excuses = High Targets



Intervention 2

We created a central Population Health Coordinator (PHC) team that supports population health initiatives across the entire MGH primary care network

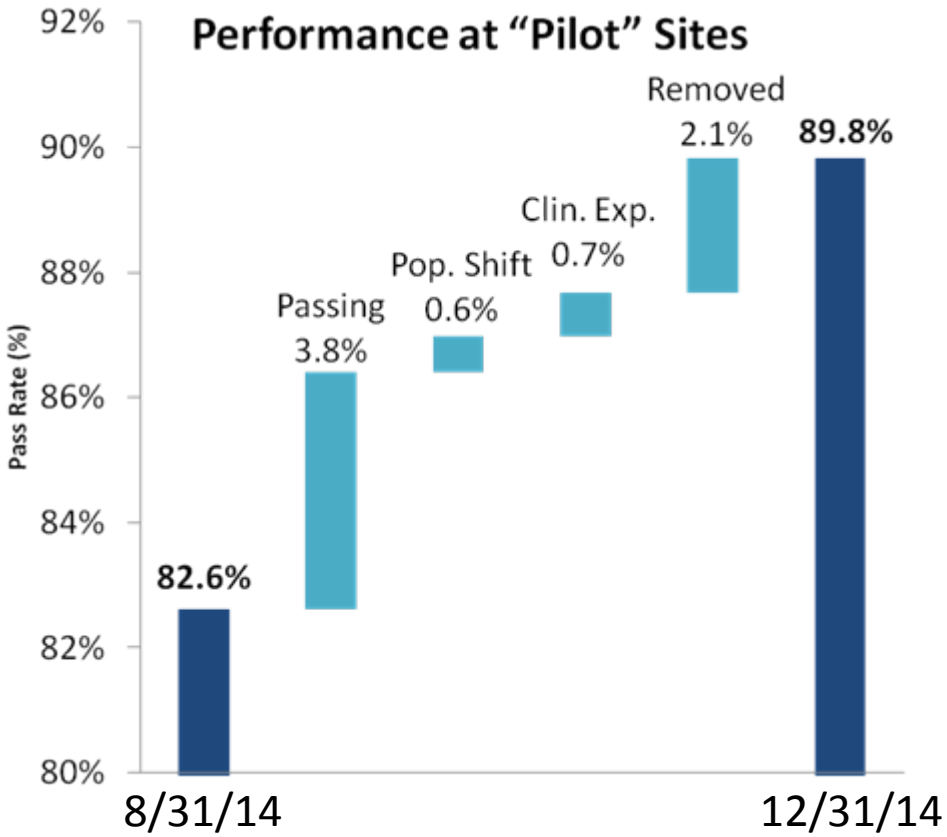


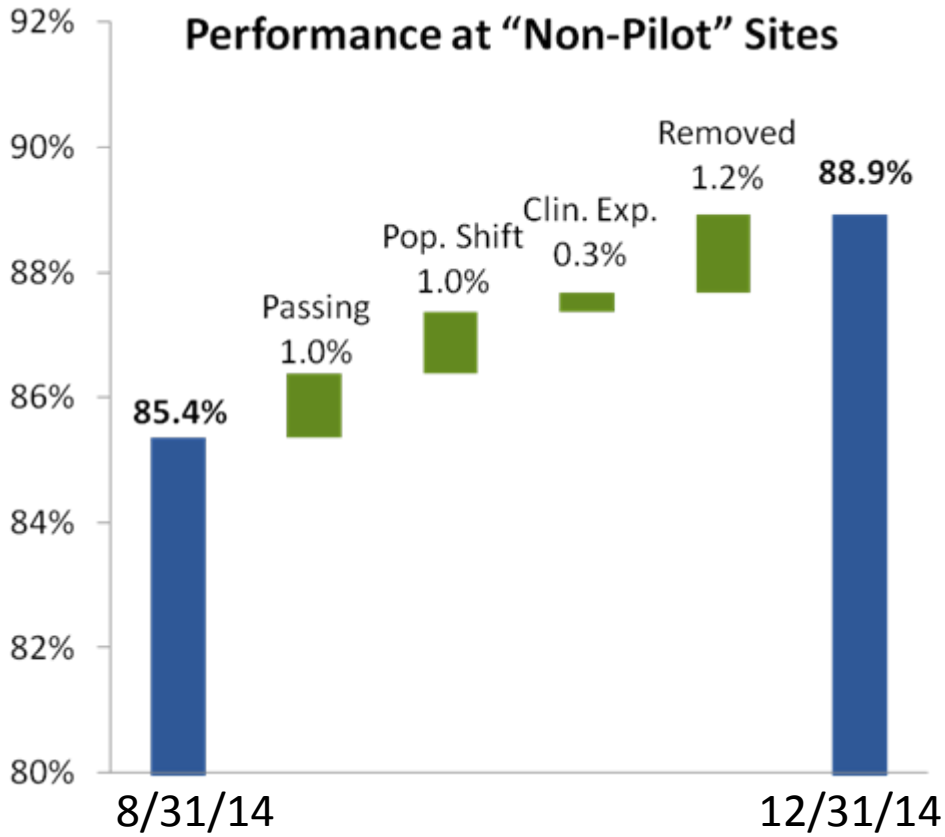
~~They~~ huddle ~~with physicians, take care of~~ appointments, test reminders, patient outreach, and clean up EHR documentation, thereby allowing clinical providers to work at the top of their licenses!

Operations Matter

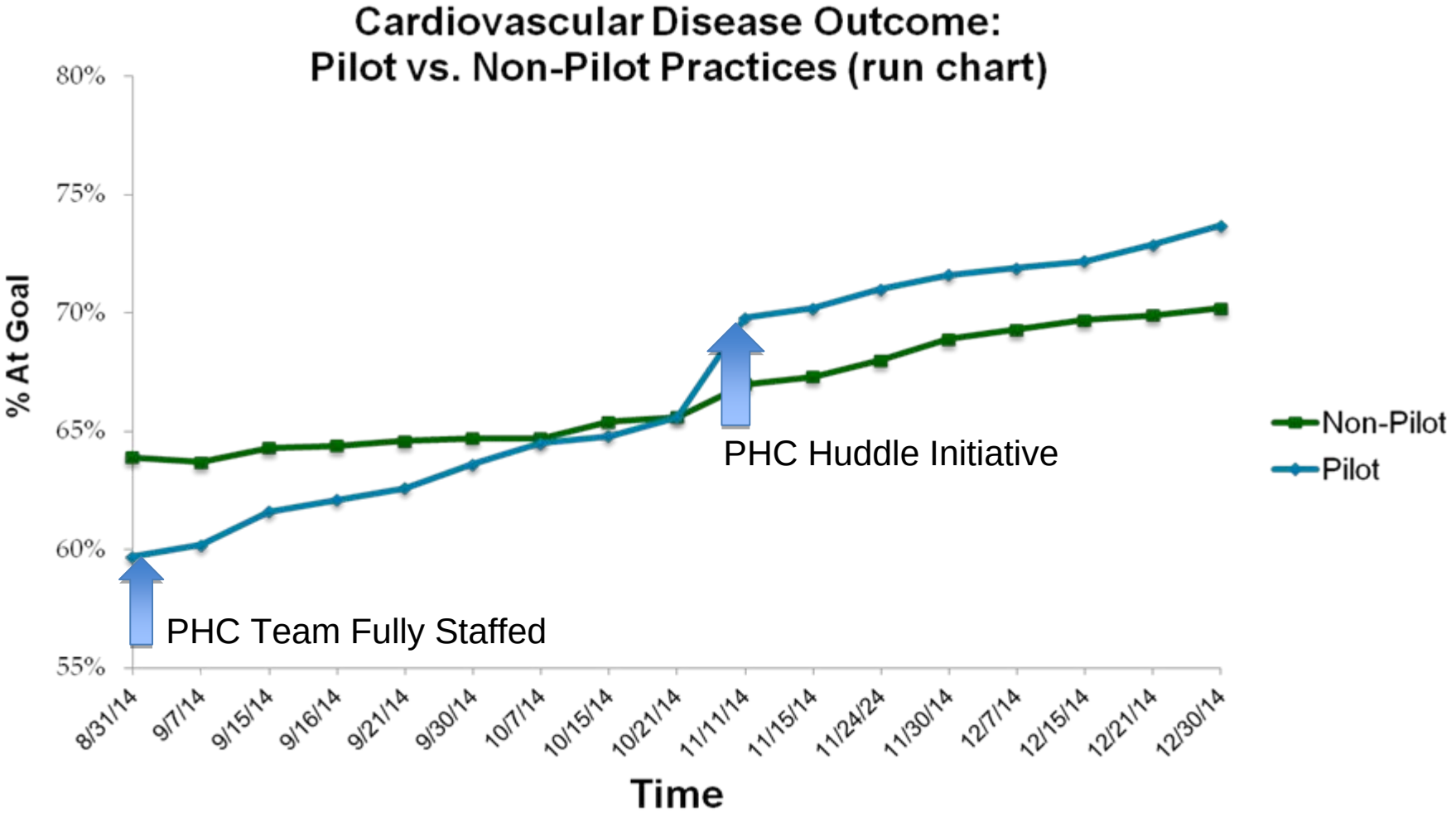
MGH compared performance at “Pilot” sites where coordinators worked lists and engaged with clinicians to “Non-Pilot” sites that did not have coordinators.

Diabetes Blood Pressure Control





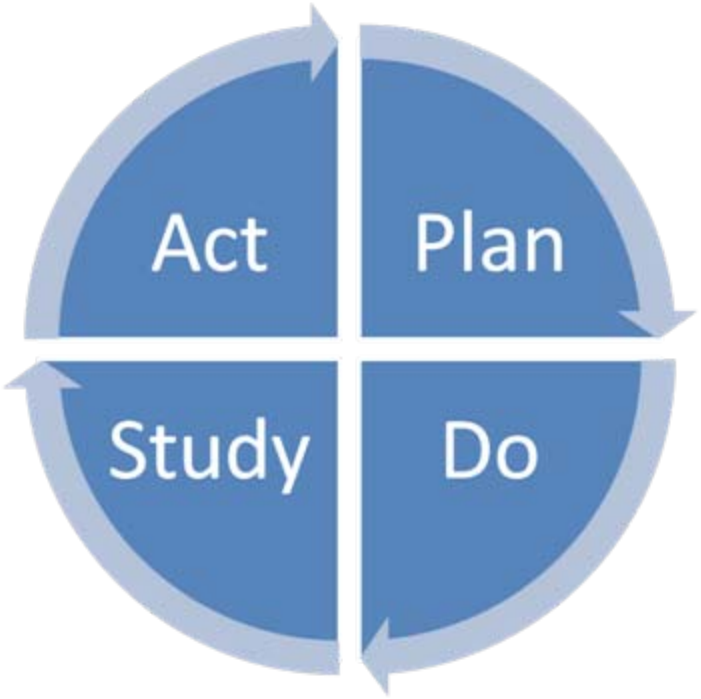
Coordination between central and distributed model is critical



Intervention 3

We implemented TopCare, which enabled us to identify all the gaps in care, track our outcomes, coordinate care appropriately, and intervene to close those gaps

The Objective



To improve outcomes, you need tools that **enable continuous improvement**

The Challenge

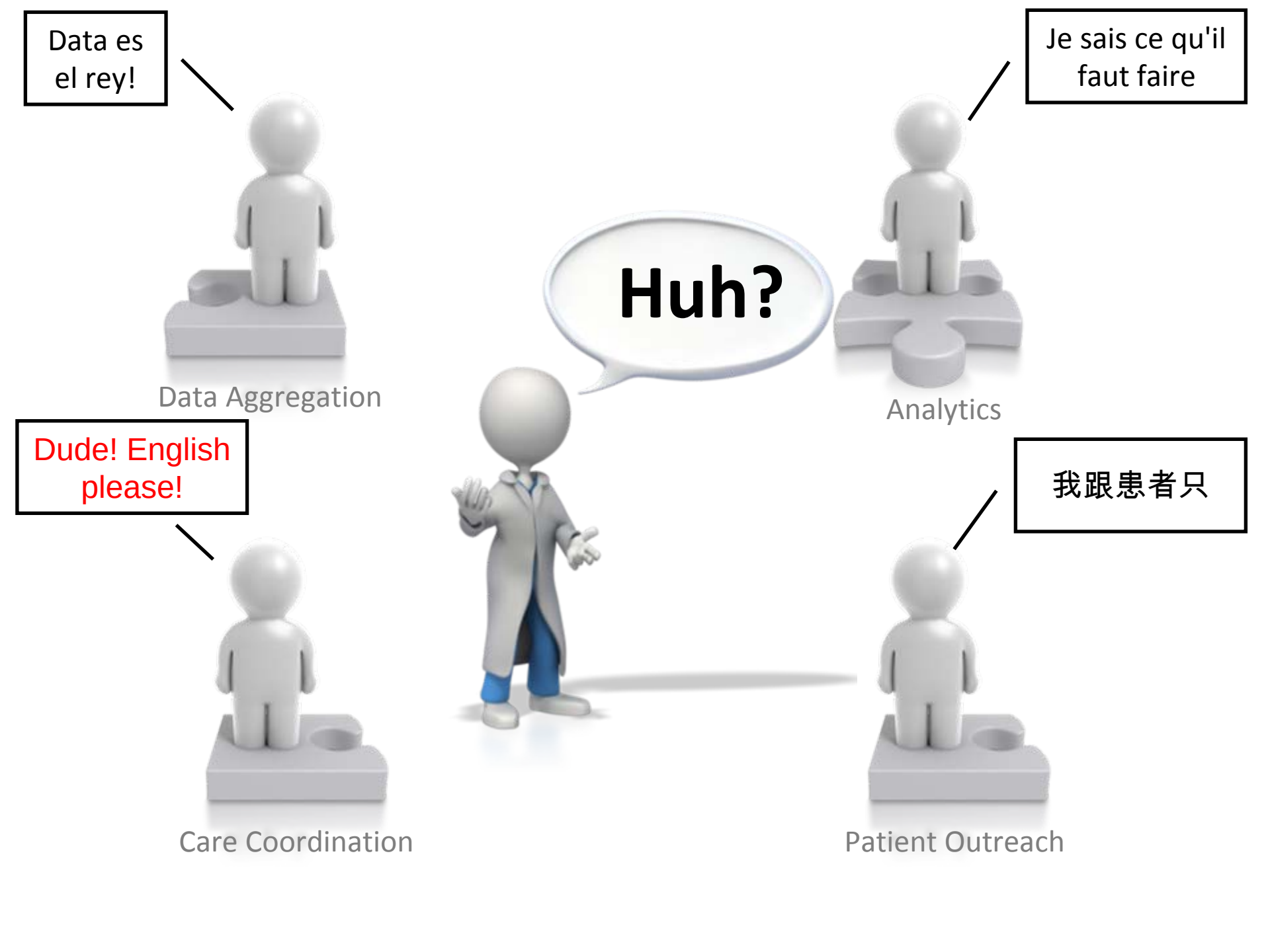
The tools that need to work together are found in **different** vendor solutions

Typical PHM IT strategy scenario:

The 4 Essential PHM Pillars are:

1. Data Aggregation
2. HC Analytics
3. Care Coordination
4. Patient Outreach

Ok, let's purchase a software package for **each pillar!**


Data es el rey!
Data Aggregation
Je sais ce qu'il faut faire
Analytics
Huh?
Dude! English please!
Care Coordination
我跟患者只
Patient Outreach


Quality Improvement Guru
Mr. TopCare
0021457A
ID Number
8845389847383
Master Interpreter

What we did on day 1 (June 30th 2014):

We managed ALL patients belonging to

the Massachusetts General Hospital Primary Care Network

From managing **~70k** contract patients to:

Populations	
Diabetics	~24k
CVE (CAD, PVD, CVD)	~18k
Colorectal CS	~108k
Cervical CS	~124k
Breast CS	~71k
Hypertension	~72k
Other	n/a
Total Patients Actively Tracked	**~300k**

Clinical Assets

Clinical Setting	
Academic Health Centers	2
Primary Care Practices	**30**

Clinical Providers	
Physicians	1045
Delegates	261
Practice managers	58
DM Champions	64
DSME	29
Navigators	9
PHMs	33
Total	**1499**

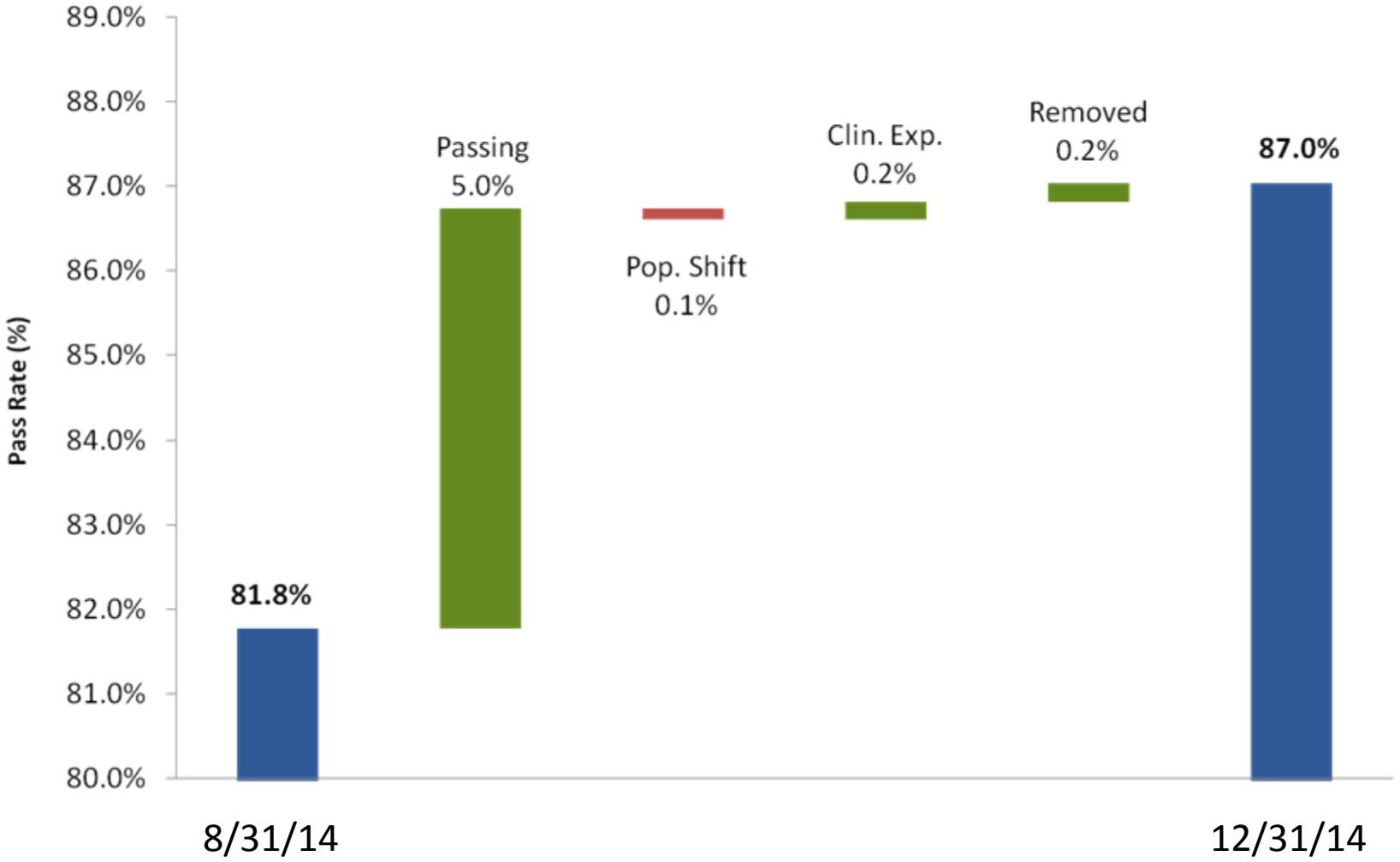
Our Results

All of our quality measures went up!

Actively managing >300,000 patients over 6 months

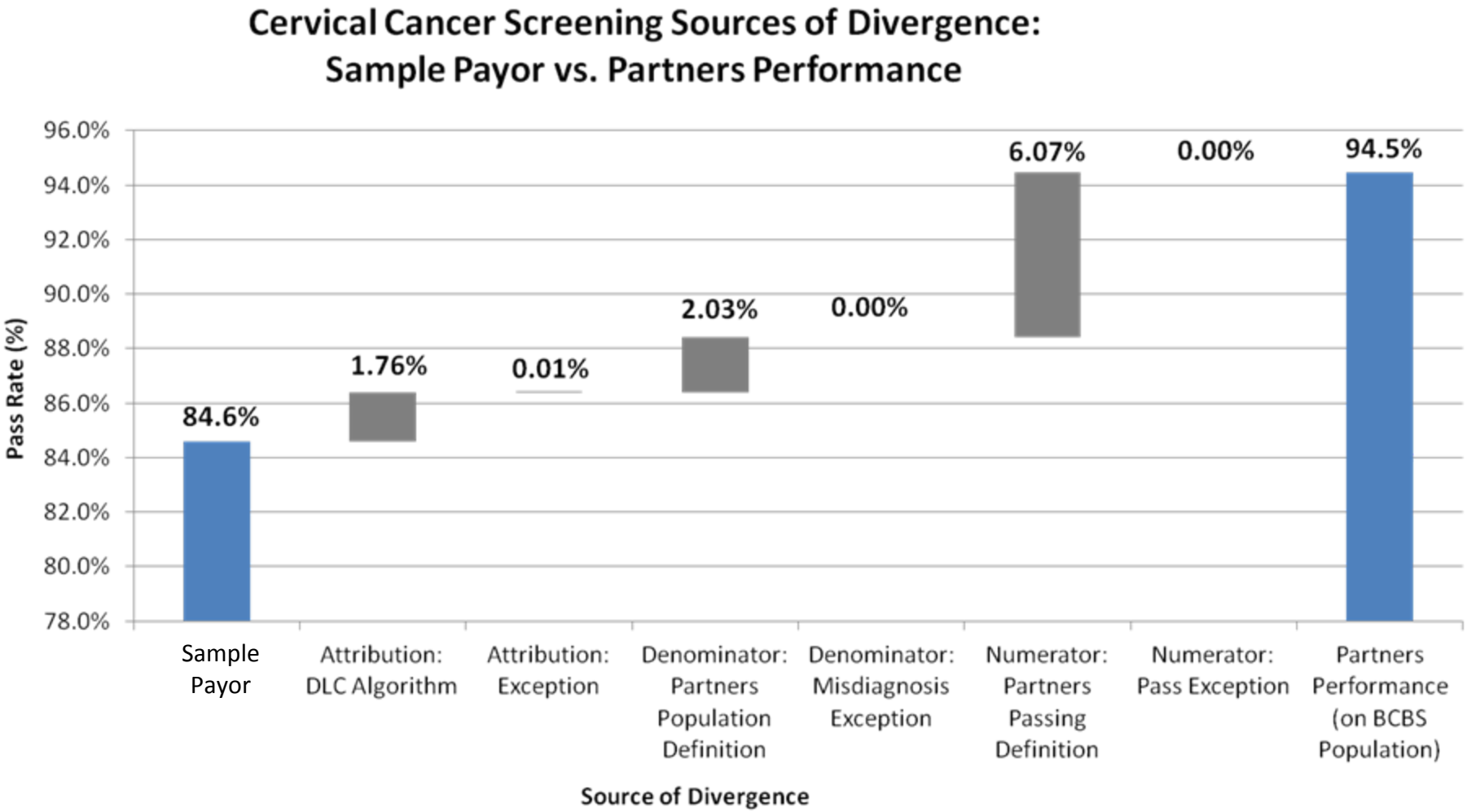
Measures	% Change over 6 months
Breast Cancer Screening Process Measure	+ 3.1%
Cervical Cancer Screening Process Measure	+ 7.7%
Colorectal Cancer Screening Process Measure	+ 2.6%
CVE LDL Process and Outcome Measure	+ 8.5%
Diabetes Eye Exam Process Measure	+ 7.3%
Diabetes HbA1c Process and Outcome Measure	+ 5.0%
Diabetes HbA1c Process Measure	+ 4.6%
Diabetes HTN Process and Outcome Measure	+ 6.9%
Diabetes LDL Process and Outcome Measure	+ 6.5%
Diabetes Nephropathy Process Measure	+ 3.4%
HTN BP Process and Outcome Measure	+ 4.4%

Breakdown of Cervical Cancer Gains



n = 124,457

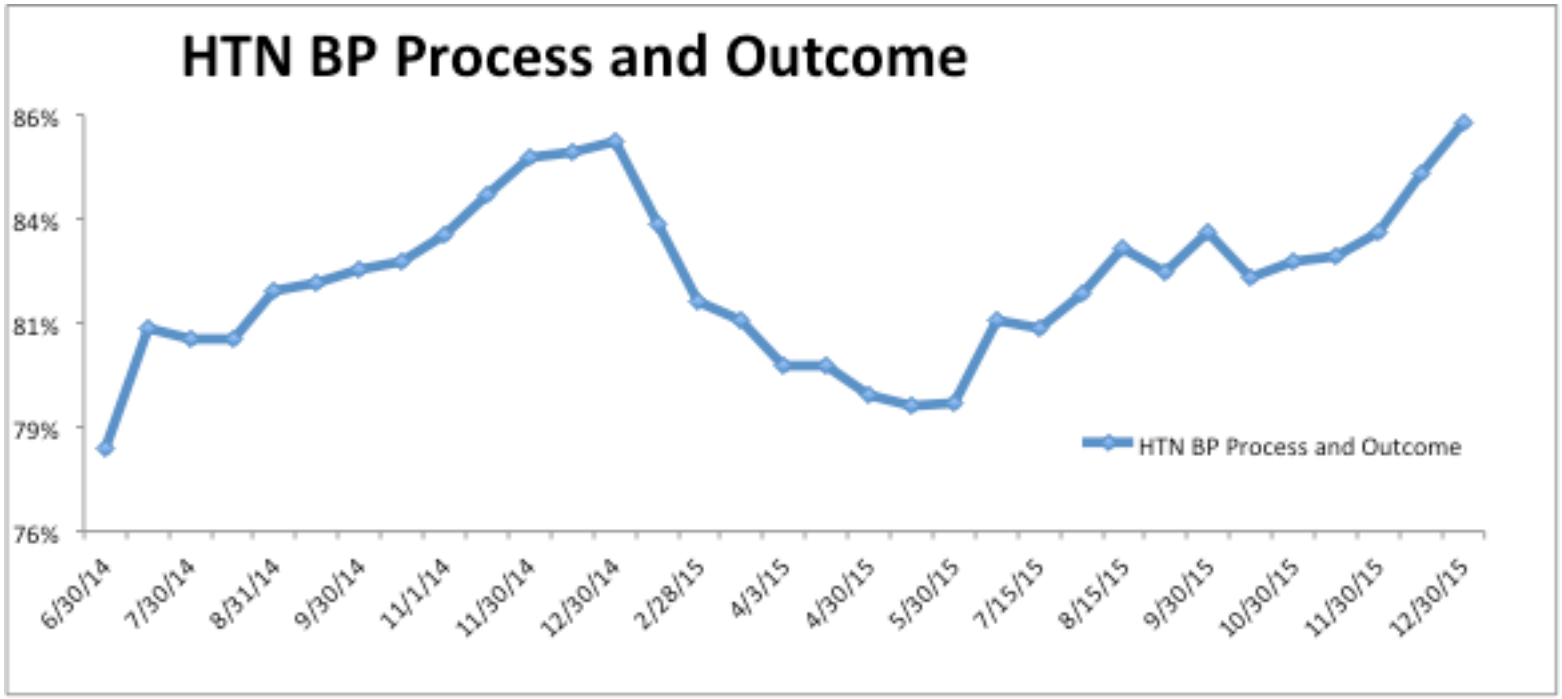
Sources of Divergence



Measure	NNT or NNS (number needed to treat to prevent 1 death/stroke/MI)	Net Patients Newly in Control from 8/31-12/31 (*Clinical Only, most conservative*)
Hypertension BP Control	1:125 (death) 1:67 (stroke) 1:100 (MI)	667
Colorectal CA Screening	1:107 (death from colon cancer)	911
Cervical Cancer Screening	1:1000 (death from cervical cancer)	6,133
CVE Lipid Control	1:27 (composite death, MI, stroke) 1:83 (death) 1:39 (MI) 1:125 (stroke)	376
Diabetes Lipid Control	1:28 (composite death, MI, stroke) 1:104 (MI) 1:154 (stroke)	384
Diabetes Blood Pressure Control	1:125 (death) 1:67 (stroke) 1:100 (MI)	289
Breast Cancer Screening	1:368 (death from breast cancer)	1,140

Estimated 76 Lives saved with 4 Months Effort

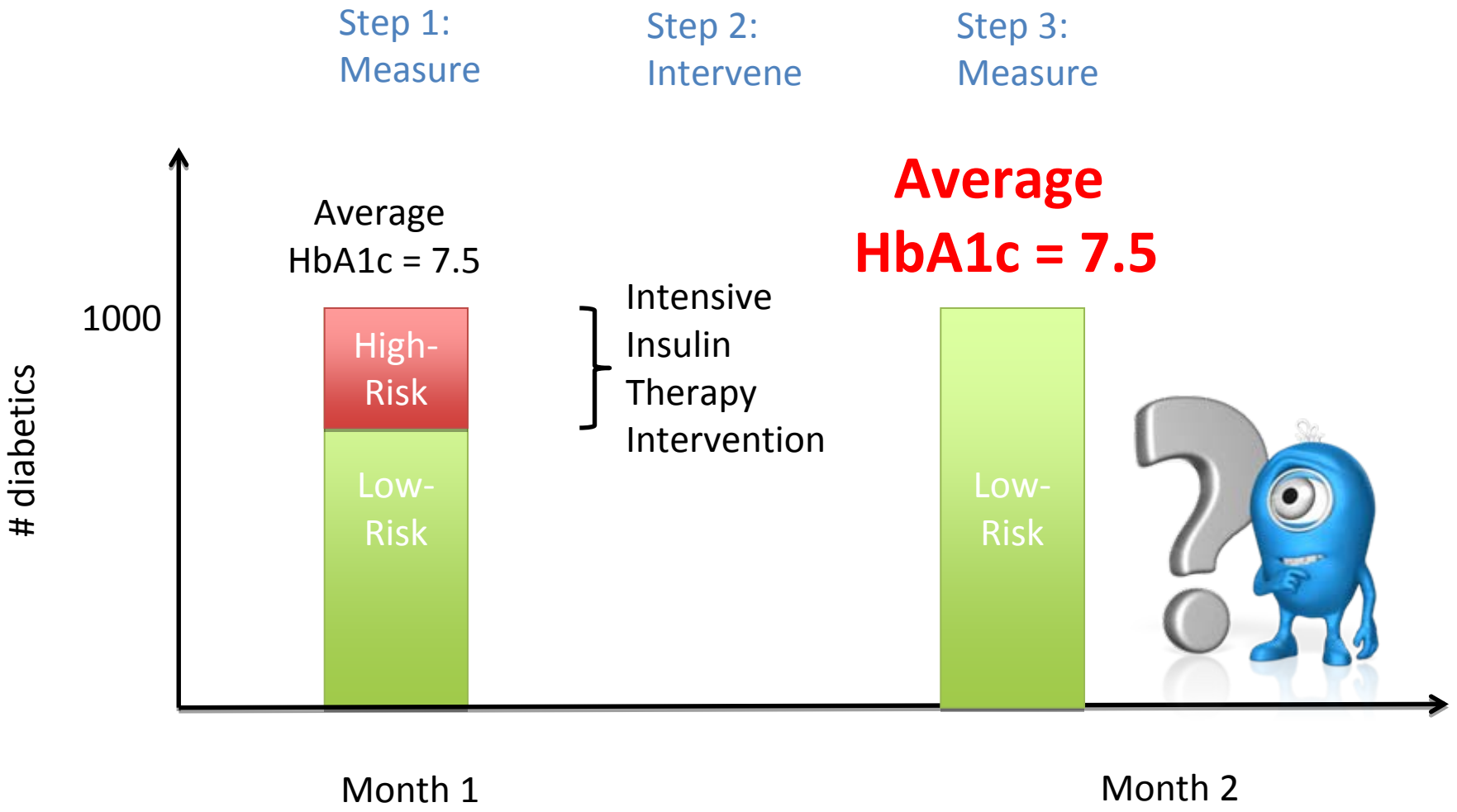
Can we relax? Nope…



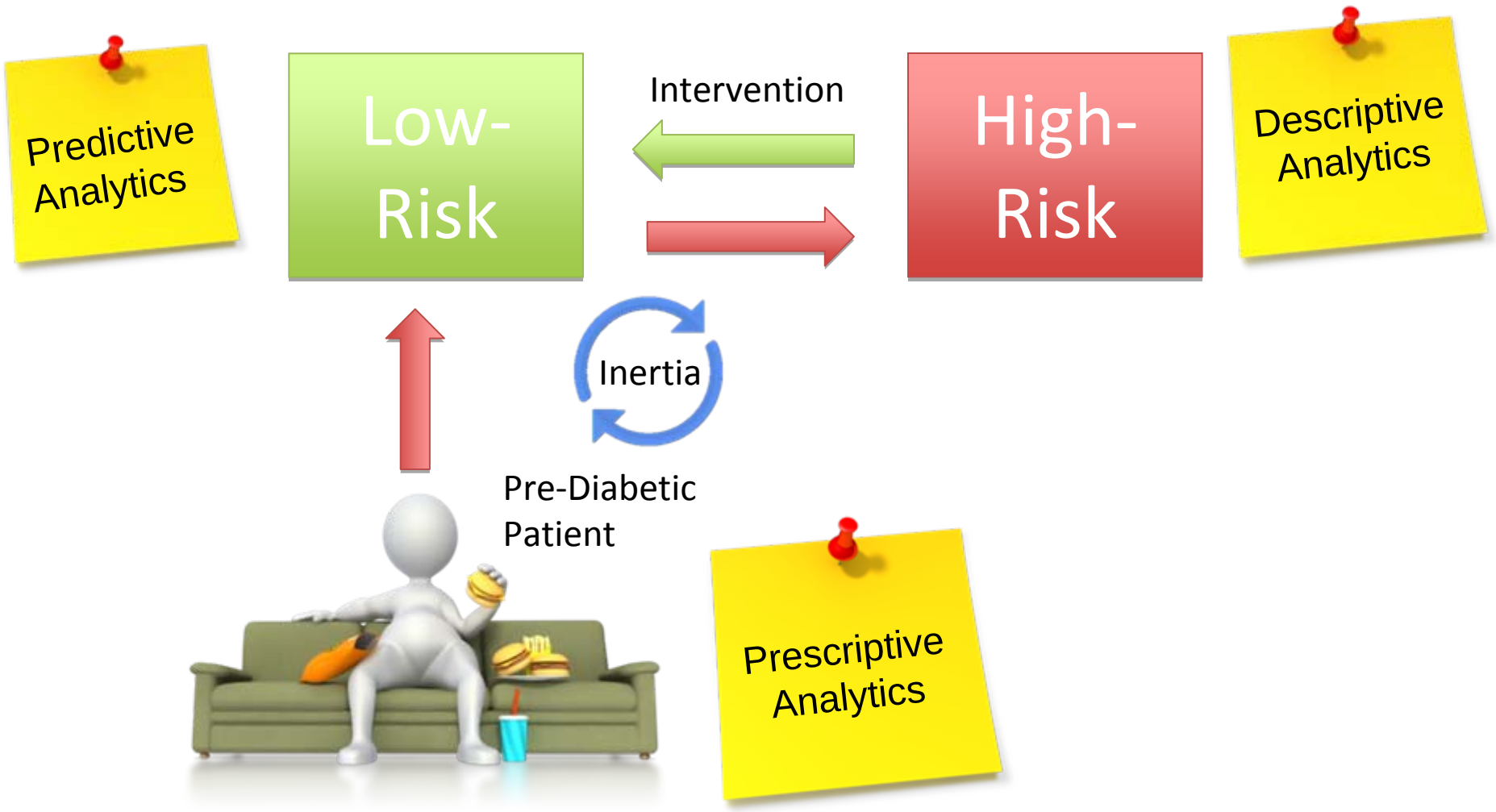

A few additional lessons

Tip #1

Targeting high-risk patients is important…

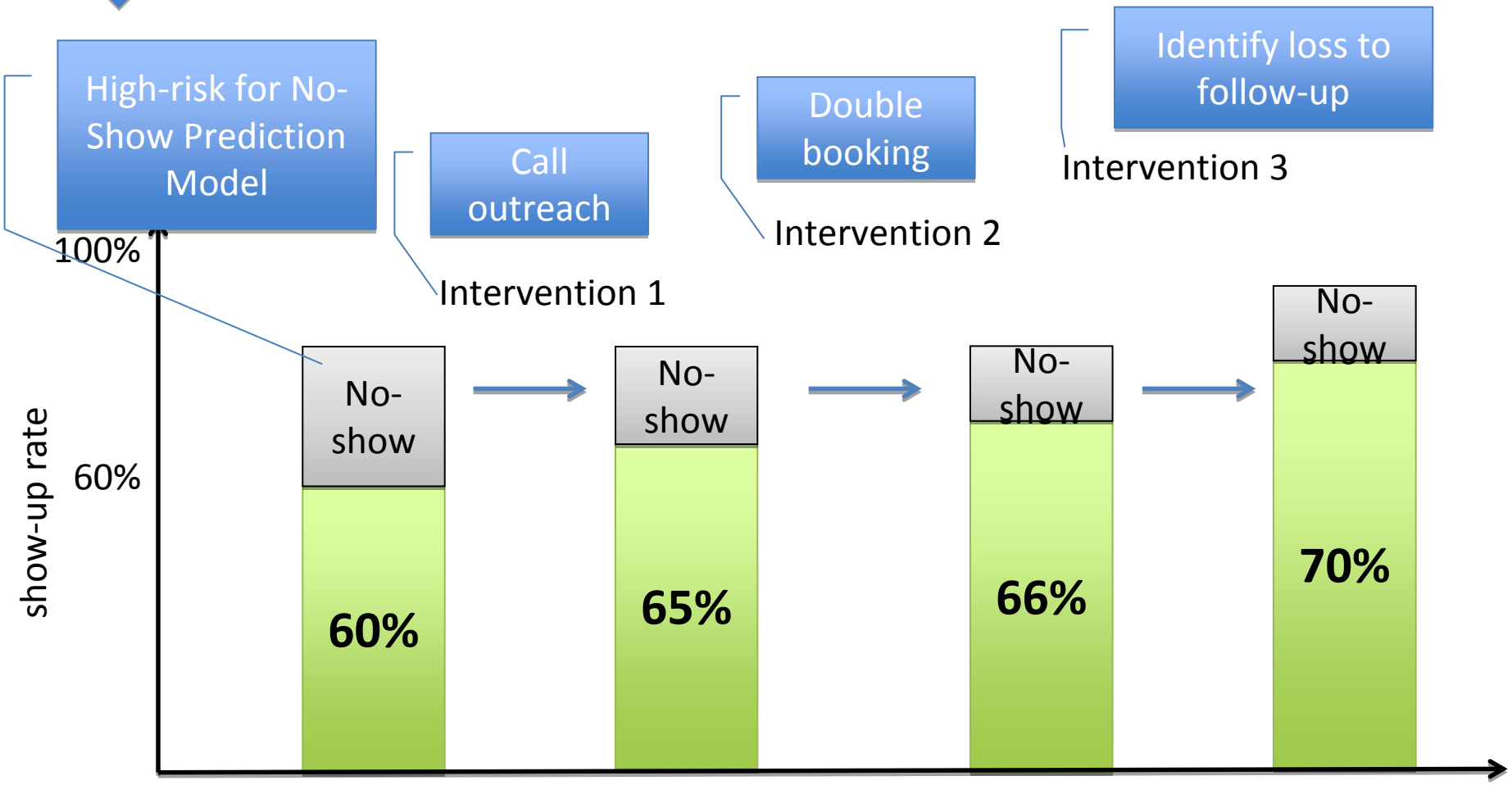


But get the big picture first!



Tip #2

Think multi-interventions



Tip #3

We identify High-Risk patients

- Why are they high-risk?
  - Poly-pharmacy
  - Multiple Comorbidities
  - Low-health literacy
  - Poor cognition
- High-risk for what?
  - Readmission
  - High-cost
  - Non-Adherence, etc…
- Is the risk modifiable?
- Do we have an intervention available?
- Is the intervention effective?

How about identifying optimal patients to match interventions?

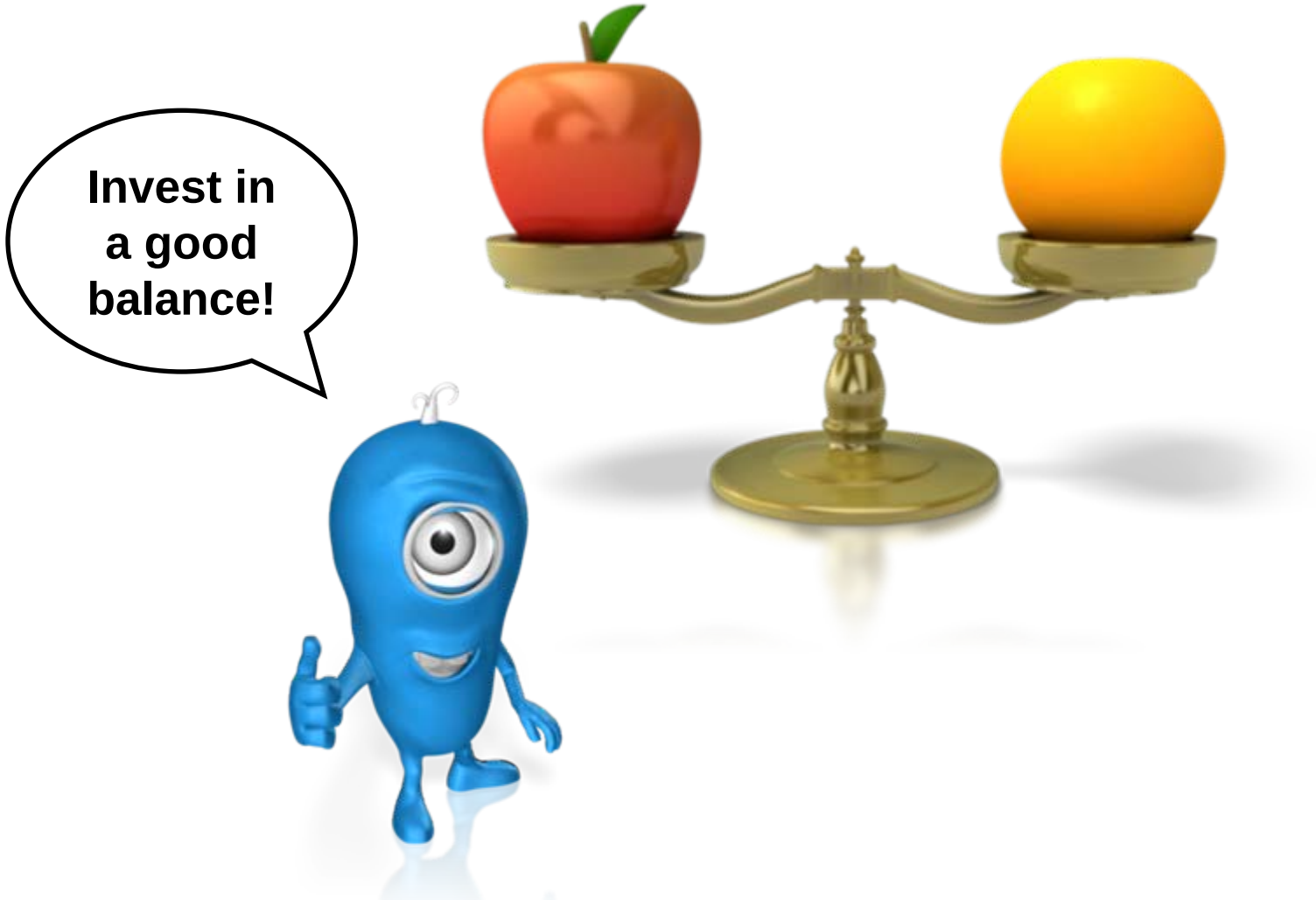
Low health literacy → Education support

Financial challenges → Social work consult

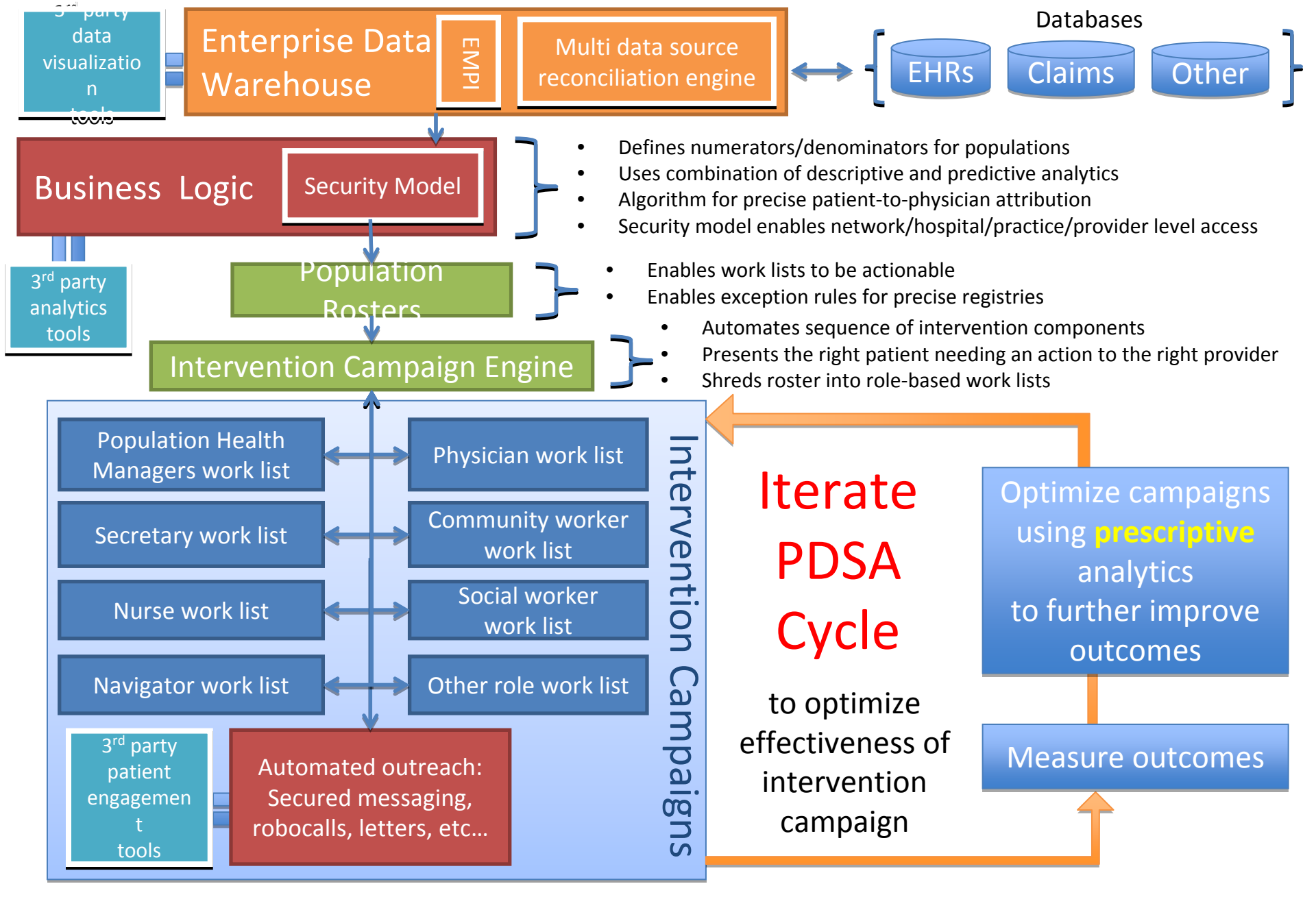
Meets palliative care criteria → Supportive Clinical Care Consultation

Tip #4

Which intervention is better?

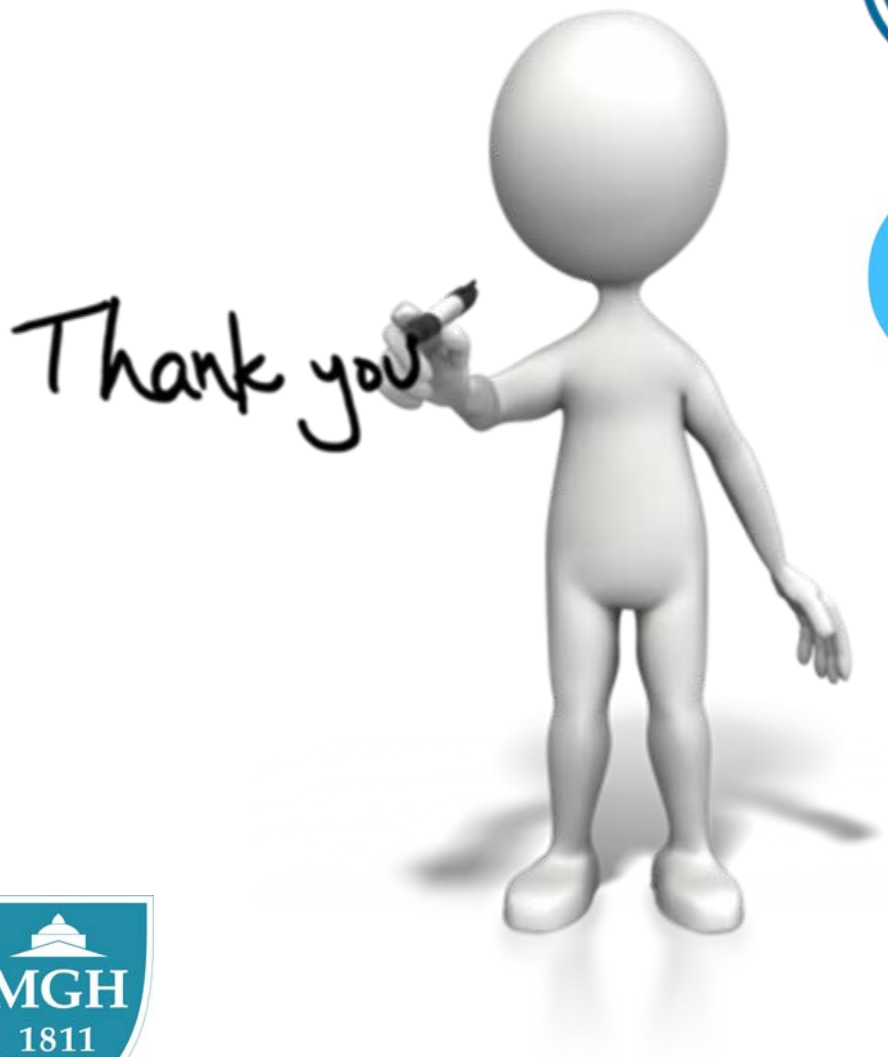


Components needed for an effective population health IT system



10 Lessons Learned

1. Optimizing processes is important
2. Focus on precise population identification
3. It's ok to (sometimes) take the physician out of the equation
4. Question your measures
5. Driving outcomes doesn't have to be expensive
6. Interoperability between all IT components is critical
7. Don't target high-risk patients only, look at how quickly low-risk patients are becoming high-risk
8. Use multi-interventions to optimize outcomes
9. Match the right high-risk patients to the appropriate interventions
10. Have an effective PHM IT system to compare effectiveness of your interventions



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