



**Intermountain
Health**

iCARE - An Innovative Study Setting a New Bar for Pulmonary & Respiratory Care Intelligence

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Conflict of Interest

I have no real or perceived conflict of interest that relates to this presentation. I do not endorse any specific product. I am a:

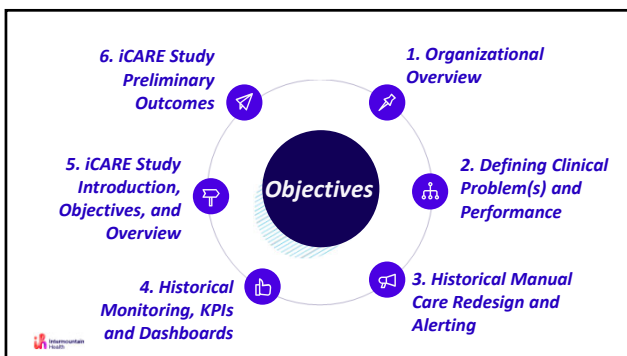
Former Board Chair, Utah Division of Professional Licensing
Former Board Member, American Association for Respiratory Care
Board Chair, Utah Tobacco Free Alliance

- Member, Society for Anesthesia and Sleep Medicine
 - Member, American Thoracic Society
- Member, National Patient Safety Foundation
- Member, American College of Respiratory Therapy Education
- Member, Health Care Compliance Association



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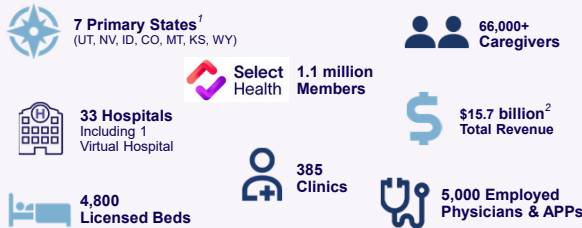
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Organizational Overview Intermountain Health



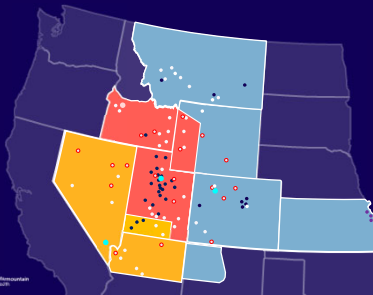
Intermountain Health by the Numbers



¹Intermountain also provides air medical transport services in other states through Classic Air Medical.
²Revenue for the trailing 12 months ended October 31, 2023.

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Intermountain Health Regions

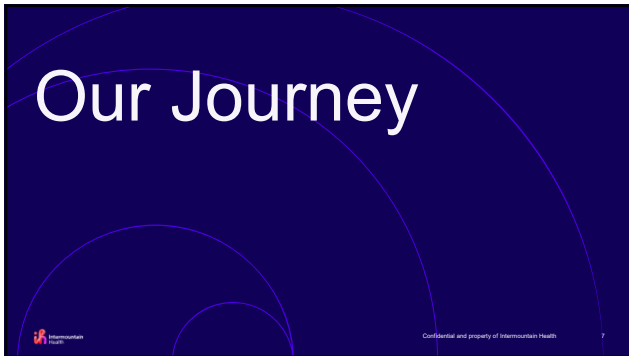


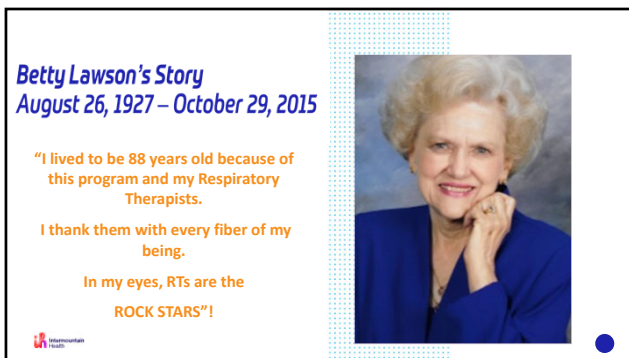
Desert Region: Nevada, Arizona, and S. Utah
Canyons Region: N. Utah, Idaho and W. Wyoming
Peaks Region: Colorado, Kansas, E. Wyoming, Montana, and New Mexico

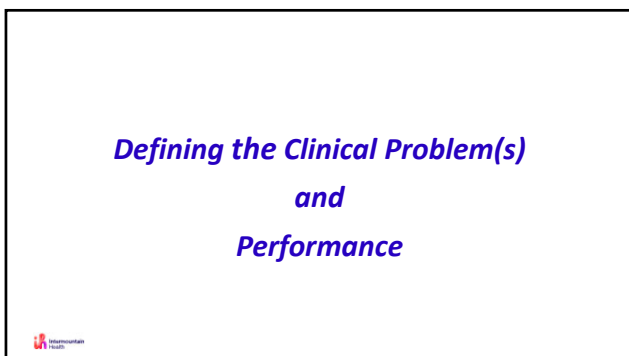
- Hospitals
- Region HQ
- Affiliate/Outreach Partnerships
- Classic Air Medical Bases
- Legacy SCL Health partner clinics



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2015-2018 Abstract Publications/Presentations

Intermountain Healthcare
A BASELINE REVIEW OF COPD FREQUENT FLIERS AT 22 HOSPITALS WITH TWO YEARS IN REVIEW
Kim Remington MBS BSKT RRT CHC, Jeff Craghead MBA, Mark Hodgkinson MBA & Steven Alghatalah MBA RRT

Intermountain Healthcare
CASE STUDY: COPD BRONCHECTASIS PATIENT OUTCOMES OF BASELINE VS THREE AIRWAY CLEARANCE TECHNIQUES (ACT)
Kim Remington MBS BSKT RRT CHC

Intermountain Healthcare
Adult Inhaled Medication Delivery and Inspiratory Flowrates
A Pulmonary Disease Navigator's Findings Among Medically Complex Patients
Kim Remington MBS, RRT CHC, Scott David RRT, Erika Wilson RRT, and Tamera Steele RRT

Intermountain Healthcare
What Pulmonary Function Testing (PFT) Frequency is Recommended for COPD Patients?
Kim Remington MBS, RRT CHC, Erika Wilson RRT, and Tamera Steele RRT

The COPD Playbook

Executive Summary

The Respiratory Care Clinical Services Line (RCSL) conducted an assessment of current evidence regarding the care of Chronic Obstructive Pulmonary Disease (COPD) patients. The assessment included an audit of 2015-2017 patient care across all "Respiratory Hospital Unit" COPD patients. The results of identified gaps and work to date are reported in this table below. The detailed results of the audit review are reported in a subsequent section of this report.

COPD Respiratory Care Proposal Status to Date
Original report published: 2018, updated report by RCSL, last by RCSL: October 26, 2018, revised by RCSL: December 2018, December 2019

Proposal	Current Status	Next Steps	Target Date
Identify MD champion	Completed	Identify MD champion	3/2017
Implement COPD Exacerbation Protocol (all hospitals)	Completed	Implement COPD Exacerbation Protocol (all hospitals)	4/1/2015
Monitor Protocol Utilization	Completed	Monitor Protocol Utilization	4/1/2015 & ongoing
PFT result EMR integration	Manual process implemented	PFT result EMR integration	2018
COPD Playbook Creation	Completed	COPD Playbook Creation	2015
PDN Pilot Implementation	Q4 2016	PDN Pilot Implementation	Q4 2016

Intermountain Health 2018 Leadership Summit

Intermountain Healthcare
Pulmonary Disease Navigators Impact on Chronic Obstructive Pulmonary Disease Patient Care
The Respiratory Care Clinical Services Line (RCSL) conducted an assessment of current evidence regarding the care of Chronic Obstructive Pulmonary Disease (COPD) patients. The assessment included an audit of 2015-2017 patient care across all "Respiratory Hospital Unit" COPD patients. The results of identified gaps and work to date are reported in this table below. The detailed results of the audit review are reported in a subsequent section of this report.

Intermountain Health 2018 Leadership Summit

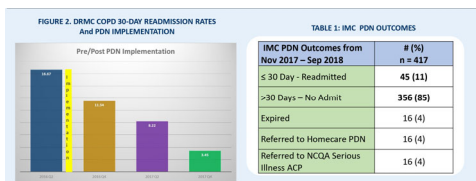


TABLE 1: IMC PDN OUTCOMES

IMC PDN Outcomes from Nov 2017 – Sep 2018	# (%)
≤ 30 Day - Readmitted	45 (11)
>30 Days – No Admit	356 (85)
Expired	16 (4)
Referred to Homecare PDN	16 (4)
Referred to NCQA Serious Illness ACP	16 (4)

- CONCLUSION**
- Intermountain Disease Navigators (PDN) can help close care gaps in COVID patients and improve care coordination leading to better patient outcomes and timely referrals.
 - Processes for PDN implementation for the nation's in progress to provide extension resources to physicians and their patients.
 - Patients, their families and members of the healthcare team may benefit from detailed, timely, coordinated interventions that are guided by Respiratory Therapists under the general supervision, direction & orders of physicians.

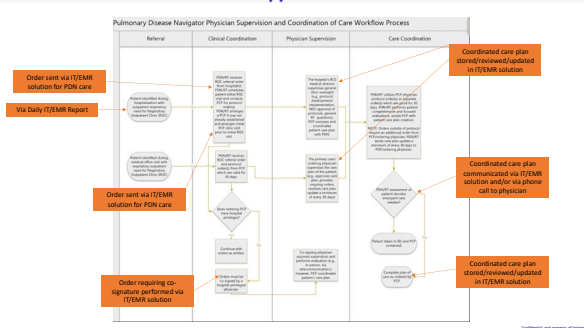


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Historical Manual Care Redesign & Alerting



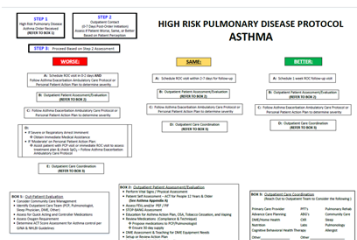
EMR Flowchart Support for PDN/ROC Patients



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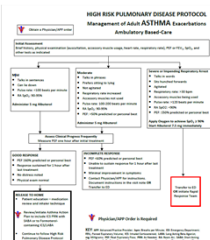
Asthma Adult Ambulatory Exacerbation Protocol



REPRODUCTIVE CASE INVENT CASE PLAN CHECKS
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Asthma Adult Ambulatory Exacerbation Protocol



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Asthma Adult Ambulatory Exacerbation Protocol

HIGH RISK PULMONARY DISEASE PROTOCOL Adult Management of Asthma Ambulatory Exacerbations

ASTHMA - Appendix A

Asthma Control TestTM (ACT) for people 12 yrs and older.

The ACT is:

- A simple, 5-question test that is self-administered by the patient.
- Designed to be the national standard of asthma control.
- Used to identify patients who are not well controlled and need more treatment.

Step 1 Write the number of each answer in the score box provided.

Step 2 Add the score boxes for your total.

1. In the last 4 weeks, how often have you had asthma symptoms that interfere with your normal activities?	0 = Never	1 = Sometimes	2 = Often	3 = Always
2. In the last 4 weeks, how often have you had asthma symptoms that interfere with your normal activities?	0 = Never	1 = Sometimes	2 = Often	3 = Always
3. In the last 4 weeks, how often have you had asthma symptoms that interfere with your normal activities?	0 = Never	1 = Sometimes	2 = Often	3 = Always
4. In the last 4 weeks, how often have you had asthma symptoms that interfere with your normal activities?	0 = Never	1 = Sometimes	2 = Often	3 = Always
5. In the last 4 weeks, how often have you had asthma symptoms that interfere with your normal activities?	0 = Never	1 = Sometimes	2 = Often	3 = Always

If the score is 19 or less, patient's asthma may not be controlled as well as it could be.

REPRODUCTIVE CASE INVENT CASE PLAN CHECKS
REPRODUCTIVE CASE INVENT CASE PLAN CHECKS
REPRODUCTIVE CASE INVENT CASE PLAN CHECKS

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Historical Monitoring KPIs & Dashboards



2019 – 2020 St George Hospital Pilot Study: Manual Patient Physiologic Monitoring

RPM with:

- Pulse Ox
- Inspiratory Flow Meter
- PFT Screener (FEV1)



- Of 53 trial patients, (2%) patient enrolled in the study was readmitted to the hospital within the year.
- Compared to a patient identifying worsened cough, shortness of breath, or mucous production, a drop in the FEV1 by 10% was noted on average 3 days prior to patient reporting.



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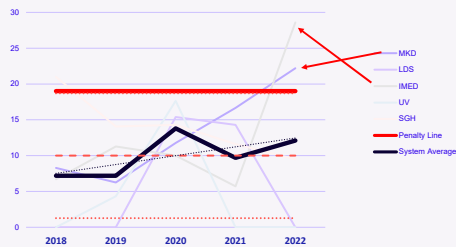
Manual Continuous Monitoring: COVID Hospital Readmissions

IMED:

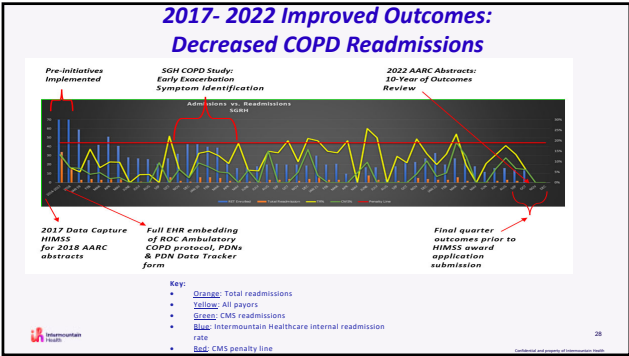
- Highest level of care
- Post-COVID "Long-haulers"
- PDNs pulled to units during pandemic

MKD:

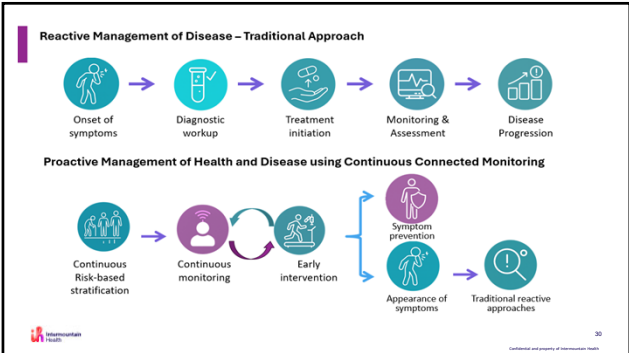
- No pulmonology presence
- RCS leadership change
- PDNs pulled to units during pandemic



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**iCARE Study Introduction,
Objectives,
and
Overview**



Primary iCARE Study Objective: Decrease Hospital Readmissions

PRIMARY STUDY OBJECTIVE
decrease 30-day hospital readmission



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Six Secondary Study Objectives

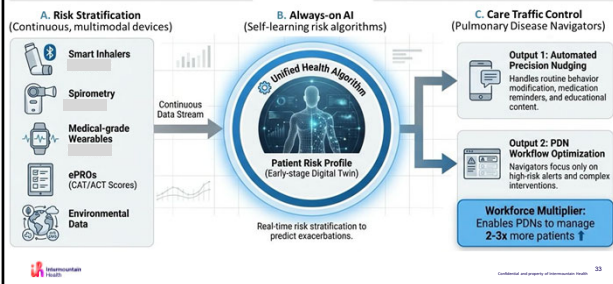
To validate:

- Predictive intervention rather than reactive care
- Multimodal risk signal integration
- Digital twins can be applied to scale
- Comprehensive monitoring is possible remotely and precisely
- Technology-augmented human care model
- Patient engagement with digital health twins



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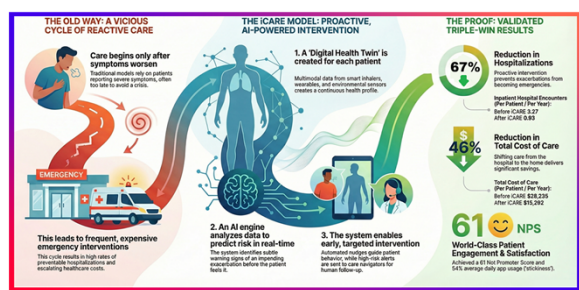
Mechanism: Proactive Remote Intervention



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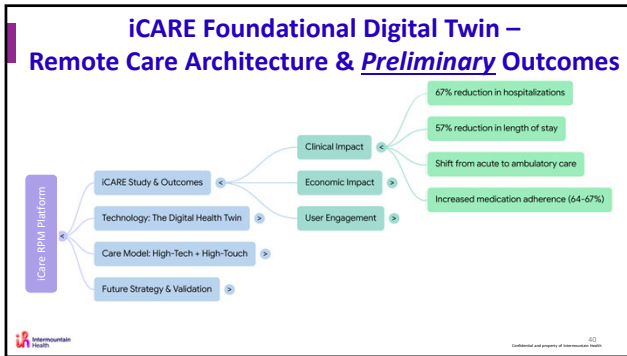
iCARE Study
Preliminary
Outcomes
(March 2024-August 2025
697 enrolled patients)

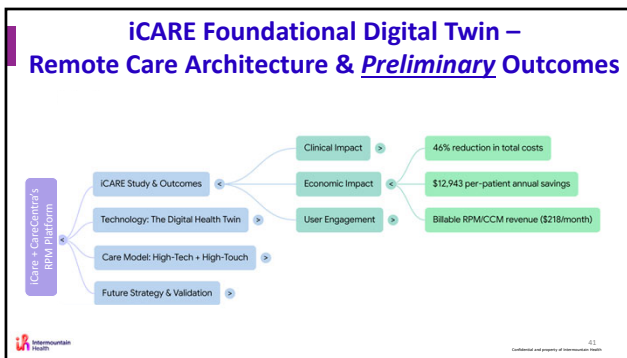


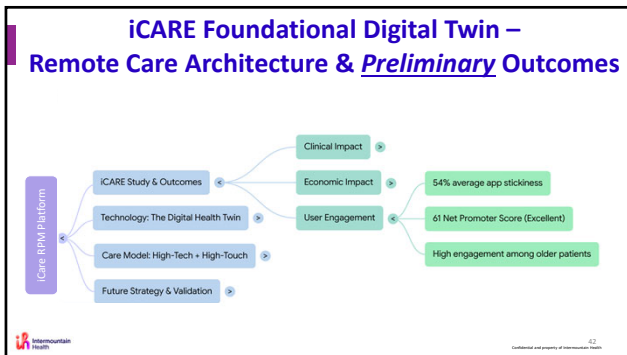
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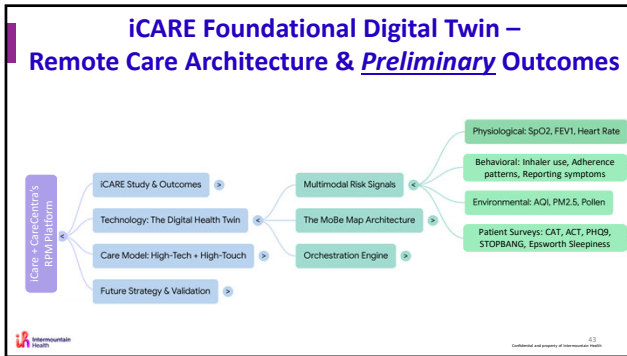
iCARE Foundational Digital Twin – Remote Care Architecture & Preliminary Outcomes

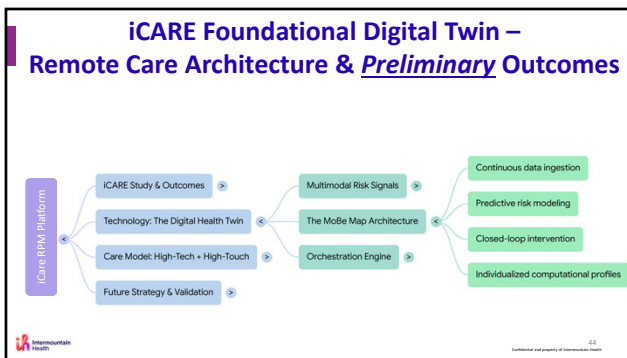


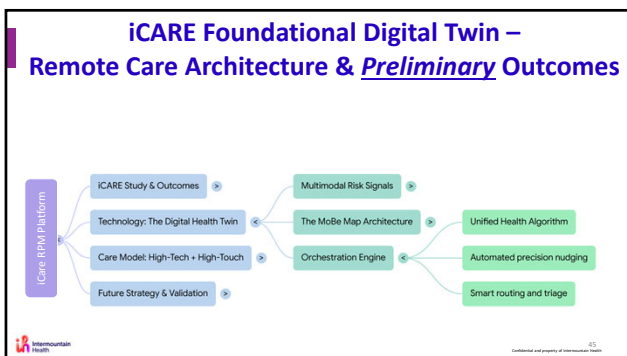


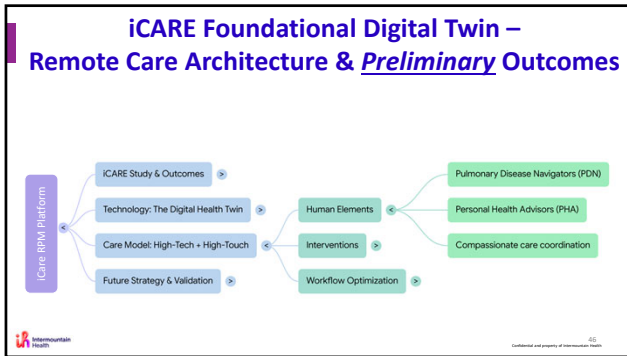


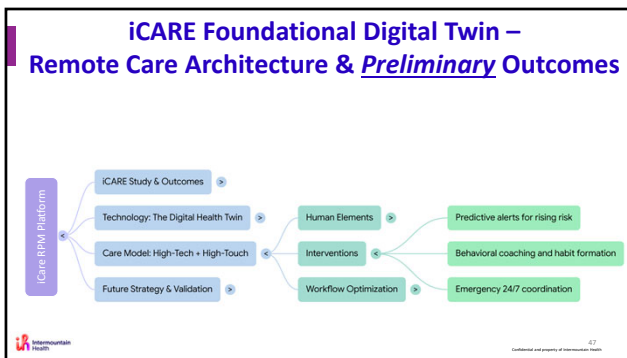


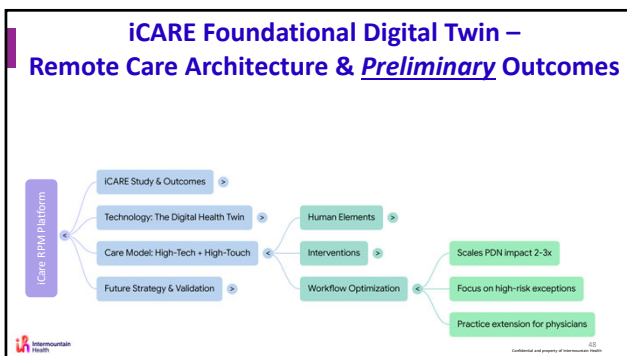




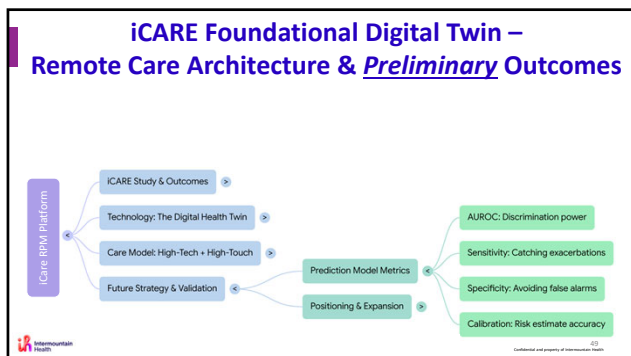




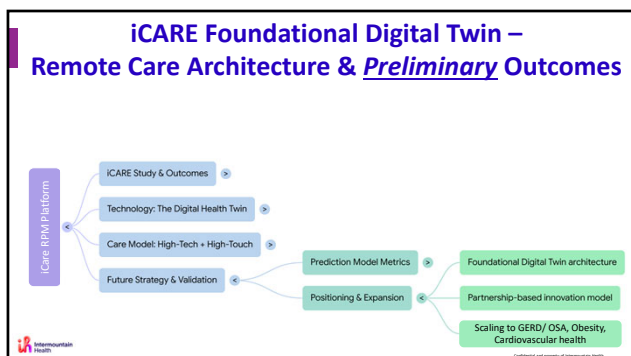




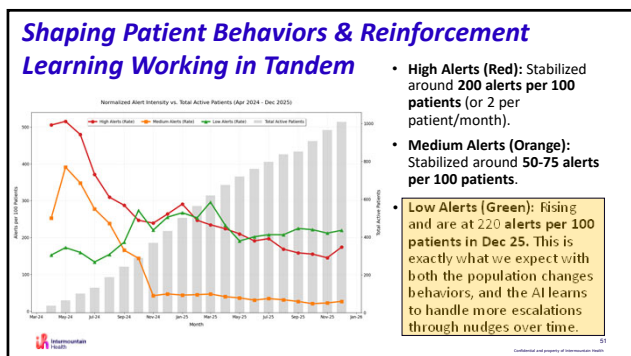
iCARE Foundational Digital Twin – Remote Care Architecture & Preliminary Outcomes

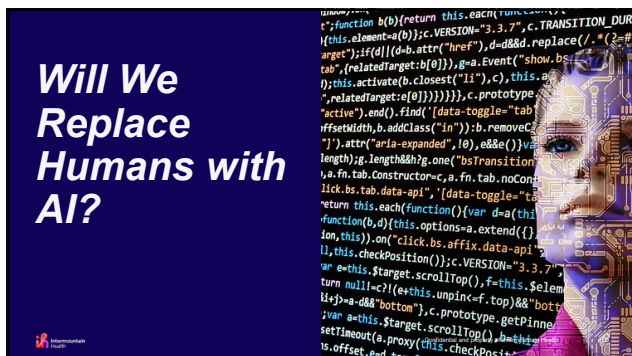


iCARE Foundational Digital Twin – Remote Care Architecture & Preliminary Outcomes



Shaping Patient Behaviors & Reinforcement Learning Working in Tandem





Argument One: Human Judgement, Not AI, Stratified Clinical

- High Touch alerts showed **highly significant differences** ($p < 0.0001$) across both COPD disease severity (GOLD A/B/E) and Asthma control levels (6 GINA phenotypes)
- AI Agents/Algorithms alerts showed **NO significant differences** across any disease groups (designed to depend on human judgement)

Bottom Line: PDN clinical judgment is what differentiates high-risk from low-risk patients. Algorithms alone cannot replicate this capability.



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Argument Two: Human Touch Achieved Statistically Significant Clinical Outcomes

- 153 fewer exacerbations prevented
- Strongest results in GOLD B COPD (45.8% reduction) - the group most responsive to human **coaching and intervention**
- Net reduction of **\$1.5M - \$2.3M in healthcare costs** (estimating \$10K-\$15K per exacerbation)

Bottom Line: The human touch isn't a "nice to have" - it's the intervention that drove 67% fewer hospitalizations.



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Argument Three: Complex, High-Burden Patients Need PDN Personalization

- **38% of ALL exacerbations** came from just 3 patient phenotypes:

- Age 61-70 × Uncontrolled -HR Asthma: **835 exacerbations**
- Age 61-70 × GOLD E COPD: **717 exacerbations**
- Age 71-80 × GOLD E COPD: **1,000 exacerbations**

Bottom Line: The highest-cost, highest-risk patients require PDN expertise to navigate complex comorbidities, coordinate care, and personalize interventions.



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Summary: Human Touch Impact

Metric	Finding	Statistical Significance	Clinical Implication
High Touch Alerts	Stratified risk across disease severity	p<0.0001 ***	PDN judgment identifies truly high-risk patients
Exacerbation Reduction	37.2% overall reduction	p<0.01 **	Human-touch program prevents hospitalizations
GOLD B COPD	45.8% reduction	p=0.0028 **	Coaching-responsive group shows best outcomes
OSA + Asthma	Only 27.3% reduction	p=0.252 ns	Complex patients need enhanced PDN support
Ultra-high-risk profiles	38% of all exacerbations	---	Highest-cost patients require personalized care



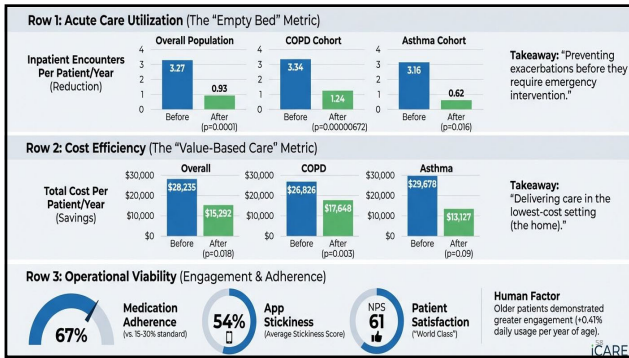
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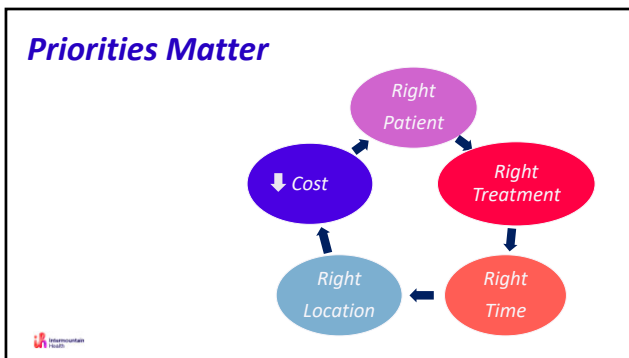
Replacing the PDNs Would Be Like...

- “Shutting off a plane’s engine after it is airborne.”
- “AI can identify the trajectory of risk using thousands of parameters quickly that human beings cannot read...BUT, to manage the trajectory of risk, bend it back, arrest its progression, or slow it down, you need a human expert.”
- “It is like the ‘check engine’ light on your dashboard. Machine intelligence can tell you something is wrong with the carburetor or the fuel pump. You need the mechanic to do something about it.”



---Vasant Kumar 57







Meet Our Pulmonary Disease Navigators

- ❑ Intermountain Medical Center: Megan Hepworth
- ❑ St. George Medical Center: Tammy Stucki
- ❑ Utah Valley Hospital: Calie McDonald & Megan Washburn
- ❑ LDS Hospital: Terilyn Stapley
- ❑ McKay-Dee Hospital: Stephanie Moser



Questions



Thank you!

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