1

2

Healthcare Delivery Innovation – Unleashing the Power of Data, Analytics, and AI Technology to Improve Cardiovascular Care

❖ To demonstrate the value of an Enterprise Data Warehouse (EDW)

❖ To highlight the role of data analytics to improve operational and clinical outcomes

❖ To describe the use of data to support current and future digital and AI technologies in cardiovascular care

AllinaHealth ❤ MINNEAPOLIS HEART INSTITUTE

3

What is Possible with Robust Data Analytics and Clinically Driven Insight:

✓ **Data driven insights to guide strategic investments**
   ✓ Joint Venture Partnerships, CV dedicated ASC, optimizing outreach clinic network
✓ **Reduce unnecessary variation in care, drive clinical care improvements**
   ✓ Reducing gaps in care in patients with valvular heart disease
   ✓ Development of E-consults
   ✓ Management of supply chain costs per case
✓ **Strategic investments in Value Based Care Arrangements and AI Tech**
   ✓ Leveraging lower cost sites of service to enable growth of complex CV care at ANW
   ✓ Eden Prairie Integrated Practice Clinic
✓ **Physician Leadership and Clinical Insight**
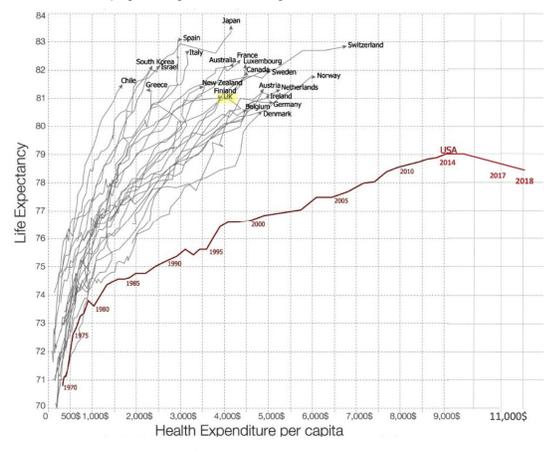
AllinaHealth ❤ MINNEAPOLIS HEART INSTITUTE

Minneapolis Heart Institute
Center for Healthcare
**Delivery Innovation**

4

Healthcare Spend and Life Expectancy

The United States is a significant outlier in healthcare spend per capita compared to life expectancy and the gap in spending between the US and comparable
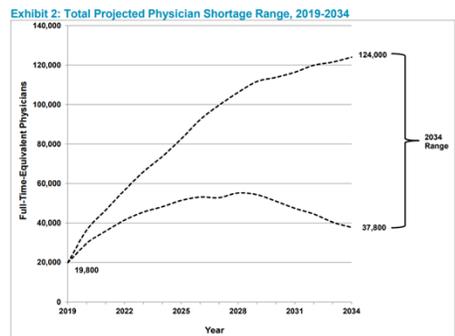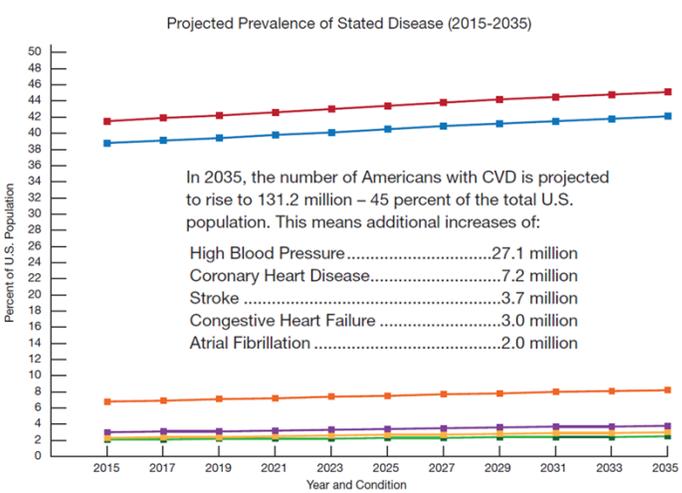

Since 1980, the gap has widened between U.S. health spending and that of other countries

Health consumption expenditures as percent of GDP, 1970-2019
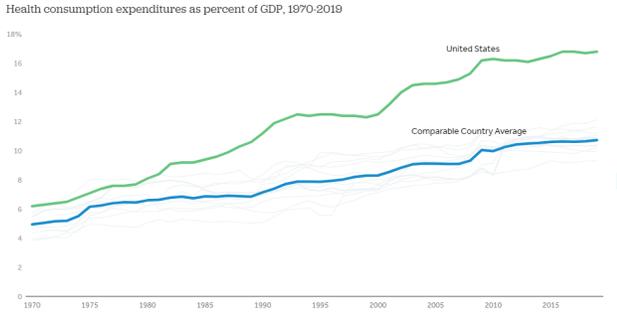
Allina Health | MINNEAPOLIS HEART INSTITUTE — HEART INSTITUTE

5

Projected Prevalence of CV Disease

Projected Prevalence of Stated Disease (2015-2035)

In 2035, the number of Americans with CVD is projected to rise to 131.2 million – 45 percent of the total U.S. population. This means additional increases of:

High Blood Pressure.............................27.1 million
Coronary Heart Disease.........................7.2 million
Stroke ....3.7 million
Congestive Heart Failure ....3.0 million
Atrial Fibrillation ....2.0 million

Exhibit 2: Total Projected Physician Shortage Range, 2019-2034

Allina Health | MINNEAPOLIS HEART INSTITUTE — HEART INSTITUTE

6

Cardiovascular Disease Market Dynamics

✓ The current US healthcare delivery system remains fragmented, costly, and reactive.

✓ Demographics are driving a growing demand for cardiovascular care.

✓ The growth of market disruptors creates potential for significant change.

   ✓ 22% growth in private equity and VC deals

   ✓ 38-fold growth in virtual health visits

   ✓ Virtual and home hospital care

   ✓ Patient focused digital health technologies

   ✓ Artificial Intelligence

✓ Increased focus on value-based reimbursement, risk sharing, and population health initiatives.

Allina Health ❄ MINNEAPOLIS HEART INSTITUTE

7

Allina Health Minneapolis Heart Institute: Market Dynamics

I — Assess the landscape

✓ By 2035, over 131M (45%) Americans will have CV Disease.

✓ 87% of healthcare spend is driven by clinical decisions around care.

✓ 33% of MN healthcare spend is for hospital care.

✓ Healthcare delivery is changing with transitions including the growth of virtual care, ambulatory and home hospital care, and value-based risk sharing.

✓ Population Health based payment reform requires complex data and analytics.

II — Envision the future

✓ Seamless care transitions across the CV continuum at all points of access to the Allina Health Minneapolis Heart Institute.

✓ Patient focused, digitally-supported, and data-driven optimal cardiovascular care from CV prevention to heart transplant.

✓ A population health focus through MHI's HDI Center for quality, innovation, and advanced analytics to reduce unnecessary variation in care.
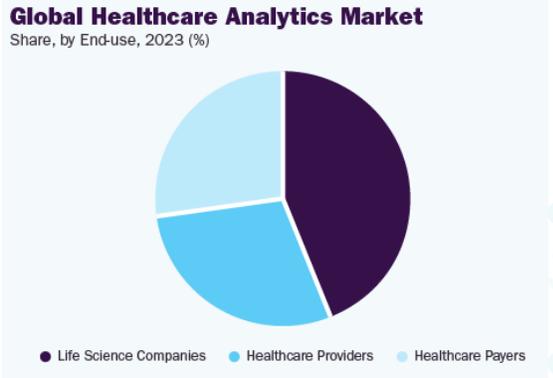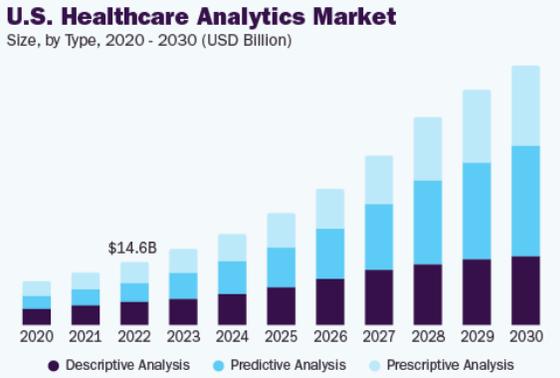
III — Emerging strategies

✓ 24/7 CV Coordination and Care Center with enhanced access to novel digital technologies.

✓ Expand CV ASC footprint for site of service transitions.

✓ Grow MHI's integrated clinic model, virtual/Tele-heart care, and access to sub-specialty care.

✓ Invest in and grow the proven impact of MHI's HDI Center.

Allina Health ❄ MINNEAPOLIS HEART INSTITUTE

8

Healthcare Analytics Market Growth

"As more healthcare organizations are coming to understand, the future of healthcare will rely on the broad and more effective use of their vast stores of data." Dan Burton, Health Catalyst CEO

U.S. Healthcare Analytics Market
Size, by Type, 2020 - 2030 (USD Billion)

$14.6B

2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
● Descriptive Analysis ● Predictive Analysis ● Prescriptive Analysis

Global Healthcare Analytics Market
Share, by End-use, 2023 (%)

● Life Science Companies ● Healthcare Providers ● Healthcare Payers

Allina Health ✣ **MINNEAPOLIS HEART INSTITUTE**

9

Healthcare Delivery Innovation – Advanced Analytics for Data-Driven Care

Minneapolis Heart Institute
**Center for Healthcare Delivery Innovation**

The rising costs of cardiovascular care coupled with our aging population create an imperative that MHI lead in the advancement and reform of cardiovascular care delivery. The MHI Healthcare Delivery Innovation (HDI) Center is a groundbreaking, data-driven cardiovascular model to focus on improving quality, reducing costs, decreasing unnecessary care variation, and improving clinical care across the continuum for the benefit of the communities we serve.

| POPULATION HEALTH MANAGEMENT	REDUCE CLINICAL VARIATION	TEST NEW PROCESSES OF CARE & PAYMENT MODELS	LEVERAGE CUTTING EDGE TECHNOLOGY
Improve health of the population through adherence to clinical guidelines across the continuum	Transform care delivery through the reduction of clinical variation	Transform care delivery by piloting new and creative processes and payment models	Explore new ways to efficiently care for patients
• Quantify the population needs and measure adherence to clinical guidelines • Develop strategies and tools to improve care access and efficiency	• Reduce unnecessary variation in clinical care • Standardize care pathways and protocols • Increase Value	• Build on existing best practice programs and protocols to improve quality and efficiency in care delivery • Develop and test new payment models	• Cardiomems Monitoring • TAVR, MitraClip • Linq • Digital Strategy

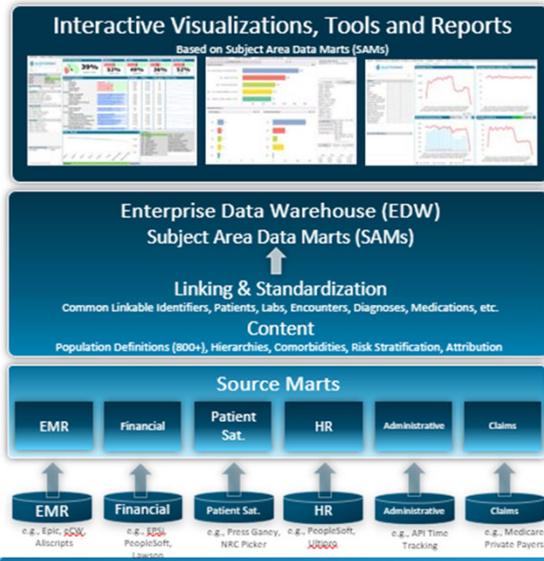Allina Health ✣ **MINNEAPOLIS HEART INSTITUTE**
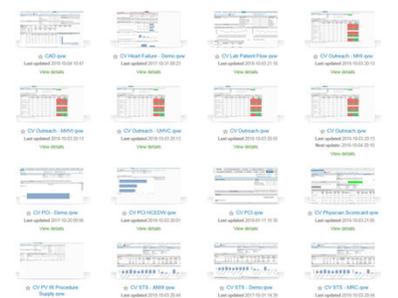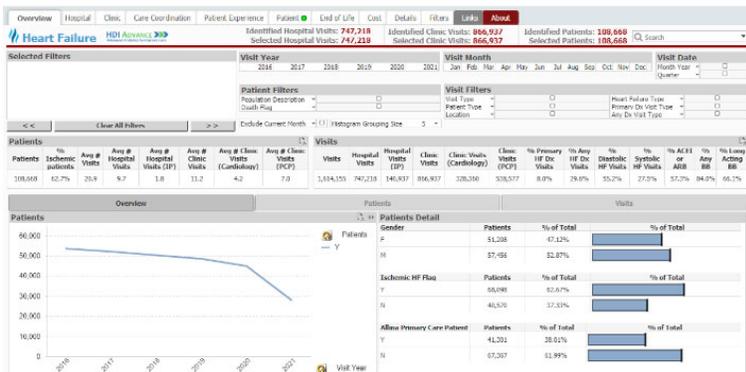
10
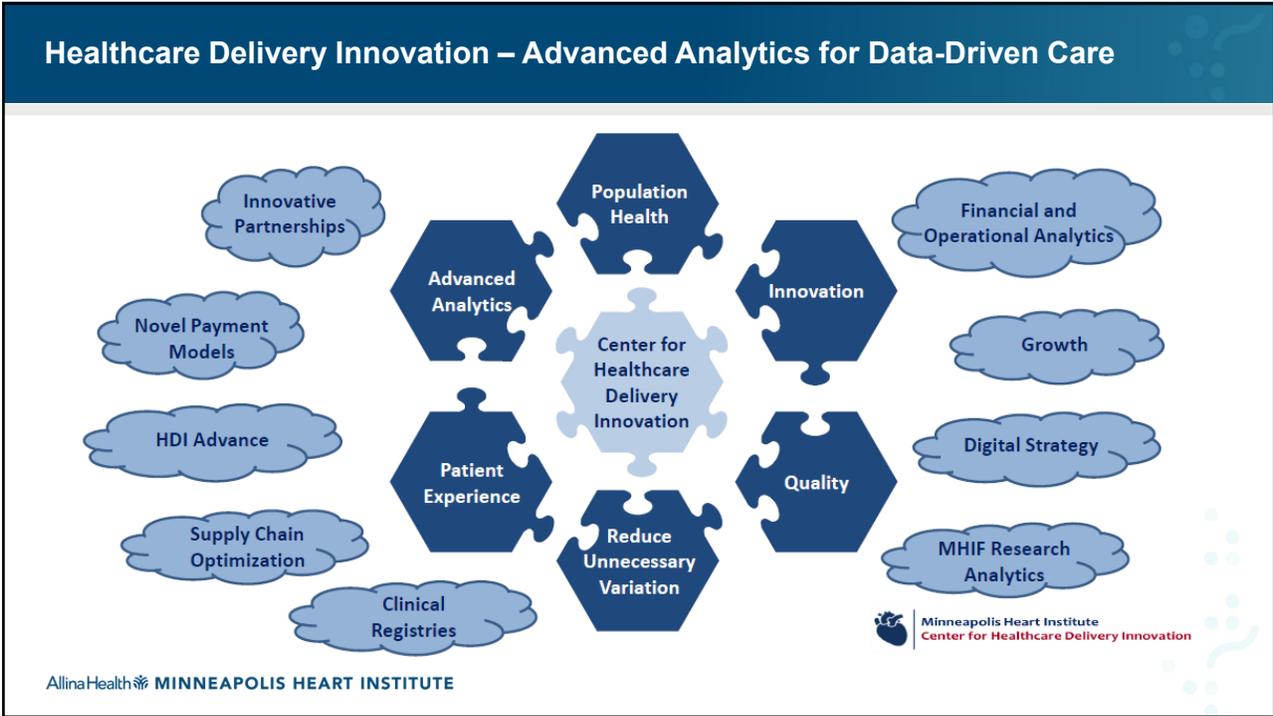
11
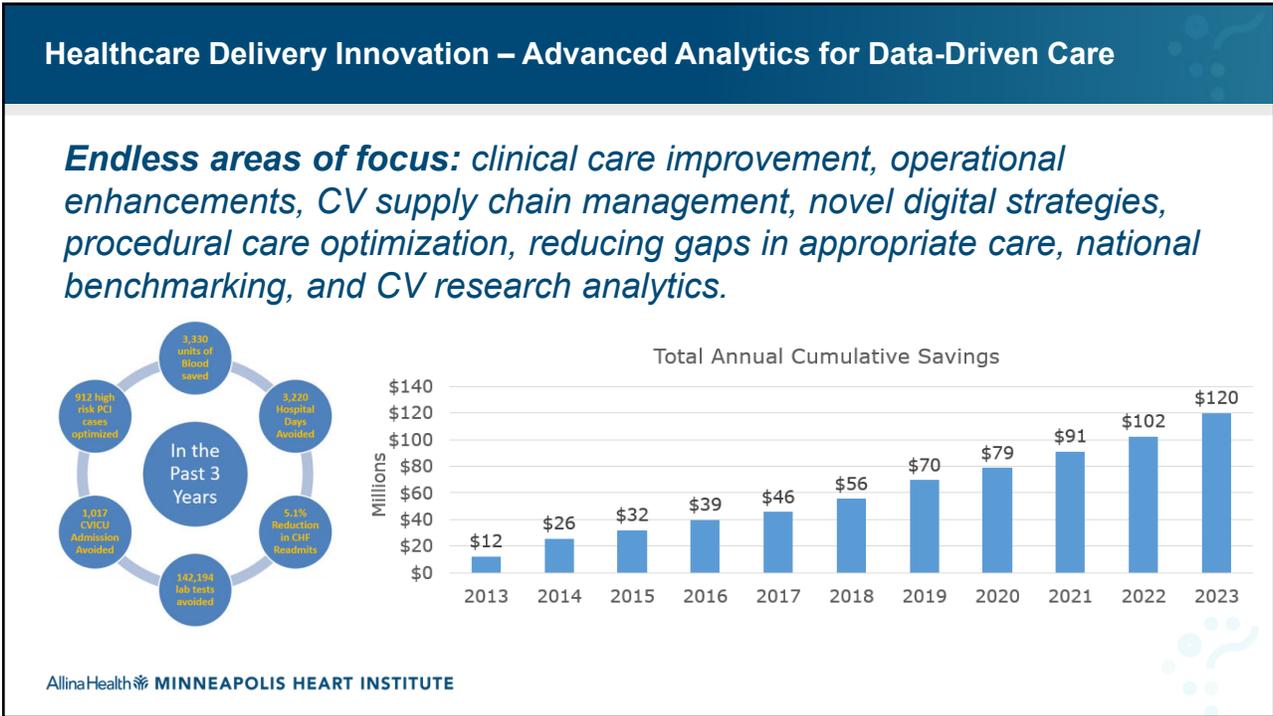
12

Enterprise Data Warehouse

- ✓ Allina and Health Catalyst partnership
- ✓ Epic systemwide EMR since 2005
- ✓ EDW data architecture links over 100 large data sources together:
  - ✓ Clinical, financial, payer, patient satisfaction, national registry and national benchmarking data
- ✓ Leverage data visualization tools to analyze and identify areas of opportunity
- ✓ Develop metrics, clinical protocols, and care delivery changes to optimize care, eliminate waste, and reduce unnecessary variation
- ✓ Closely track clinical and financial outcomes

AllinaHealth | MINNEAPOLIS HEART INSTITUTE | HEART INSTITUTE

Interactive Visualizations, Tools and Reports
Based on Subject Area Data Marts (SAMs)

Enterprise Data Warehouse (EDW)
Subject Area Data Marts (SAMs)

Linking & Standardization
Common Linkable Identifiers, Patients, Labs, Encounters, Diagnoses, Medications, etc.
Content
Population Definitions (800+), Hierarchies, Comorbidities, Risk Stratification, Attribution

Source Marts

| EMR | Financial | Patient Sat. | HR | Administrative | Claims |

EMR — e.g., Epic, ECW, Allscripts
Financial — e.g., EPSi, PeopleSoft, Lawson
Patient Sat. — e.g., Press Ganey, NRC Picker
HR — e.g., PeopleSoft, Kronos
Administrative — e.g., API Time Tracking
Claims — e.g., Medicare Private Payers

13

Dashboards for Clinical Care Management

Heart Failure	Champ AVG (n = 287)	National Averages in HF Registries and Trials*
Ace Arb Arni	93.80%	80.20%
Composite GDMT	71.10%	NA
Long-acting Beta Blocker	94.70%	81%
Spironolactone	74.10 %	58.8

*Registries and Trials:
CHAMP-HF 2015–2017   EMPEROR-REDUCED 2017–2019
US-PINNACLE 2013–2017   DAPA-HF 2017–2018
ESC-HF-LT 2011–2018

AllinaHealth | MINNEAPOLIS HEART INSTITUTE | HEART INSTITUTE

14

Minneapolis Heart Institute: Value of Data-Driven Analytics

✓ HDI outreach dashboard provides data-driven insight to optimize cardiovascular care and clinical outreach.

✓ Data analytics enables a focus on the deployment of providers to the communities with greatest need.

✓ Since 2017:
  - ✓ MHI increased the contribution margin per FTE day by **67%**.
 - ✓ MHI increased the total number of unique patients by **31%**.
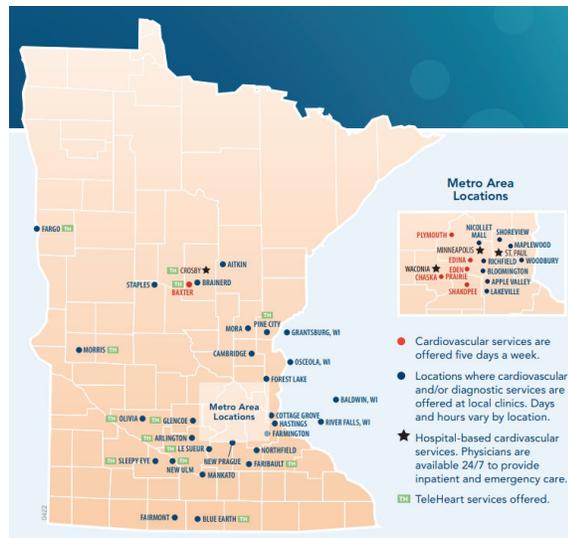
Allina Health ❄ MINNEAPOLIS HEART INSTITUTE

15

MHI Beyond 5: Delivering 24/7 Cardiovascular Care

✓Consistent access to high quality inpatient CV care throughout the weekend

✓Improve hospital efficiency

✓Reduce Inpatient length of stay (LOS)

✓Extend subspecialty services through the weekend

✓Improve the patient experience
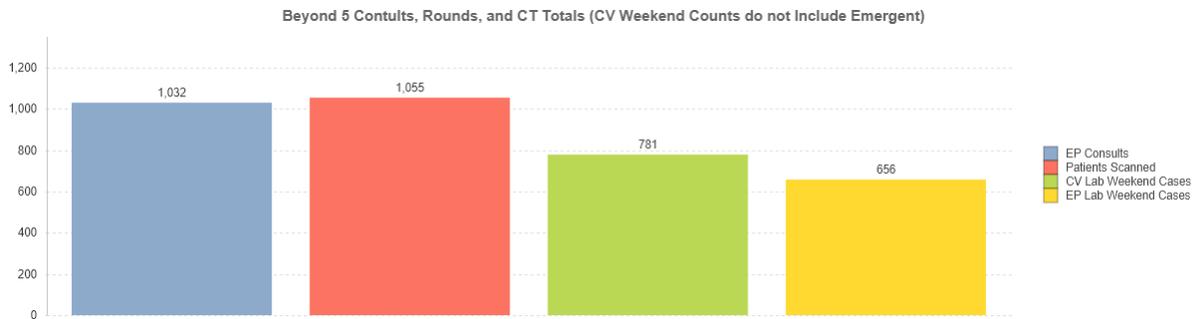
✓ Optimize utilization of high-cost infrastructure

Allina Health ❄ MINNEAPOLIS HEART INSTITUTE

"Billy and I are playing doctor. So far, I've kept him waiting three hours."
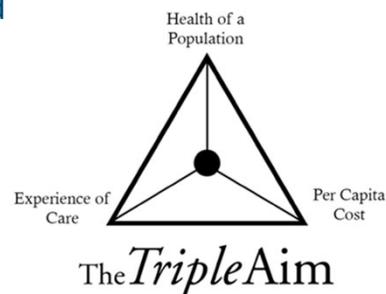
16

Capturing the Impact of Beyond 5

Since implementation in 2019, MHI's Beyond 5 program has delivered a financial net benefit of over $11M, avoided 1,838 inpatient hospital days, and expanded weekday CV procedural capacity.


Beyond 5 Contults, Rounds, and CT Totals (CV Weekend Counts do not Include Emergent)

Legend:
- EP Consults
- Patients Scanned
- CV Lab Weekend Cases
- EP Lab Weekend Cases

Values: 1,032 | 1,055 | 781 | 656

AllinaHealth ❄ MINNEAPOLIS HEART INSTITUTE

17

Optimal Care for Chest Pain

✓ Chest pain is the second most common presenting symptom at Emergency Departments across the US with over 8 million visits annually.

✓ In partnership with our ED providers, MHI developed a standardized protocol for CT coronary angiography in the evaluation of potential ACS presentations.

✓ Over the past 4 years, this program has *avoided 1,698 inpatient hospital days* and *avoided $7.8M in unnecessary healthcare spend* in support of our population health approach to cardiovascular care.

Health of a Population

Experience of Care — Per Capita Cost

The *TripleAim*
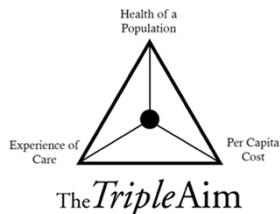
AllinaHealth ❄ MINNEAPOLIS HEART INSTITUTE
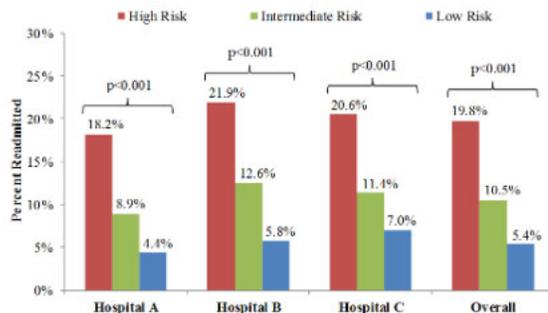
18

Optimal Care: Risk Stratification following acute MI

Risk stratifying acute MI patients enables appropriate post-hospital follow-up intervals to reduce re-admission.

19

Management of Supply Chain Costs

✓ CV achieved over $14M in net financial savings through supply chain management in 2023.
✓ CV Non-Labor Governance Committee reviewed over 110 product requests and assess each for clinical efficacy. 19% declined based on clinical need and pricing.
✓ 2021-2023 MHI's median TVC per case remain 28% lower than highest cost site

20

A Focus on Population Health

To effectively manage the growth in demand for cardiovascular care, we will need to focus on how we can best deliver care and value to our community in locations and care models that best meet our patient's needs.

✓ Direct clinical impact on the cardiovascular care of over 7,500 patients.

✓ A reduction of over $1.2M in direct patient care costs.

✓ A combined savings to commercial and government payers of over $4.2M.

Cardiology Curbside

Consult a cardiologist about your patient by calling Cardiology Curbside, a complimentary service from the Minneapolis Heart Institute.® A cardiologist is available to discuss:

- Questions on cardiovascular testing and EKG review
- Medical management issues
- Next steps or a second opinion for evaluation or treatment
- Facilitate a transfer for additional care

Allina Health ❀ MINNEAPOLIS HEART INSTITUTE

21

C5: Developing a Comprehensive CV Coordination Center

✓ 24/7 Comprehensive CV Coordination Center:

  ✓ Virtual inpatient and outpatient triage

  ✓ Cardiology curbside consultation

  ✓ Inpatient virtual cardiology consultation across Allina hospital and affiliate network

  ✓ Hospital at Home CV care management

  ✓ Provider to provider E-consults

  ✓ Remote patient monitoring and real-time care management

  ✓ Outpatient care coordination and scheduling optimization

  ✓ Management of predictive analytics to reduce unnecessary ED visits and hospitalizations

Allina Health ❀ MINNEAPOLIS HEART INSTITUTE

22

C5 KPI Impact Q1 2024

✓ Monthly increase in CV transfers:
  - ✓ Allina facility transfers: increased by 50%
  - ✓ Non-Allina facility transfers: increased by 67%

✓ Weekend sub-specialty consults and non-emergent procedures:
  - ✓ Inpatient EP consults: increased by 126%
  - ✓ Inpatient EP procedures: increased by 35%
  - ✓ Inpatient CV procedures: increased by 82%
  - ✓ Inpatient Advanced CHF consults: increased by over 36%

✓ Median CV GMLOS decreased from 128% of predicted to 111%.

✓ Median CMI increased from 2.74 to 2.84.

Allina Health ❤ MINNEAPOLIS HEART INSTITUTE

23

23

Developing an Integrated Practice Clinic

A focus on delivering clinical outcomes that matter to patients in a comprehensive care model that improves efficiency through technology, coordination, and advanced analytics to optimize value.

✓ "Healthcare does not have to be chaotic."

✓ "Patients and families should not have to worry about coordinating their own care."

✓ "Clinicians should not have to wonder who will provide the other services that their patients need."

" In IPUs, excellence is not defined by the performance of individuals, but instead by the expertise, integration, and coordination of a team with clinicians who can learn as a group from past performance and best practices."

NEJM Catalyst | Innovations in Care Delivery

ARTICLE

Integrated Practice Units: A Playbook for Health Care Leaders

Michael E. Porter, PhD, MBA, Thomas H. Lee, MD, MSc
Vol. 2 No. 1 | January 2021
DOI: 10.1056/CAT.20.0237

Allina Health ❤ MI MINNEAPOLIS HEART INSTITUTE HEART INSTITUTE

24

25

26

MHI Integrated Practice Clinic Eden Prairie

Visit Volumes

	All Clinic Visits	Physician Visits	APP Visits	New Visits	Established Visits	Phone/Video Visits	Teleheart Visits
ANGMA	9,673	9,673	0	721	6,515	1,619	818
MHI Eden Pr	11,638	7,814	3,824	2,594	7,823	752	469

✓ 33% of ANGMA patients are also seen by MHI Providers

✓ 40% of MHI Eden Prairie visits are covered under Allina Value Based Care agreements

✓ 56% of patients are covered by commercial insurance

✓ >88% of patients are connected to their Allina Health Account app

Imaging Volumes

MHI Eden Pr	CT Calcium Score	3,242
	CT Coronary Angiogram	537
	CT TAVR	316
	Stress Echo	247
	Echo (Excluding Stress)	3,343

AllinaHealth ❊ MINNEAPOLIS HEART INSTITUTE

27

MHI Integrated Practice Clinic Eden Prairie

✓ Small Group Patient education:
  - ✓ Atrial Fibrillation
  - ✓ Prevention / Coronary Artery Disease
  - ✓ Congestive Heart Failure
  - ✓ Story Health partnership for "health coach" longitudinal care

✓ Portable, handheld echocardiography for real time clinical assessment
  - ✓ Exercise physiologists trained in POCUS
  - ✓ Images submitted to US2 AI for automated, real-time interpretation

✓ Piloted voice enabled, AI technology to support optimal clinic visit documentation

✓ Developed a shared remote hypertension management program

✓ Exploring AI partnerships to pilot prioritizing clinic scheduling based on a patient's clinical status, completion of required studies, and urgency

AllinaHealth ❊ MINNEAPOLIS HEART INSTITUTE

28

Aortic Stenosis: Gaps in Optimal Care

The survival curves for patients with severe, symptomatic aortic stenosis who have (top) and have not (bottom) received definitive valve therapy.
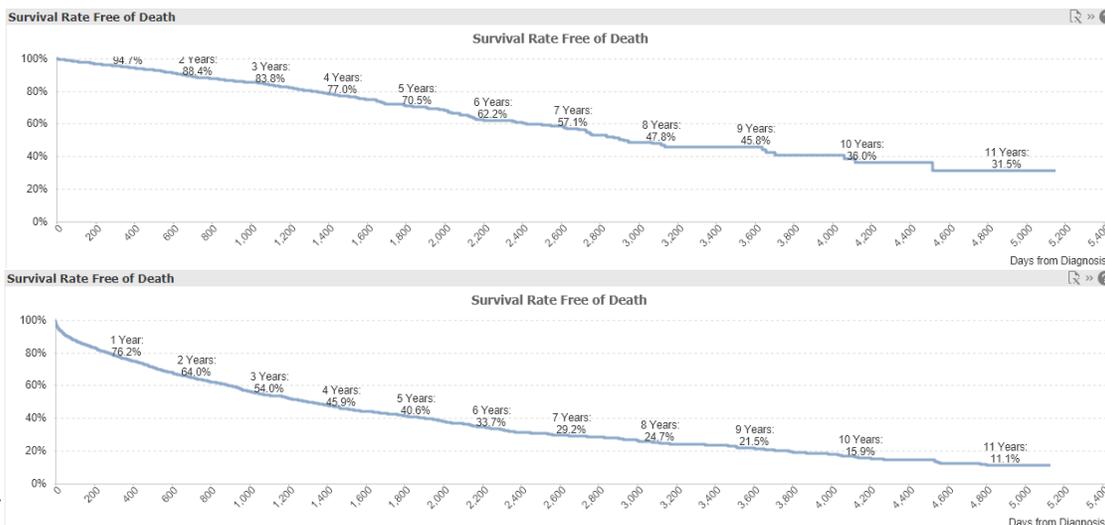
29

Aortic Stenosis: The cost of waiting

The cost of caring for patients with severe, symptomatic aortic stenosis increases with delays in definitive therapy. The two-year healthcare resource utilization for these patients increases by over 73% in patients with greater than 6 months from diagnosis to definitive therapy.
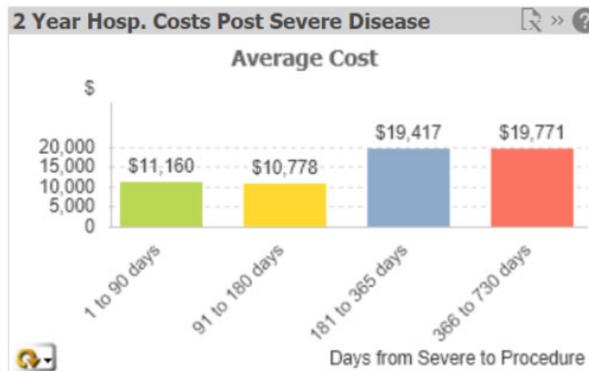

30

Investment in Cardiovascular Ambulatory Procedural Care

✓ **Consumer Focus:**
   ✓ Consumers of healthcare want ease of access, lower cost, and timely care

✓ **Payment Reform:**
   ✓ CMS has begun payment for PCI and implantable devices performed in an ASC
      ✓ CMS estimated moving 5% of coronary interventions from HOPD to ASC would reduce Medicare payments by $20M and beneficiary copays by $5M in its first year.
   ✓ Nationally, payers are beginning to require lower cost of care settings across CV imaging and procedural care.

Allina Health
MINNEAPOLIS
HEART INSTITUTE
Surgery Center
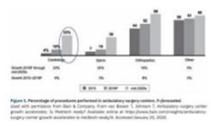
Allina Health MINNEAPOLIS HEART INSTITUTE

31

AI is a revolutionary technology powered by the growth of supercomputing speed and vast amounts of data from which to learn.

Allina Health MINNEAPOLIS HEART INSTITUTE

32

> Supercomputers can now perform as many calculations in a single second as one human could perform in over 31 billion years.

> Global annual data generation is increasing exponentially: 175 zettabytes in 2025.

> On DVD's, this amount of data storage would create a stack that circles the earth 222 times.

33

Artificial Intelligence: Transformative Technology

INFLECTION AI RAISES $1.3B
FUNDING LED BY MICROSOFT & NVIDIA

https://www.cnbc.com/video/2023/08/02/a-i-will-be-the-greatest-leap-forward-in-productivity-says-deepmind-co-founder-mustafa-suleyman.html

34

35

Current Opportunities

What is Artificial Intelligence?

- *AI is a machine's ability to perform the cognitive functions typically associated with human intelligence.*

- **Machine learning:** The development of algorithms by machines trained on large datasets that can detect patterns and adapt to new data to make predictions.

- **Generative AI:** AI models that generate detailed content in response to a prompt. These models are trained on the vast publicly available sources across the internet including books, images, news articles, Wikipedia, and scientific journals.

Allina Health ❖ MINNEAPOLIS HEART INSTITUTE


36

Current AI Opportunities in CV

➢ **Ambient AI for Clinical Documentation**: AI can translate and summarize the conversation between clinician and patient.

➢ **Echo Analysis and Interpretation**: AI can identify cardiac structures, measure chamber sizes, and assess cardiac function with speed and accuracy.

➢ **Arrhythmia Detection**: smartwatches and patches use AI to detect irregular cardiac rhythms which can aid in earlier diagnosis and treatment.

➢ **Advanced Cardiac Imaging**: AI can assist in analyzing and interpreting cardiac CT's, MRI's, and invasive coronary angiograms to identify and quantify abnormalities with greater precision and in less time.

AllinaHealth ⚕ MINNEAPOLIS HEART INSTITUTE

37

Future AI Opportunities in CV:

- Early disease detection and risk assessment
- Multi-modal predictive analytics
- Novel drug discovery and development
- Personalized treatment planning
- Resource optimization
- Patient engagement and education
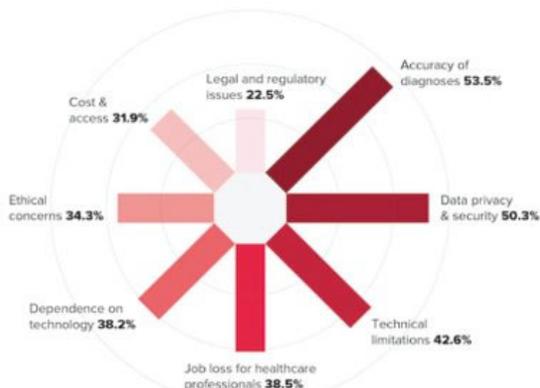- Quality improvement
- Telemedicine
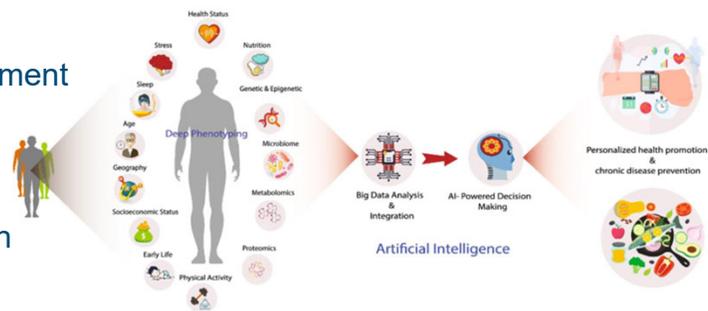
AllinaHealth ⚕ MINNEAPOLIS HEART INSTITUTE

38

AI Risks in CV

- Data privacy and security
- Data quality
- Bias and fairness
- Regulatory and Ethical issues
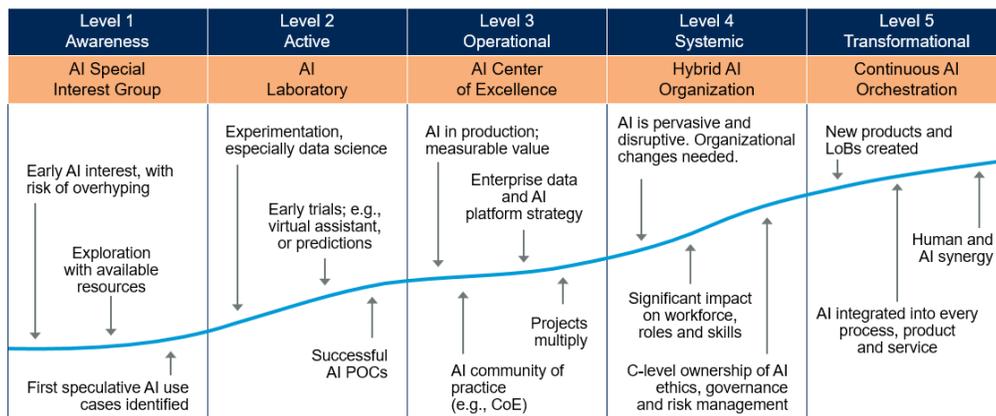- Over-reliance on AI "black box"
- Clinical validation
- Technical challenges

AllinaHealth ✦ MINNEAPOLIS HEART INSTITUTE

39

AI Governance

AllinaHealth ✦ MINNEAPOLIS HEART INSTITUTE

40

AI Opportunities Are Everywhere

Cleerly's AI software for noninvasive FFR estimates receives a Category 1 CPT code

The company officially launched its Cleerly ISCHEMIA software for delivering noninvasive evaluations of CCTA exams in early 2024. This update provides a closer look at the software from a billing perspective.

Leveraging AI and wearables for enhanced cardiac rehabilitation monitoring

NYU Grossman School of Medicine researchers used artificial intelligence and wearable activity trackers to improve the monitoring and classification of older adult cardiac rehabilitation patients.
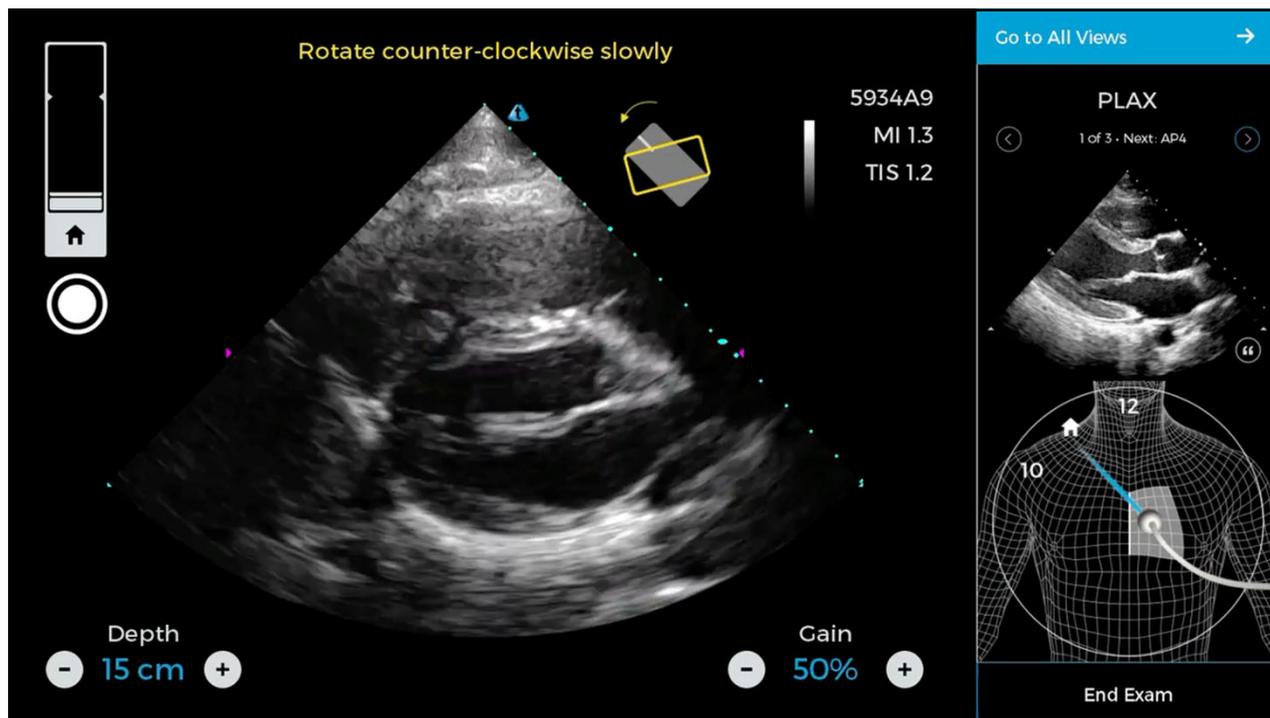
AI-powered risk score predicts how heart failure patients will respond to loop diuretics

New research out of Texas could go a long way toward improving care for patients with acute decompensated heart failure.
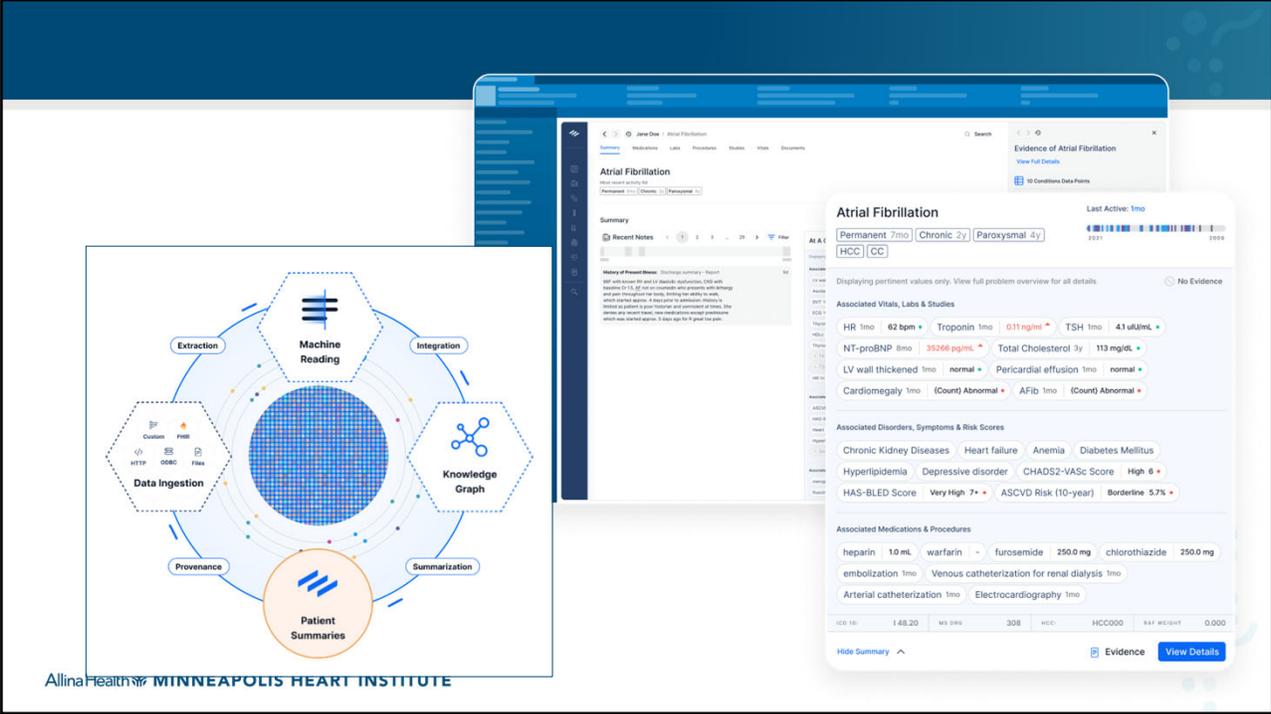
Allina Health ❦ MINNEAPOLIS HEART INSTITUTE

41

42

43

44

Collaborative Intelligence

Artificial intelligence really needs to be renamed *"collaborative intelligence,"* because it is really a collaboration between a human doctor and the machine to leverage the best abilities both have to offer to improve patient care and efficiencies in healthcare.

Ami Bhatt, MD
Chief Innovation Officer, American College of Cardiology (ACC)
Adult Congenital Heart Disease Cardiologist, Mass General Hospital

Allina Health ❄ MINNEAPOLIS HEART INSTITUTE

45

"The Development of AI is as fundamental as the creation of the personal computer. It will change the way people work, learn, and communicate – and transform healthcare. AI is already being used to improve how diseases are detected and diagnosed. In the future, it will help accelerate research breakthroughs and make accurate, reliable medical advice available to those who never get to see a doctor."

- Bill Gates

Allina Health ❄ MINNEAPOLIS HEART INSTITUTE

46

46

What is Possible with Robust Data Analytics and Clinically Driven Insight:

✓ **Data driven insights to guide strategic investments**
  - ✓ Joint Venture Partnerships, CV dedicated ASC, optimizing outreach clinic network

✓ **Reduce unnecessary variation in care, drive clinical care improvements**
  - ✓ Reducing gaps in care in patients with valvular heart disease
  - ✓ Development of E-consults
  - ✓ Management of supply chain costs per case

✓ **Strategic investments in Value Based Care Arrangements and AI Tech**
  - ✓ Leveraging lower cost sites of service to enable growth of complex CV care at ANW
  - ✓ Eden Prairie Integrated Practice Clinic

✓ **Physician Leadership and Clinical Insight**

AllinaHealth ❄ MINNEAPOLIS HEART INSTITUTE

Minneapolis Heart Institute
Center for Healthcare
Delivery Innovation

47

AllinaHealth ❄ MINNEAPOLIS HEART INSTITUTE

48