



# Connected Healthcare

A Better Healthcare approach

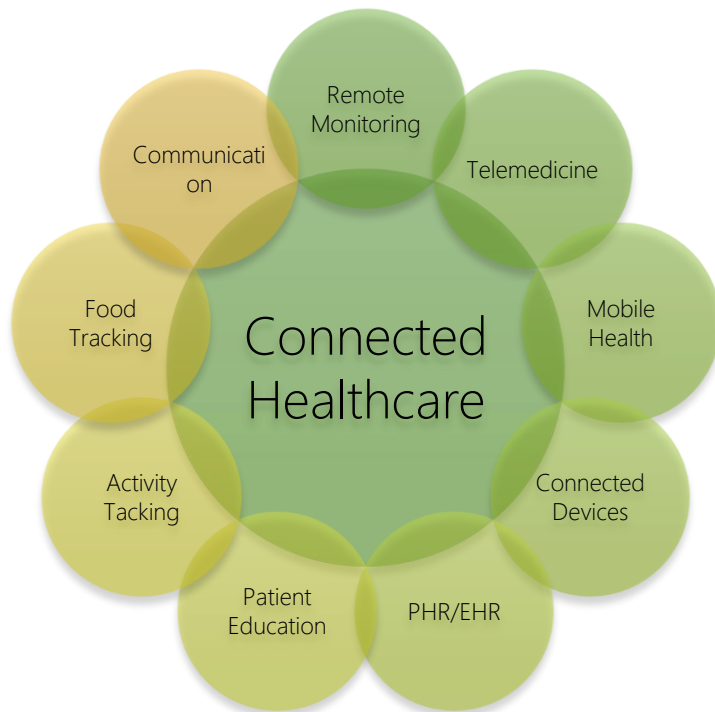
# Connected Care Definition

Connected Care is the real-time, electronic communication between a patient and a provider, including telehealth, remote patient monitoring, and secure email communication between clinicians and their patients



- Improves access to care, helps providers and patients avoid costly health care services, and increases convenience for patients
- Enable care teams to collect and connect millions of data points on personal fitness from wearables like heart-rate, sleep, perspiration, temperature, and activity
- Sensor-fed information can send out alerts to patients and caregivers in real-time so they get event-triggered messaging like alerts and triggers for elevated heart-rate etc.
- Improves workflow optimization and ensures that care can also be managed from the comfort of home.

# Connected Care Definition



Promote Preventive care, Improve Patient care, Enhance Patient care and satisfaction

, industry leaders recognize the strategic importance of considering patients' needs, values and preferences, particularly as growth continues in consumer-driven health plans and calls grow louder for greater transparency around healthcare quality and cost.

American Institute for Research (AIR) identifies these five principles:

**Patient-driven:** Patients' goals, preferences, and priorities drive what is measured and how performance is assessed.

**Holistic:** Measurement recognizes that patients are whole people and considers their circumstances, life and health histories, and experiences within and outside of the healthcare system.

**Transparent:** Patients have access to the same data as other stakeholders and understand how data is used to inform decision-making around care practices and policies.

**Comprehensible and timely:** Patients and other stakeholders get timely, easy-to-understand data to inform decision-making and quality improvement.

**Co-created:** Patients are equal partners in measure development and have decision-making authority about how data is collected, reported, and used.

# Connected Care Benefits

A connected and collaborative healthcare system is more effective, superior and less costly overall than any other way of providing patient care



- ▶ Access to comprehensive patient data in real-time is the key to delivering improved care with better outcomes.
- ▶ Real-time communication across multiple form factors enriches patient engagement.
- ▶ Mindset shift from siloed care to a collaborative care model.

## For Patients

- ✓ Improved care reception
- ✓ Cost-effective healthcare
- ✓ Awareness
- ✓ Empowerment
- ✓ Personalized care

## For Providers

- ✓ Improved care delivery
- ✓ Avoidable utilization
- ✓ Increased patient satisfaction
- ✓ Focused medical prevention
- ✓ Improved outcomes
- ✓ Population health management

## For Payers

- ✓ Transparency
- ✓ Cost-effective healthcare
- ✓ Claims reduction
- ✓ Social and community care at scale

# Connected Care Benefits

- ▶ **Decreased Costs:** Patient monitoring done on a real-time basis and seamless transfer of information, cuts down on costs due to decreased in-patient stays and by cutting down on unnecessary visits to doctors.
- ▶ **Improved outcomes:** Real-time feedback from all parties of the care team, creates scope for a much more informed decision making. This ensures healthcare provision is timely and treatment outcomes are improved.
- ▶ **Reduced Errors:** Accurate collection of data, automated workflows combined with data driven decisions are an excellent way of cutting down on waste, reducing system costs and most importantly minimizing on errors.
- ▶ **Enhanced Patient Experience:** Proactive treatments, improved accuracy when it comes to diagnosis, timely intervention by physicians and enhanced treatment outcomes result in accountable care that is highly trusted among patients.
- ▶ **Enhanced post-hospitalization care and better drug management:** Harmonization between patient and physician post hospitalization, ensures proactive care and better drug management, thereby reducing re-admissions and increasing scope of full recovery.

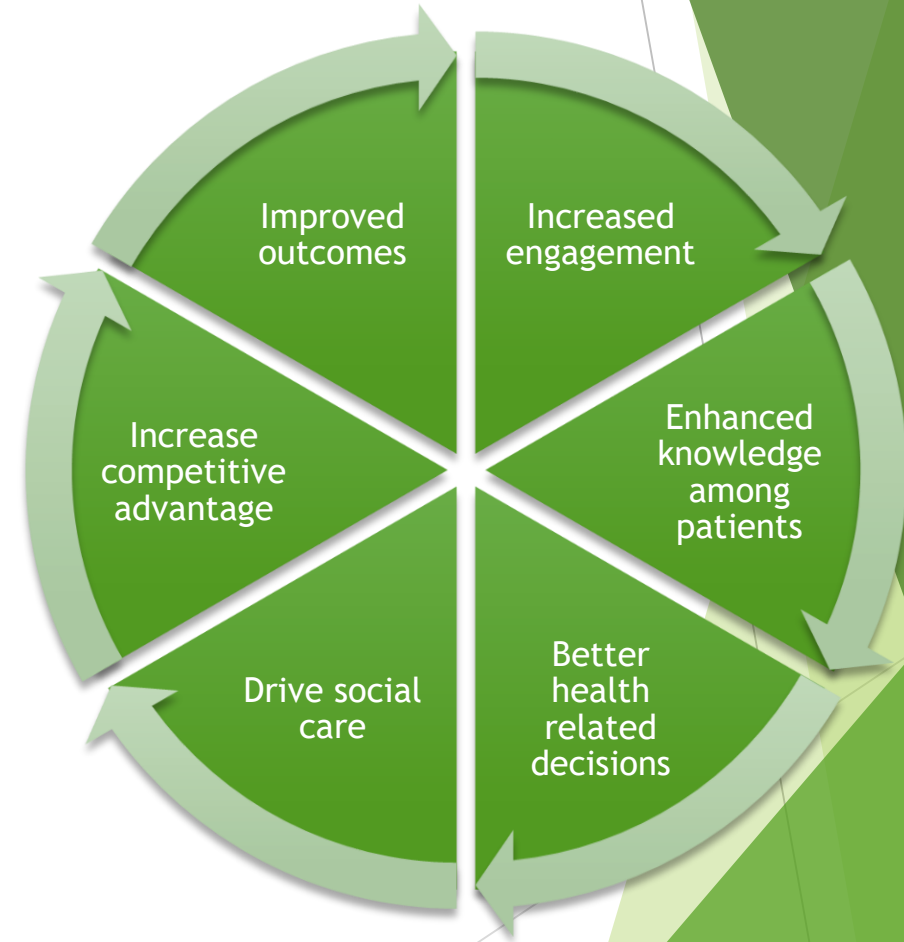
# Patient-Centric Care

A patient-centric approach is a way healthcare systems can establish a partnership among practitioners, patients, and their families to align decisions with patients' wants, needs, and preferences.

- This includes the delivery of specific education and support patients need to make these decisions and participate in their own care

# Patient-Centric Care Principles

- ▶ Increased engagement with all stakeholders (patients, providers, and others), leading to decreased overall expenses.
- ▶ Enhanced knowledge and understanding among patients of their own health, wellbeing, and healthcare choices, leading to improved care.
- ▶ By collaborating and engaging with patients in the decision-making process, health providers can make better decisions regarding a patient's health.
- ▶ Increase competitive advantage as more hospitals are now competing for patients based on both cost and quality of care.



# Healthcare 360° Continuum



360 degrees of care is defined by electronic health records (EHR) and the sharing of patient data and health records across healthcare systems.

- Descriptive & diagnostic analytics to summarize historical data, in an attempt to define what happened and why it happened?
- Patient voice duly becomes part of discussions and decision-making around measurement.
- Drives ability towards meaningful change, better health, better social care, and lower costs.



# Healthcare Platform

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# DigiCare Platform

## CORE FEATURES

### Data Integration

- Data integration ready
- Flexible database to support EMR/EHR schema
- 3<sup>rd</sup> party education contents
- Converged with remotely collected data

### AI / Machine Learning

- Predictive analytics and actionable data insight
- Readily available ML models on clinical data
- Reduced cost & improved outcomes

### 3<sup>rd</sup> Party Integration

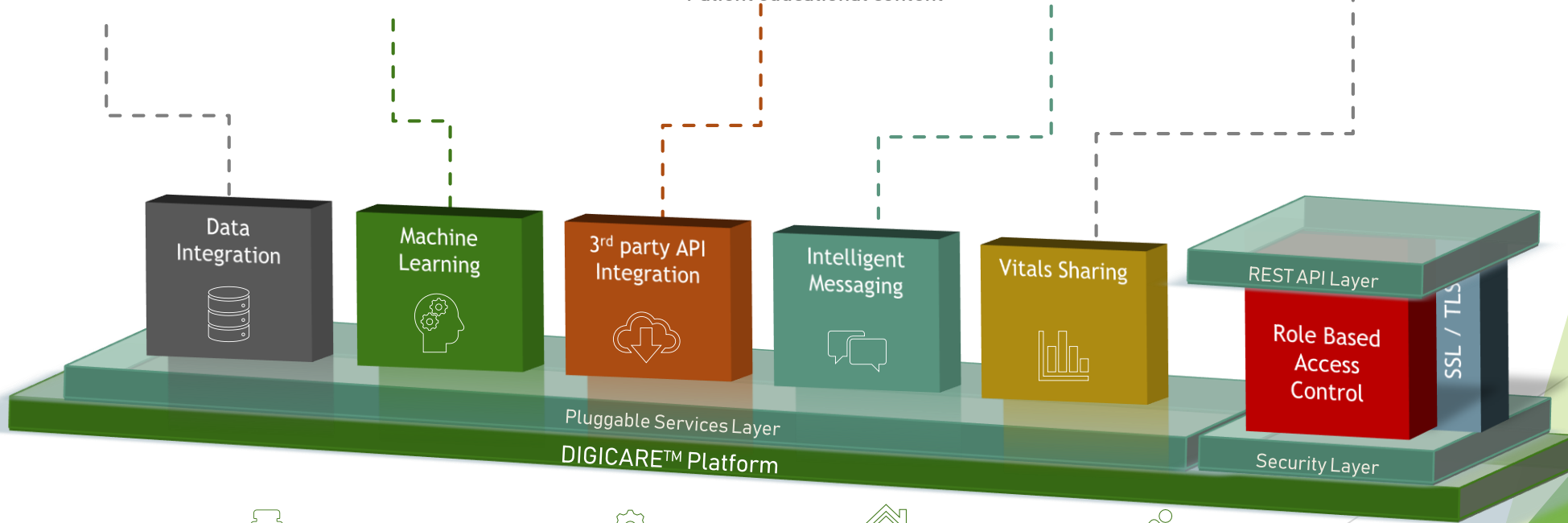
- Pre-integrated with providers, such as iHealth®, Withings®, Fitbit® and more
- Automatic data sharing with providers
- Patient educational content

### Intelligent Messaging

- Secure messaging across multiple players
- Health alerts, tips & notification
- Doctor notes sharing
- Real-time online chat service

### Remote Monitoring

- Full fledged, remote monitoring system
- Visualization and analytics
- Data collection and sharing at individual & group levels



Patient engagement



Clinical data Integration



Smart Remote Monitoring



Intelligent Fitness Tracking

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# Machine Learning Use cases

# Machine Learning

Predictive Analytics using ML can help solving below challenges:

1. Predicting patient's condition and diagnosis trajectories
2. Personalized treatment using data such as, demographics, medical history (EMR), procedures, lab tests, diagnosis and medications...
  - ▶ Improve quality of care and lower the cost, decrease readmissions
  - ▶ Challenges, time irregularities in temporal (longitudinal) record. Free notes.
3. Identify risks and hospital readmission factors
4. Radiology

# Hospital Readmission

## Dataset

Publicly available dataset from UCI repository, containing (anonymized) diabetes patient encounter data for 130 US hospitals (1999–2008) containing 101,766 observations over 10 years.

The dataset has over 50 features including patient characteristics, conditions, tests and 23 medications.

## Problem

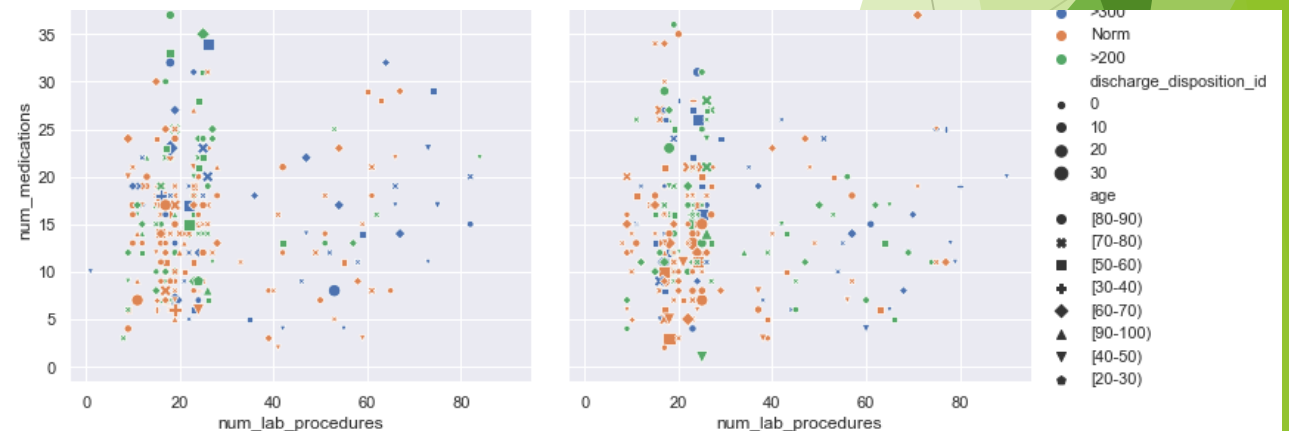
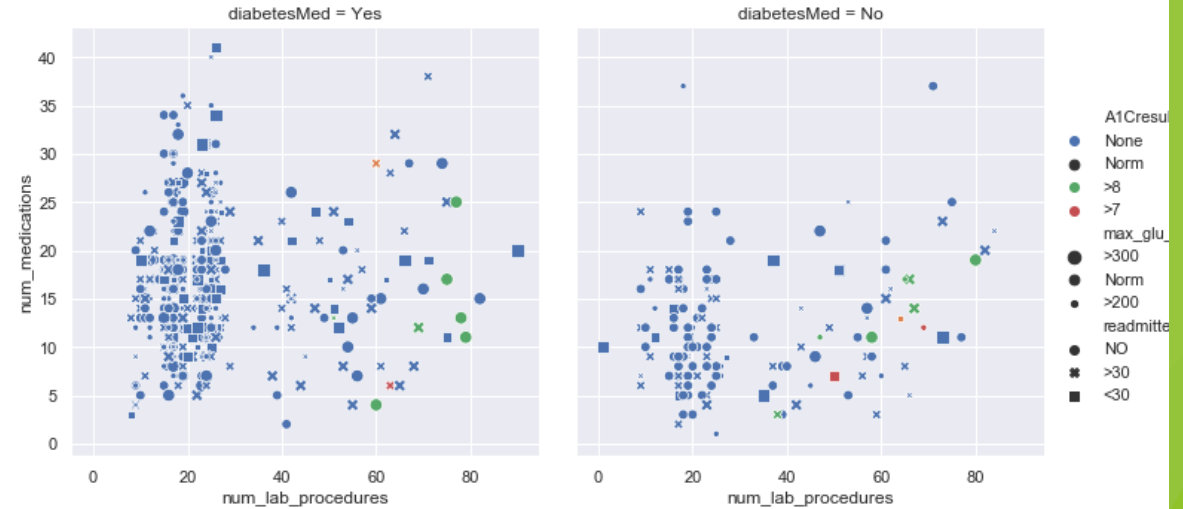
- ▶ To evaluate readmission cases for diabetic patients

## Model Designing

- ▶ Categorization of diagnosis (ICD) codes. 900+ codes, difficult to utilize. Ranges converted into categorization groups, such as *Respiratory*, *Digestive*, *Diabetes*, *Injury*.
- ▶ Consolidating admission types, 1, 2 and 7, for example.
- ▶ Readmission variable category simplification.
- ▶ Other techniques, such as removal of outliers, grouping and standardization, Regularization.

## Algorithms & Results

- ▶ Logistic Regression – accuracy 61%
- ▶ Decision tree – accuracy above 70%



# Total Covered Charges & Medicare

## Dataset

Publicly available dataset Inpatient Prospective Payment System (IPPS) Provider Summary for the Top 100 Diagnosis-Related Groups (DRG) from CMS site.

## Problem

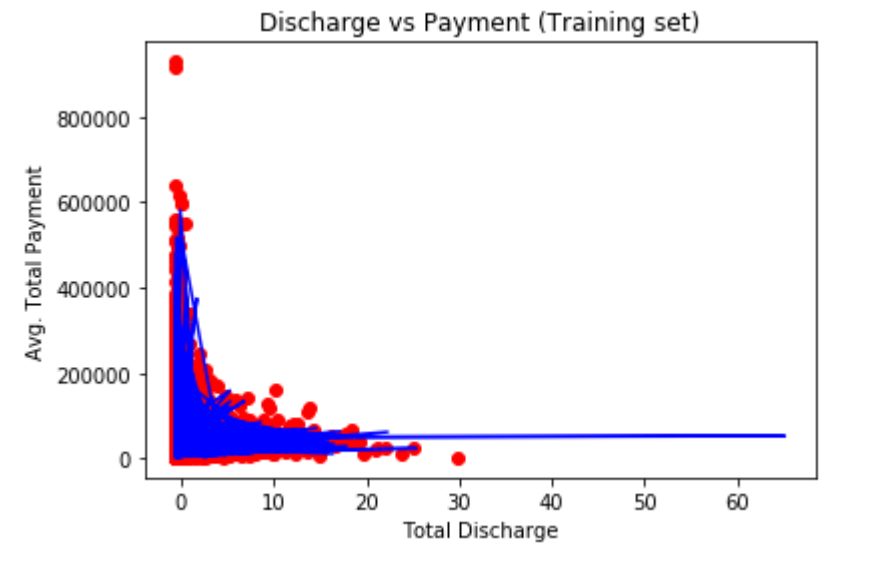
- ▶ To study total payments and covered charges trend against the DRG codes for different providers across the 50 US states

## Model Designing

- ▶ Input includes DRG codes at the state level
- ▶ Other techniques, such as removal of outliers, grouping and standardization, Regularization.

## Algorithms & Results

- ▶ Linear Regression – accuracy 68%



# Appendix

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# Digital Health

- ▶ Digital health is the convergence of digital technologies with health, healthcare, living, and society to enhance the efficiency of healthcare delivery and make medicines more personalized and precise.



# mHealth

- ▶ mHealth is the use of mobile phones and other wireless technology in medical care. The most common application of mHealth is the use of mobile phones and communication devices to educate consumers about preventive health care services.

# Connected Care Barriers

- ▶ The lack of EHR integration is another barrier to overcome.
- ▶ The reliability and security issues with data along with interoperability and a lack of training and infrastructure among providers