Overcoming big data bottlenecks in healthcare : a Predictive Modeling case study

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Sutter Health
We Plus You

DAMO CONSULTING

About Damo Consulting, Inc.

- Founded in 2012 : Management consulting, focused on healthcare sector
- Healthcare Market Advisory : Technology, Analytics, Digital
- Leadership team from big 5 consulting firms and global technology leaders
- Thought leadership and deep market knowledge: Published extensively in industry journals, speak regularly at leading industry conferences.

Healthcare analytics : key drivers and data sources

High cost, inefficient system

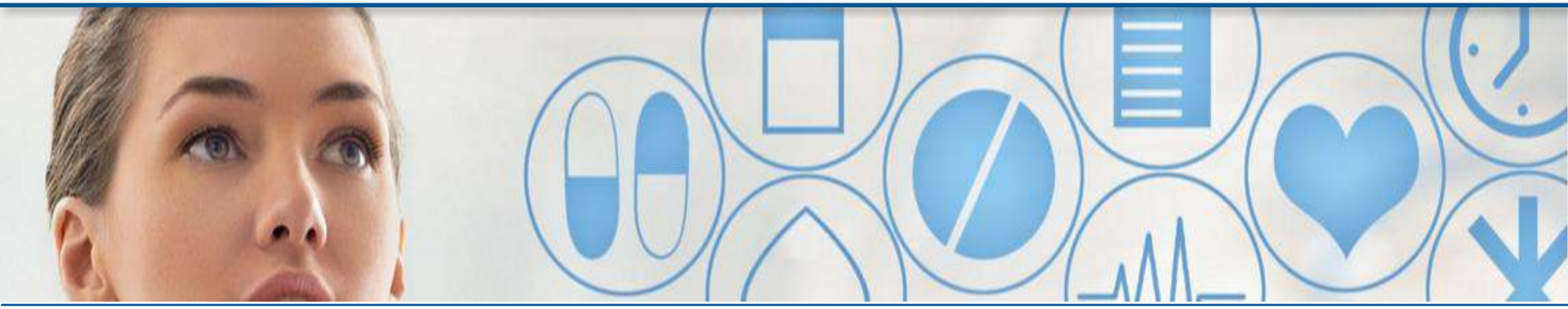
- $ 3 Trillion annual spending, highest in the world
- $ 750 Bn a year in waste, fraud and abuse
- Govt push towards a value-based system of reimbursement

Population health management (PHM) and personalized care

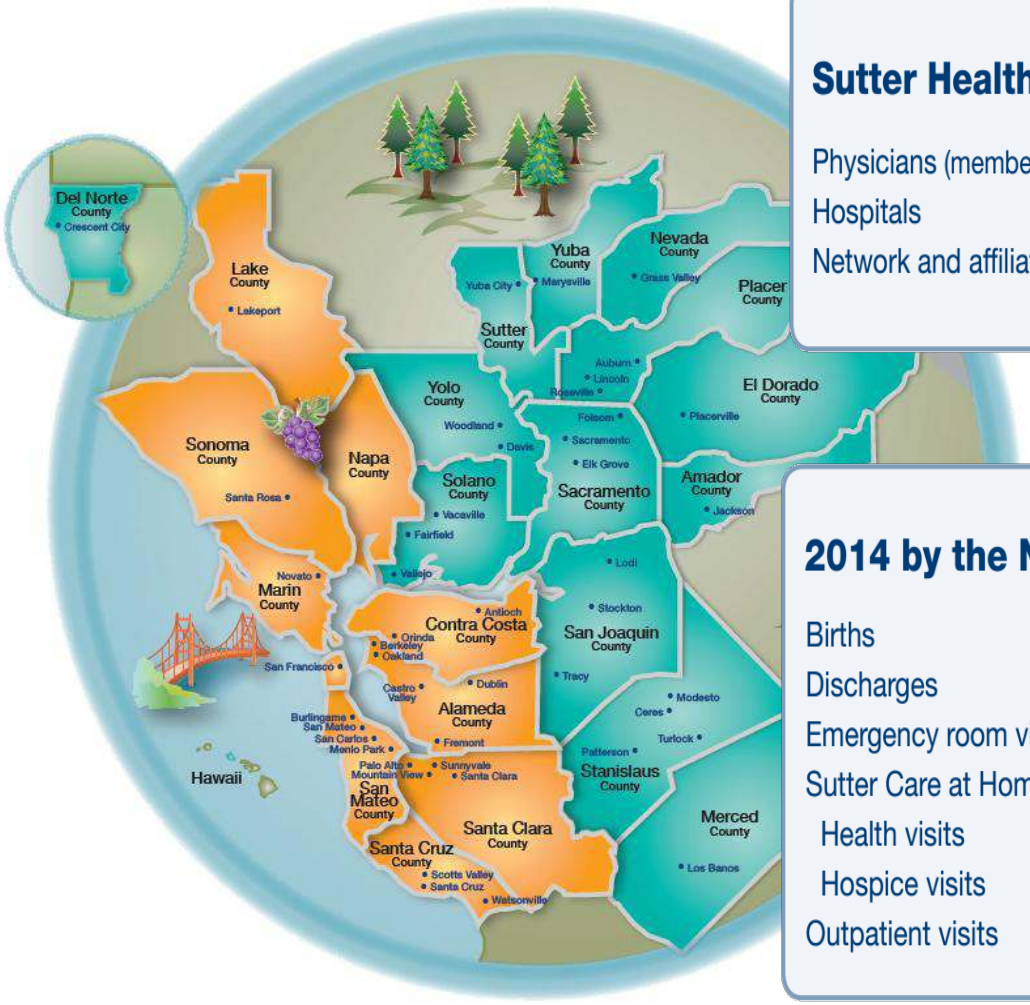
- Improving patient experience and managing health outcomes at population level
- Data and Analytics plays important role
- 30-day readmissions: key measure of clinical outcomes

Sources of data

- Over 30 BN spent on EMR systems has set up patient medical record backbone
- Other data sources to harness: notes, images, demographic data
- Medical claim information from insurers
- Emerging sources such as wearables, IoT



Sutter Health



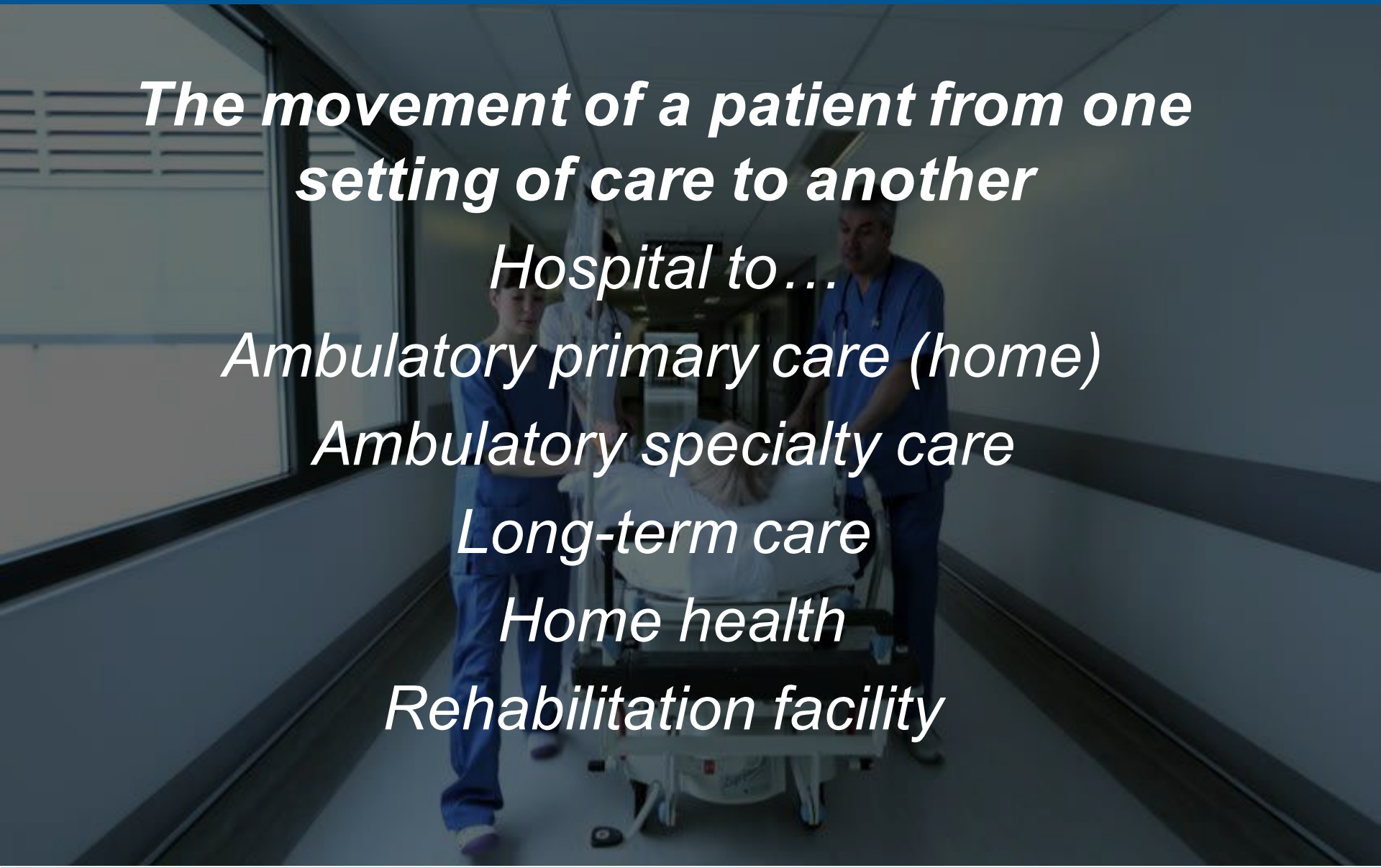
Sutter Health Facts at a Glance

Physicians (members of Sutter Medical Network)	5,000
Hospitals	24
Network and affiliate employees	49,381

2014 by the Numbers

Births	35,463
Discharges	190,054
Emergency room visits	797,057
Sutter Care at Home	
Health visits	483,649
Hospice visits	263,885
Outpatient visits	11,121,733

Transitions in Care



The movement of a patient from one setting of care to another

Hospital to…

Ambulatory primary care (home)

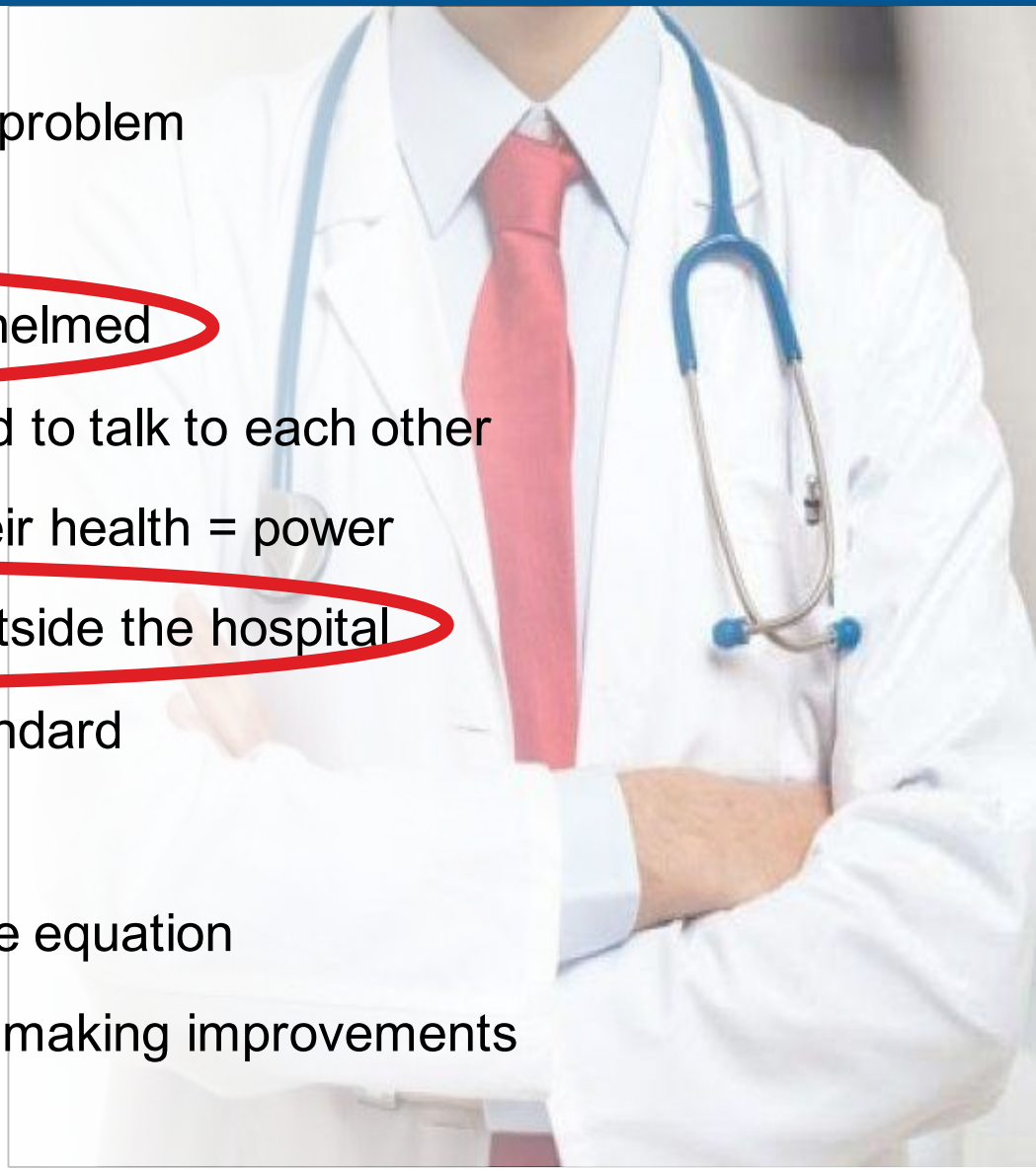
Ambulatory specialty care

Long-term care

Home health

Rehabilitation facility

Why do we care about Transitions in Care?

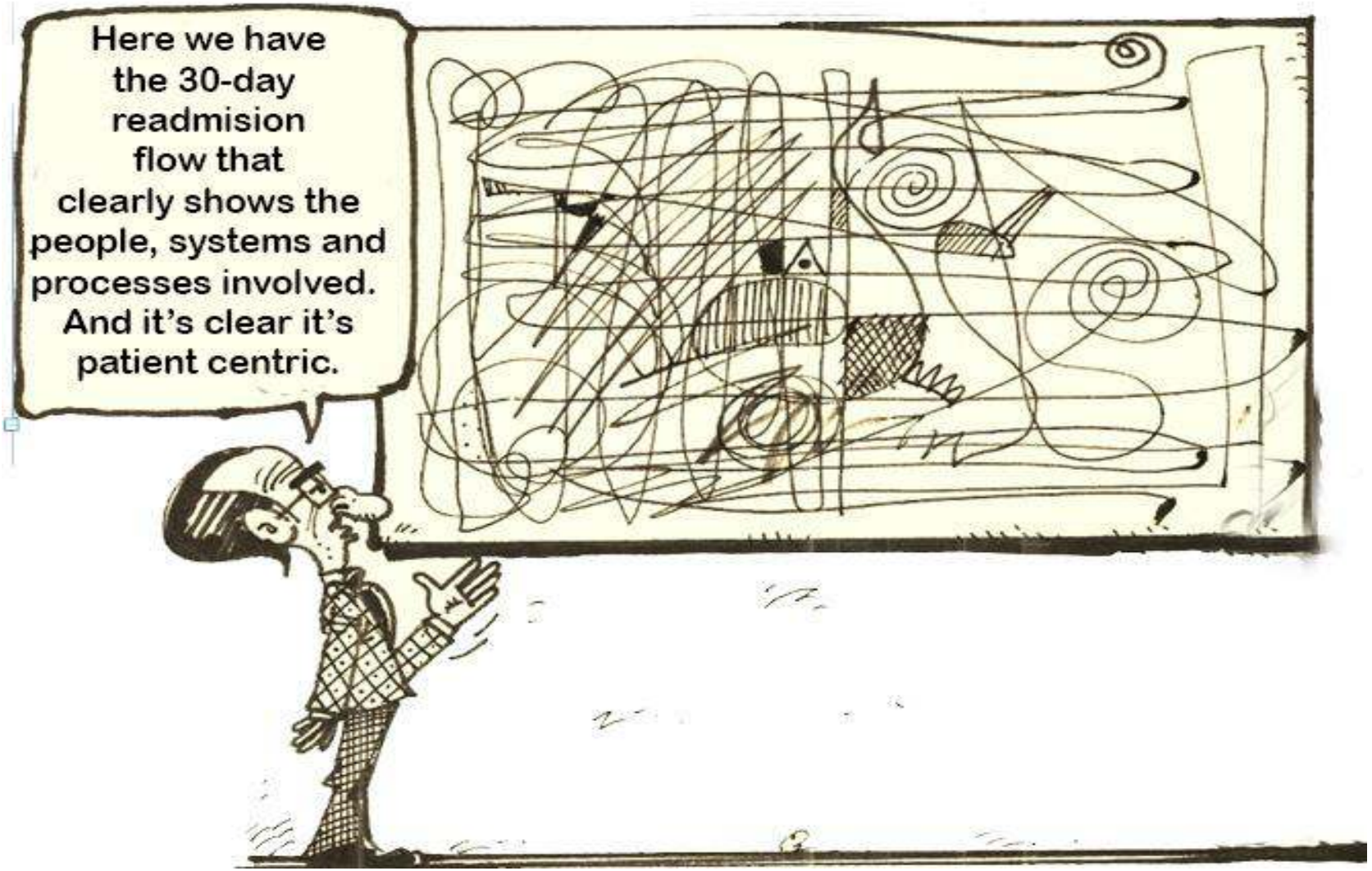


- Hospital re-admissions are a real problem
- Hospitals are paying the price
- Patients and providers are overwhelmed
- Hospitals and doctors offices need to talk to each other
- For patients, knowledge about their health = power
- Patients need to continue care outside the hospital
- Discharge plans should come standard
- Medications are a major issue
- Caregivers are a crucial part of the equation
- Hospitals and other providers are making improvements

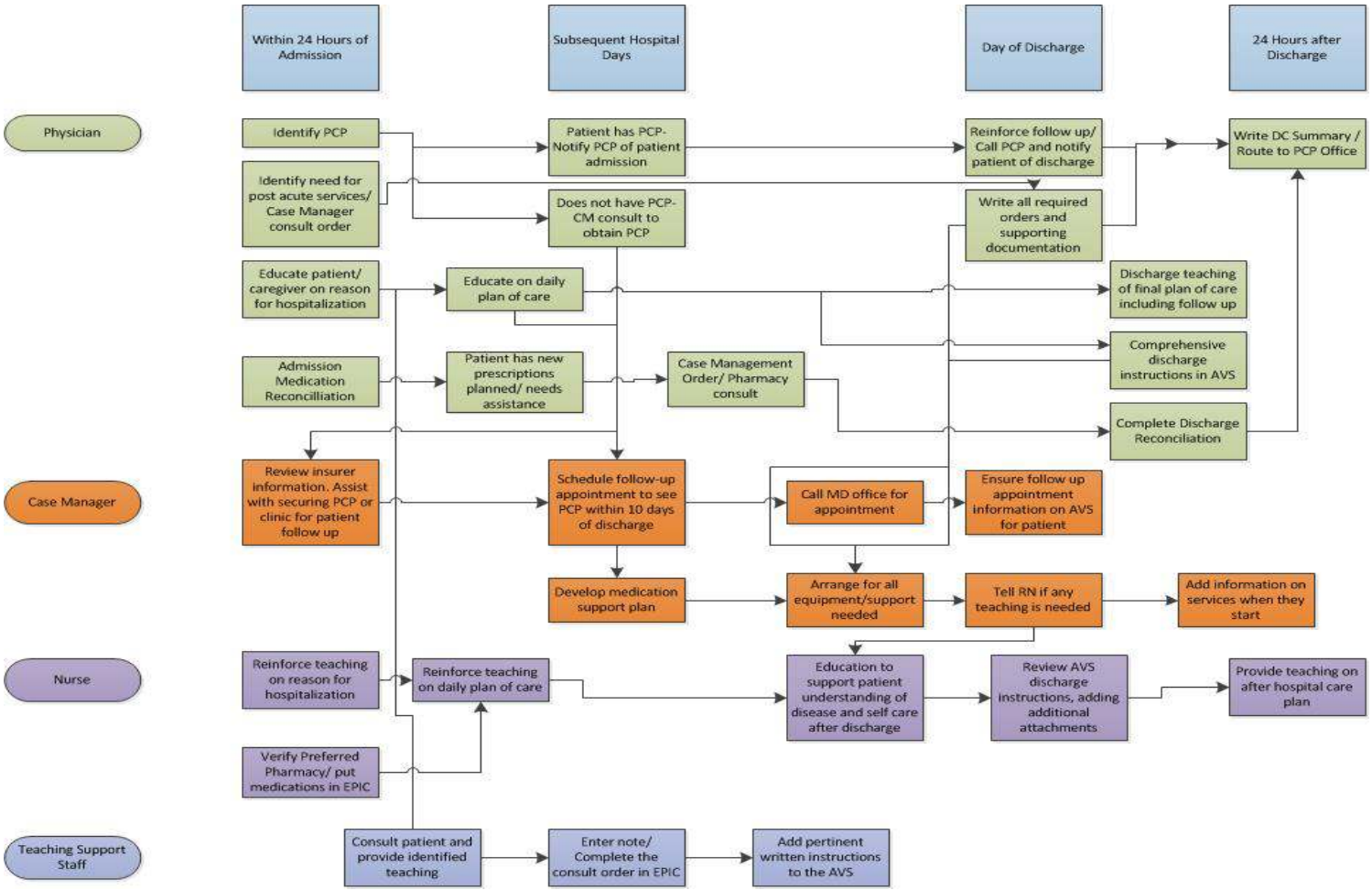
Predicting 30-day readmissions – Why?

- *Hospitals have limited resources – so efficiency is important*
- *CMS penalties for exceeding thresholds*

Figurative Current State Discharge Process



Literal Current State Discharge Process



And this process is based on national best practice standards!

Factors that Can Lead to a Hospital Readmission

- *Illness severity and complexity*
- *Inadequate communication with patients and families;*
- *Reconciliation of medications;*
- *Poor coordination with community clinicians and non-acute care facilities;*
- *Care (post-discharge) that can recognize problems early and work towards their resolution.*

High risk patients can and should receive more support

Project RED

(http://www.ahrq.gov/professionals/systems/hospital/red/toolkit/index.html)
Project Re-Engineered Discharge (Project RED) recommends 12 mutually reinforcing tasks that hospital care teams undertake during and after a patient's hospital stay to ensure a smooth, efficient and effective care transition at discharge.

1. Ascertain need for and obtain language assistance	7. Teach a written discharge plan the patient can understand.
2. Make appointments for follow-up medical appointments and post discharge tests/labs	8. Educate the patient about his or her diagnosis.
3. Plan for the follow-up of results from lab tests or studies that are pending at discharge.	9. Assess the degree of the patient's understanding of the discharge plan.
4. Organize post-discharge outpatient services and medical equipment.	10. Review with the patient what to do if a problem arises
5. Identify the correct medicines and a plan for the patient to obtain and take them.	11. Expedite transmission of the discharge summary to clinicians accepting care of the patient.
6. Reconcile the discharge plan with national guidelines.	12. Provide telephone reinforcement of the Discharge Plan.

A model for predicting readmissions: LACE (the Epic standard)

L Length of stay of the index admission.

A Acuity of the admission
(admitted through E.D. vs. an elective admission)

C Co-morbidities (Charlson Co-morbidity Index)

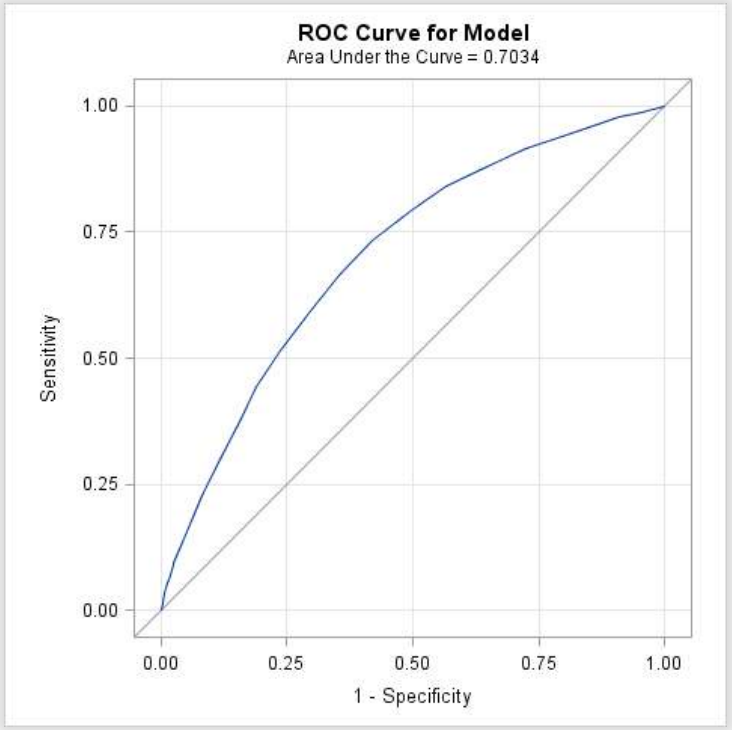
E Count of E.D. visits within the last 6 months.

LACE score ranges from 1-19

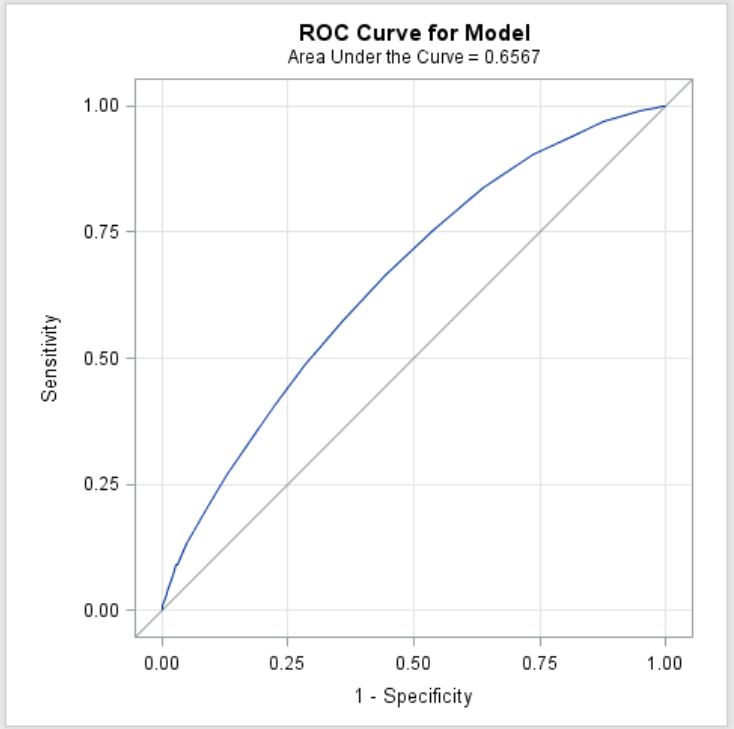
0 – 4	=	Low risk;
5 – 9	=	Moderate risk;
≥ 10	=	High risk of readmission.

LACE issues - Sutter Health Hospitals

> 18 years of age



65+years of age



Modest AUC (better than most)
Lower in higher risk population
Calculable only at/near end of admission (L)
Model accuracy a moving target

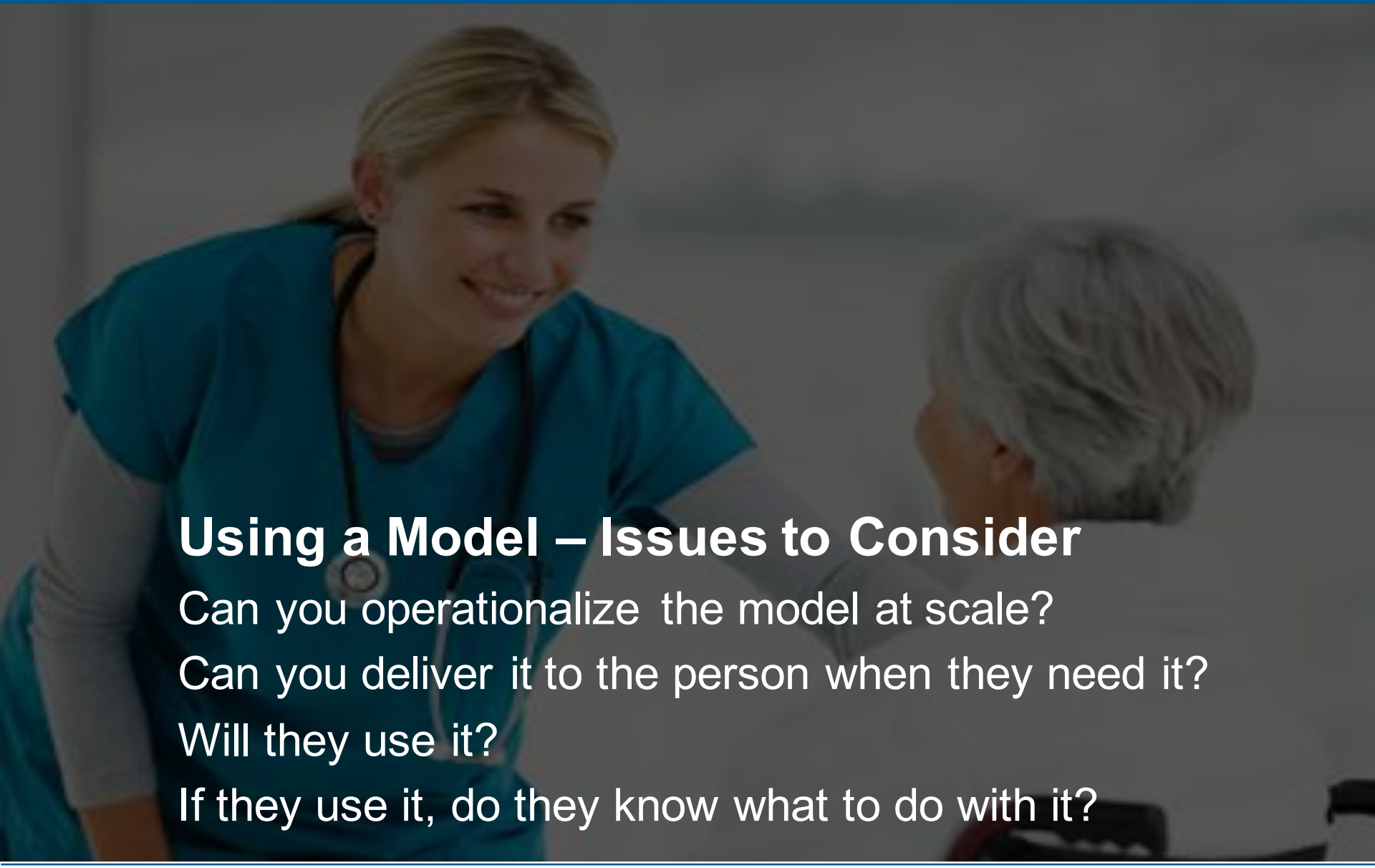
Don’t let the perfect be the enemy of the good

Even modest incremental knowledge of risk can improve the cost-effectiveness of interventions.

… and can trigger collection of additional data…

Housing status
Access to care
Health literacy
Substance abuse
Lacks social determinants

Now you have a predictive model : now what ?



Using a Model – Issues to Consider

Can you operationalize the model at scale?

Can you deliver it to the person when they need it?

Will they use it?

If they use it, do they know what to do with it?

Now you have a predictive model : now what ?

- **Can you operationalize the model at scale?**
- Can you deliver it to the right person when they need it?
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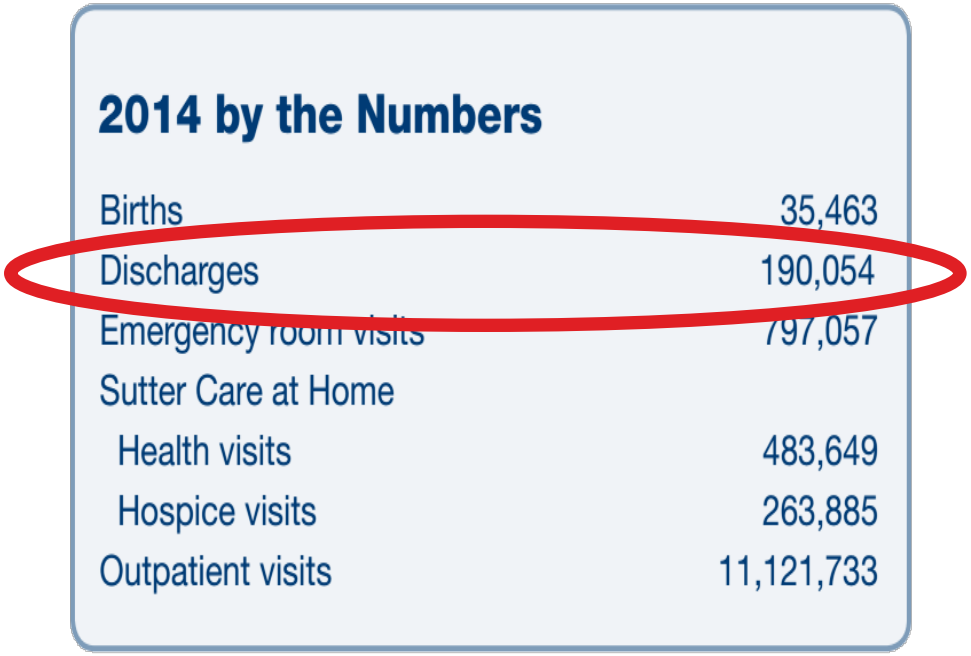

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Data bottlenecks: the major challenge to implementing advanced analytics in healthcare

- Complex workflows and lack of interoperability between systems:
  - More reactive than proactive to patient and provider needs
- Data management challenges and data silos:
  - Lack of co-ordination, willingness to share data
- Suitability and reliability of data
  - Just because there is some data out there, it doesn't mean it is usable
- Operationalization of analytics:
  - Most analytics solutions are "offline", not integrated into day to day clinical workflows
- Privacy & Security:
  - HIPAA, data breaches and liabilities

Now you have a predictive model : now what ?

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At admission? Prior to discharge?

Case manager

Discharge coordinator

Nurse

Doctor

Pharmacist

Caregiver

Patient

Scheduling services

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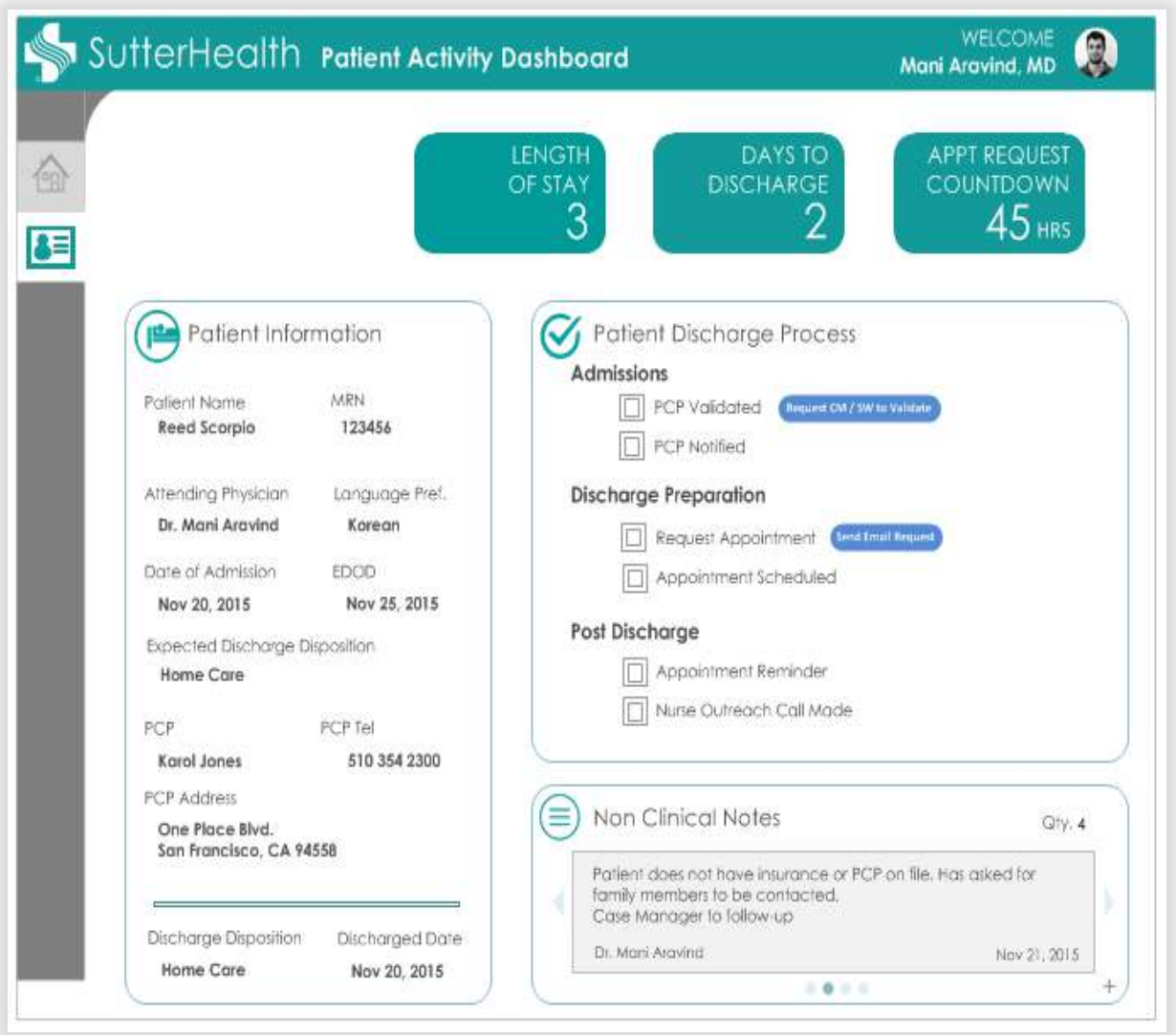
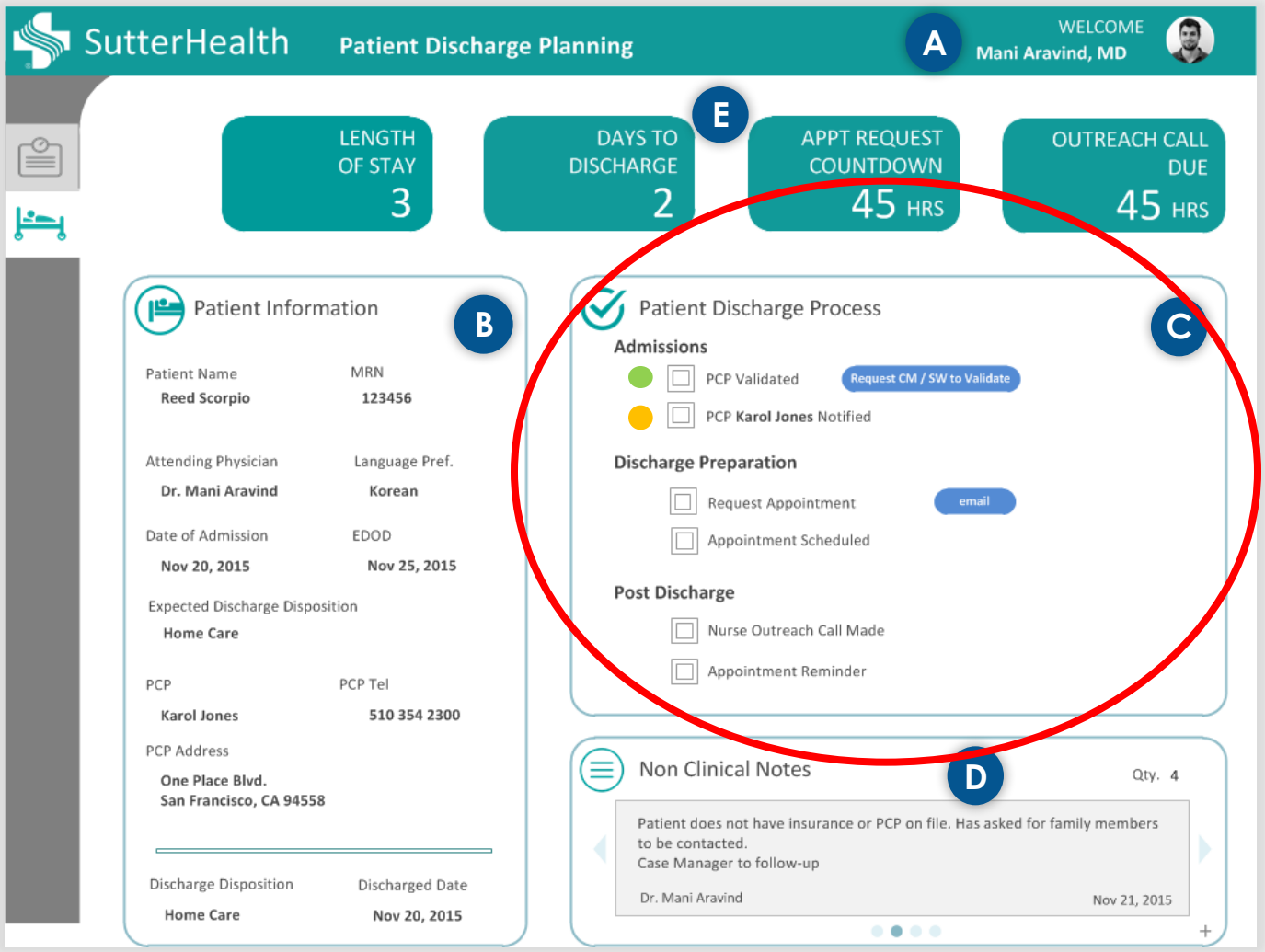
Our Solution? A Discharge Planning Application

- Browser-based solution.
- Manages inpatient discharge process.
- Full workflow visibility (Project RED) on patient's care transition plan.
- Admissions worklist that provides real-time discharge status information of each patient.
- Note manager streamlines communication between care team.

Project RED UX Integration



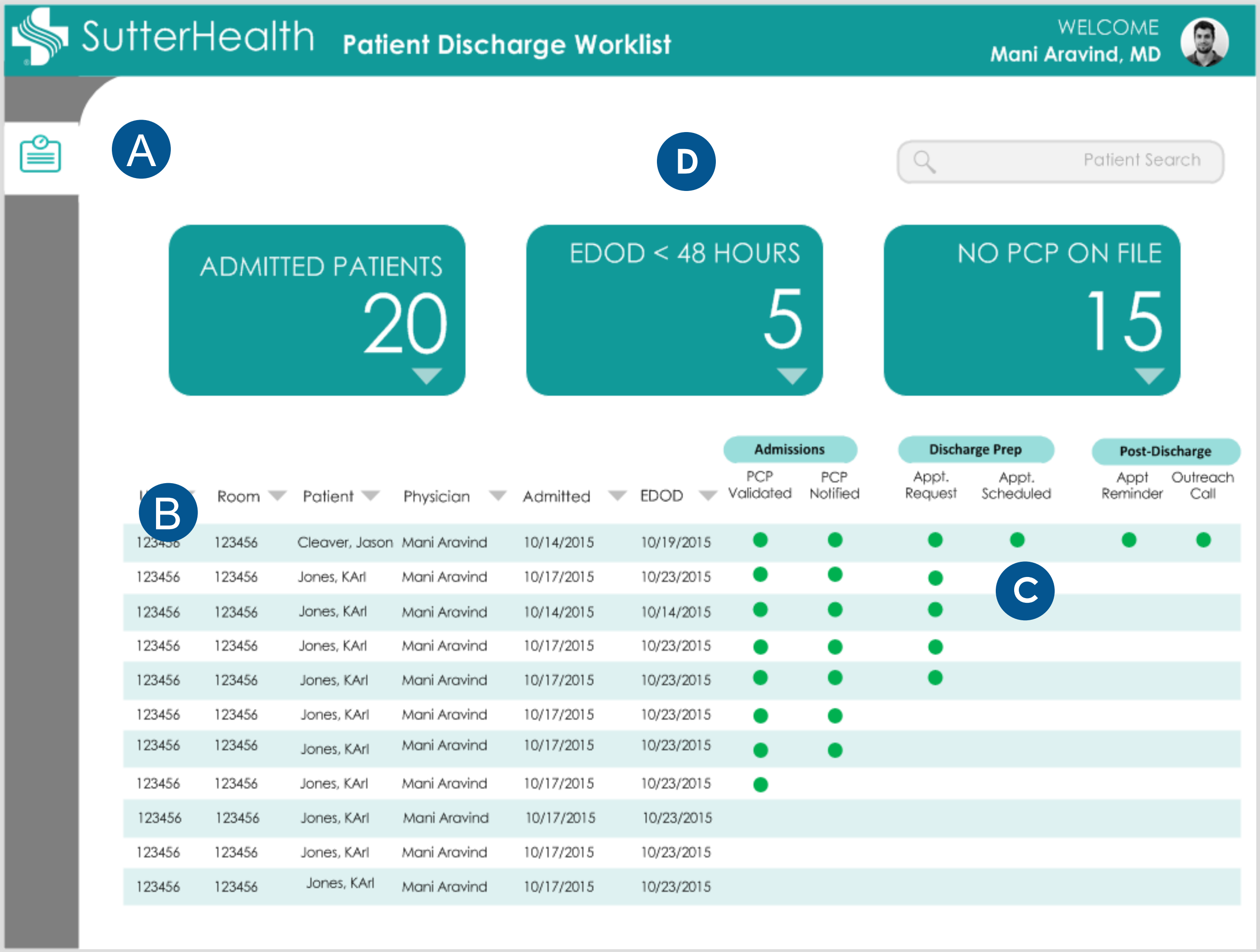
Discharge Planner - Patient Detail View



Launched from EPIC Patient Banner.

- **A** User Authentication
- **B** Real-Time EPIC Patient Admissions Data.
- **C** Single view task Management for all User Roles.
- **D** Non clinical notes management to Streamline communications.
- **E** Key Metrics visibility.

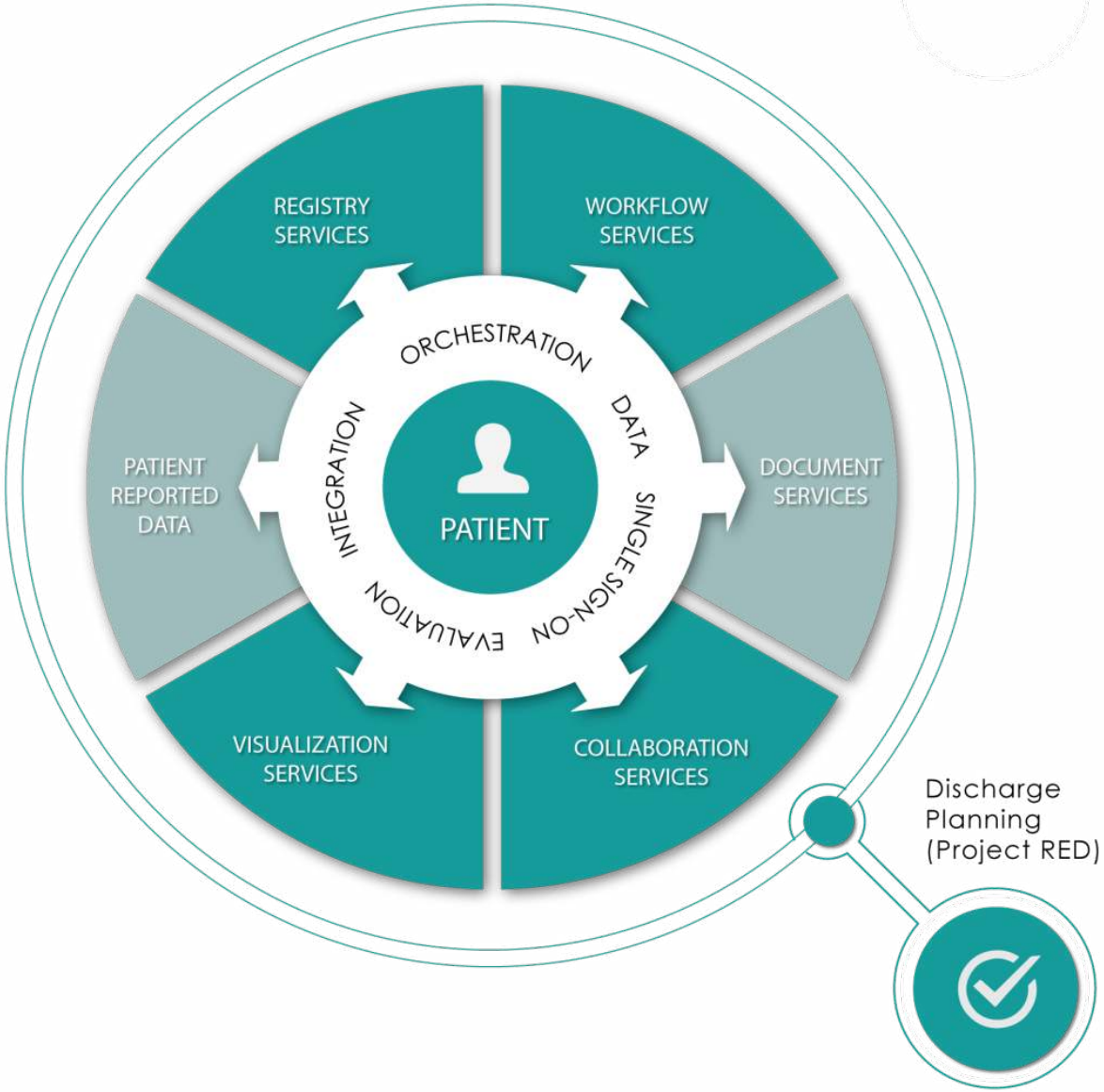
Discharge Planner - Patient Worklist View



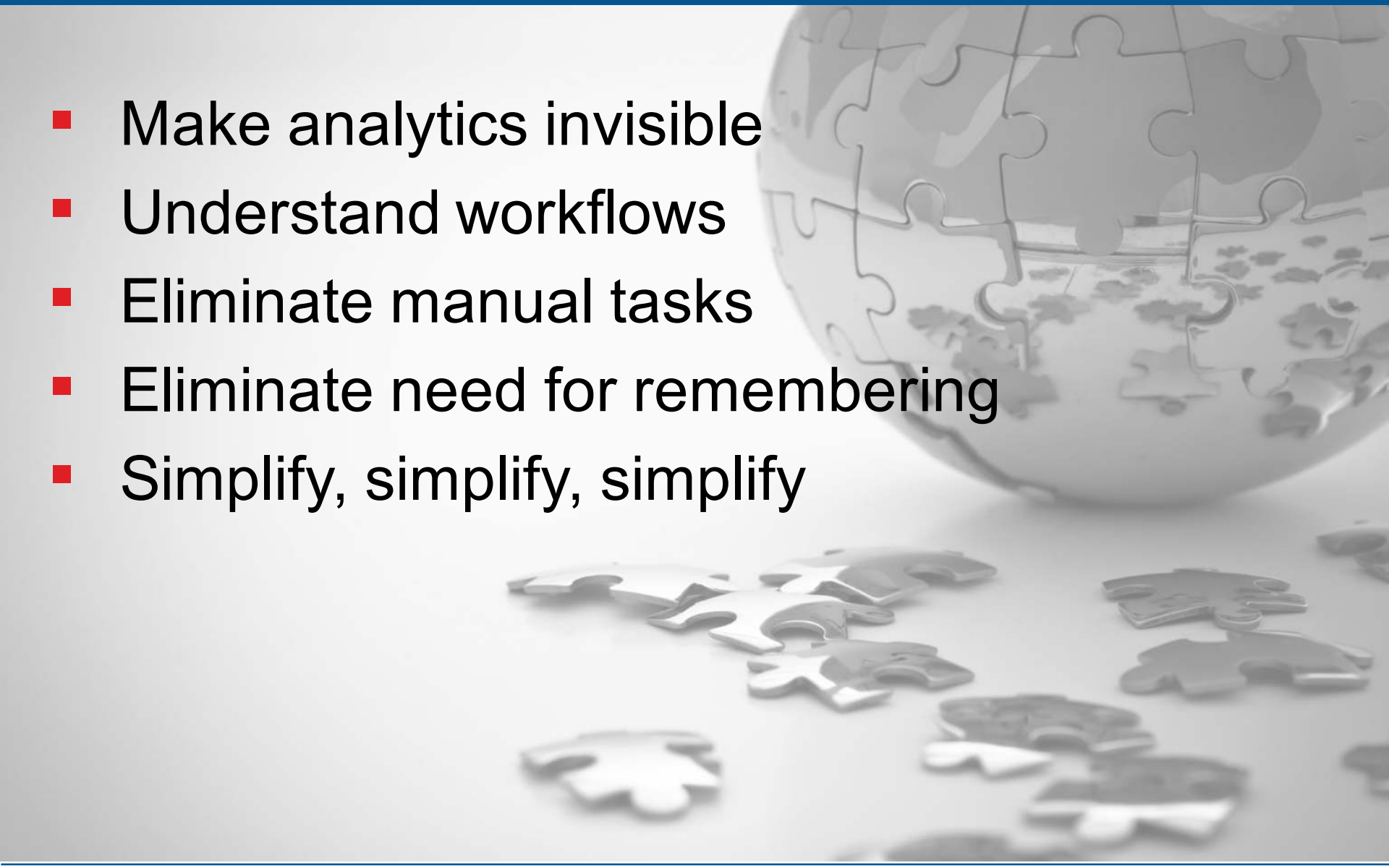
						Admissions		Discharge Prep		Post-Discharge	
	Room	Patient	Physician	Admitted	EDOD	PCP Validated	PCP Notified	Appt. Request	Appt. Scheduled	Appt Reminder	Outreach Call
123456	123456	Cleaver, Jason	Mani Aravind	10/14/2015	10/19/2015	●	●	●	●	●	●
123456	123456	Jones, KArl	Mani Aravind	10/17/2015	10/23/2015	●	●	●			
123456	123456	Jones, KArl	Mani Aravind	10/14/2015	10/14/2015	●	●	●			
123456	123456	Jones, KArl	Mani Aravind	10/17/2015	10/23/2015	●	●	●			
123456	123456	Jones, KArl	Mani Aravind	10/17/2015	10/23/2015	●	●	●			
123456	123456	Jones, KArl	Mani Aravind	10/17/2015	10/23/2015	●	●				
123456	123456	Jones, KArl	Mani Aravind	10/17/2015	10/23/2015	●	●				
123456	123456	Jones, KArl	Mani Aravind	10/17/2015	10/23/2015	●					
123456	123456	Jones, KArl	Mani Aravind	10/17/2015	10/23/2015						
123456	123456	Jones, KArl	Mani Aravind	10/17/2015	10/23/2015						
123456	123456	Jones, KArl	Mani Aravind	10/17/2015	10/23/2015						

- **A** Launched from EPIC Worklist or App side tab
- **B** "At-A-Glance" view of admitted patients and its corresponding data
- **C** Full visibility into patient discharge status
- **D** Real-time Key Metrics visualization

Maestro – Our Engine for Developing Solutions



How can we make the best and most affordable care the easiest care to deliver and receive?



- Make analytics invisible
- Understand workflows
- Eliminate manual tasks
- Eliminate need for remembering
- Simplify, simplify, simplify

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