Introduction to Humber River Health

CHIEF Visit
October 30, 2024
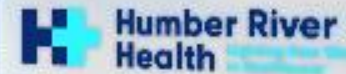
Dr. Peter Bak
Chief Information Officer

HRH 752 beds of care | 1,100 Beds Open Across 3 Sites

October 2015
Wilson site – 656 beds opened

December 2017
Finch RCC
230 beds

Partners Include
Mackenzie Health
Markham Stouffville
Southlake
North York General

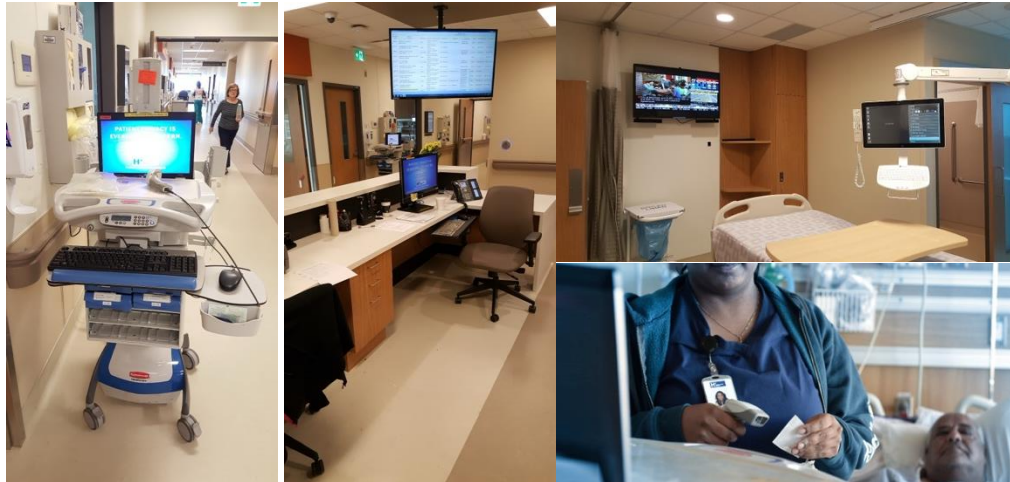December 2018 May 2019
Church RCC –
214 beds opened

Partners Include
Sunnybrook
Southlake
William Osler
Trillium
St. Joseph's (Unity)

Humber River Health Lighting New Ways in Healthcare™

Humber River Hospital is Highly Digital

Robotics and Automation

Clinical Command Centre

EMRAM 6++

Humber River Health
Lighting New Ways in Healthcare

World Class Energy Efficiency

Figure 1.
Greening Health Care international benchmarking of acute care hospitals' 2018 energy use*

#2 Humber River Hospital

*Hospitals over 100,000 sf and data screened for apparent errors.

Weather normalized to Toronto, Ontario.
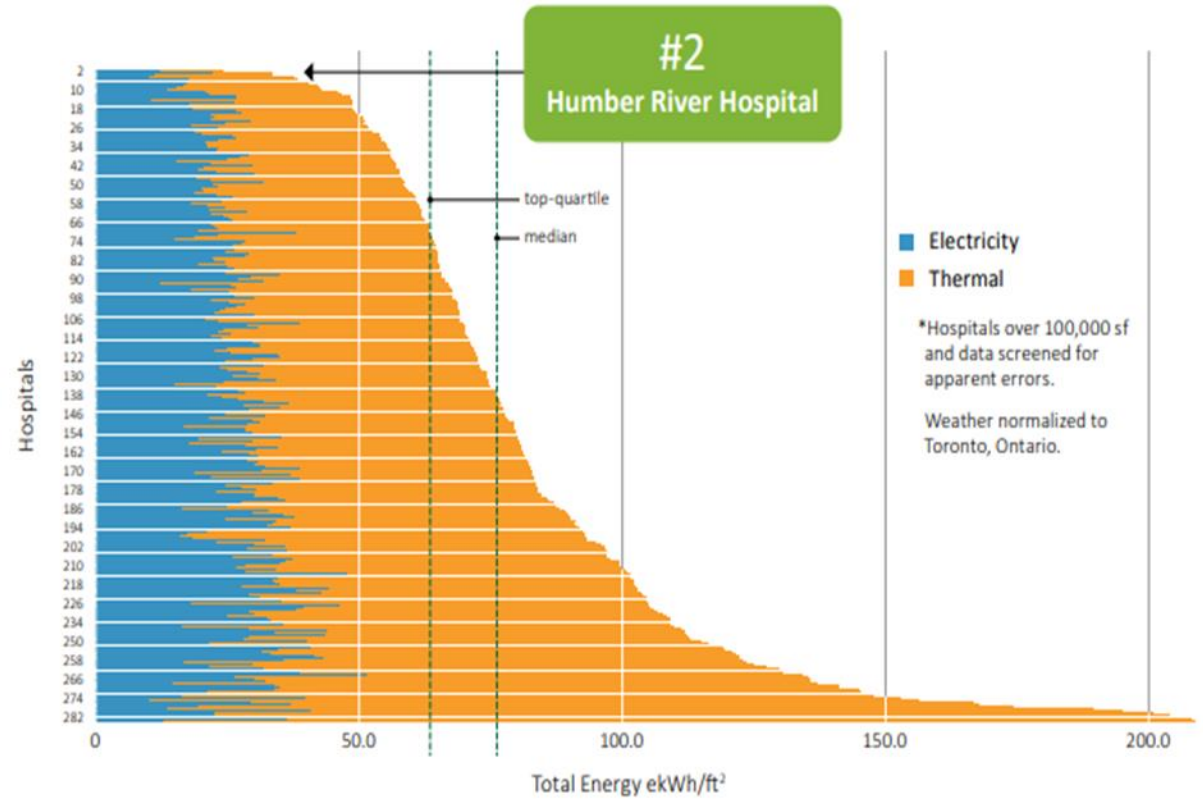
FTE Transport of Products – Reduction

84.2 % Automation

164.8 km/day

24.6 FTE

$ 2,500,000 Annual Savings

Humber River Health
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Nurse : Patient Ratios

Old Inpatient Unit

New Inpatient Unit

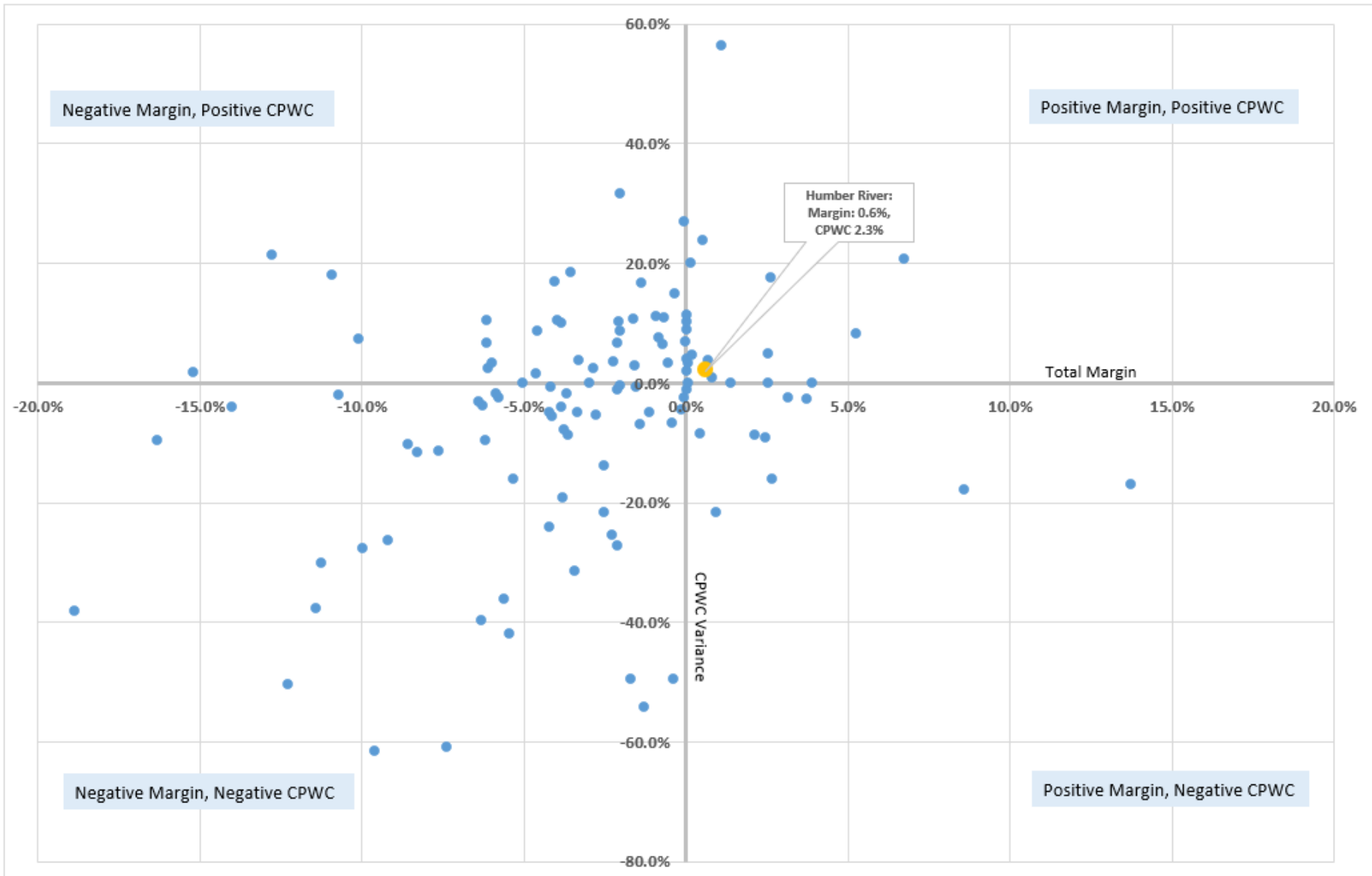| Old Inpatient Unit	New Inpatient Unit
34 Bed Unit	**32** Bed Unit
11,100 SF	**28,000** SF
1 Nurse to **5** Patients Staffing Ratio	**1** Nurse to **5** Patients Staffing Ratio
326.5 SF / Bed	**875.0** SF / Bed

With a result of a 168 % increase in SF/Bed with no increase in nursing staff

Humber River Health Lighting New Ways in Healthcare™

Results: Elimination of Agency Nursing at HRH

Agency Nursing Hours per month at Humber River Hospital
January 2018 - June 2023

3383

1317

725

403

25   **0**

Actual Hours
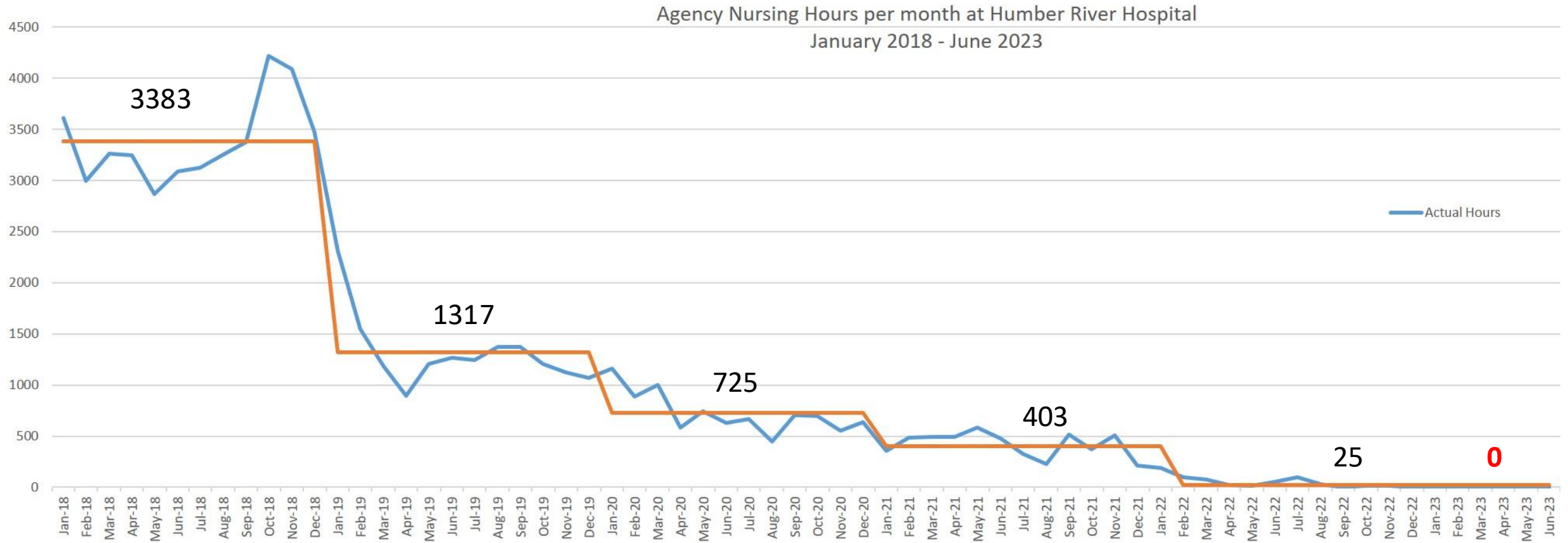
Satisfaction Results

PATIENTS

WOULD YOU RECOMMEND THIS HOSPITAL TO FAMILY AND FRIENDS

Humber River Health 84%

Ontario 70%

Canada 68%

OVERALL HOSPITAL EXPERIENCE

72% **Humber River Health**

64%   Ontario

64%   Canada

EMPLOYEES

WHERE WE ARE EXTRAORDINARY:

CPR — I find my values and the organizations' values are similar (compassion, professionalism, and respect): **80% agreement**

I understand what is expected of my job: **82% agreement**

Supervisor is supportive of personal issues: **77% agreement**

Humber promotes a culture of diversity and inclusion where diverse groups are respected: **77% agreement**

Humber provides top quality care: **76% agreement**

WHERE WE WANT TO DO BETTER:

RECOGNITION PROGRAMS (Humber does a good job recognizing individuals for their work – 61% agreement)

HEALTH AND WELLNESS PROGRAM (Humber provides opportunity for health and wellness – 69% agreement)

PROFESSIONAL DEVELOPMENT OPPORTUNITIES (Satisfied with professional development opportunities provided – 65% agreement)

Humber River Hospital

PHYSICIANS

WHERE WE ARE EXTRAORDINARY:

I work well with other physicians, nurses, and other allied professionals: **79% agreement**

Humber promotes a culture of diversity and inclusion where diverse groups are respected: **78% agreement**

I feel that Humber is a physically safe place to work: **80% agreement**

WHERE WE WANT TO DO BETTER:

COMMUNICATION (Satisfied with communication – 57% agreement)

HEALTH AND WELLNESS PROGRAM (Humber provides opportunity for health and wellness – 55% agreement)

RECOGNITION PROGRAMS (Humber does a good job recognizing physicians for their contributions – 61% agreement)

Humber River Hospital

Patient Flow & Patient Care Logistics Outcomes

35
The Command Centre has created operational efficiencies equivalent to opening up 35 new beds. Consequently, MoH added $23M to our base funding

16%
reduction in Inpatient Ultrasound Turnaround Time, down 4 hours from request to completion

76%
reduction in Allied Health Initial Assessment Delays

34%
reduction in the average time a patient in the Emergency Department waits before being placed in a bed

51%
increase in Portering Benchmark Compliance to assign Porter in < 10 min. target

38%
reduction in the time for patients to wait to receive certain diagnostic test results
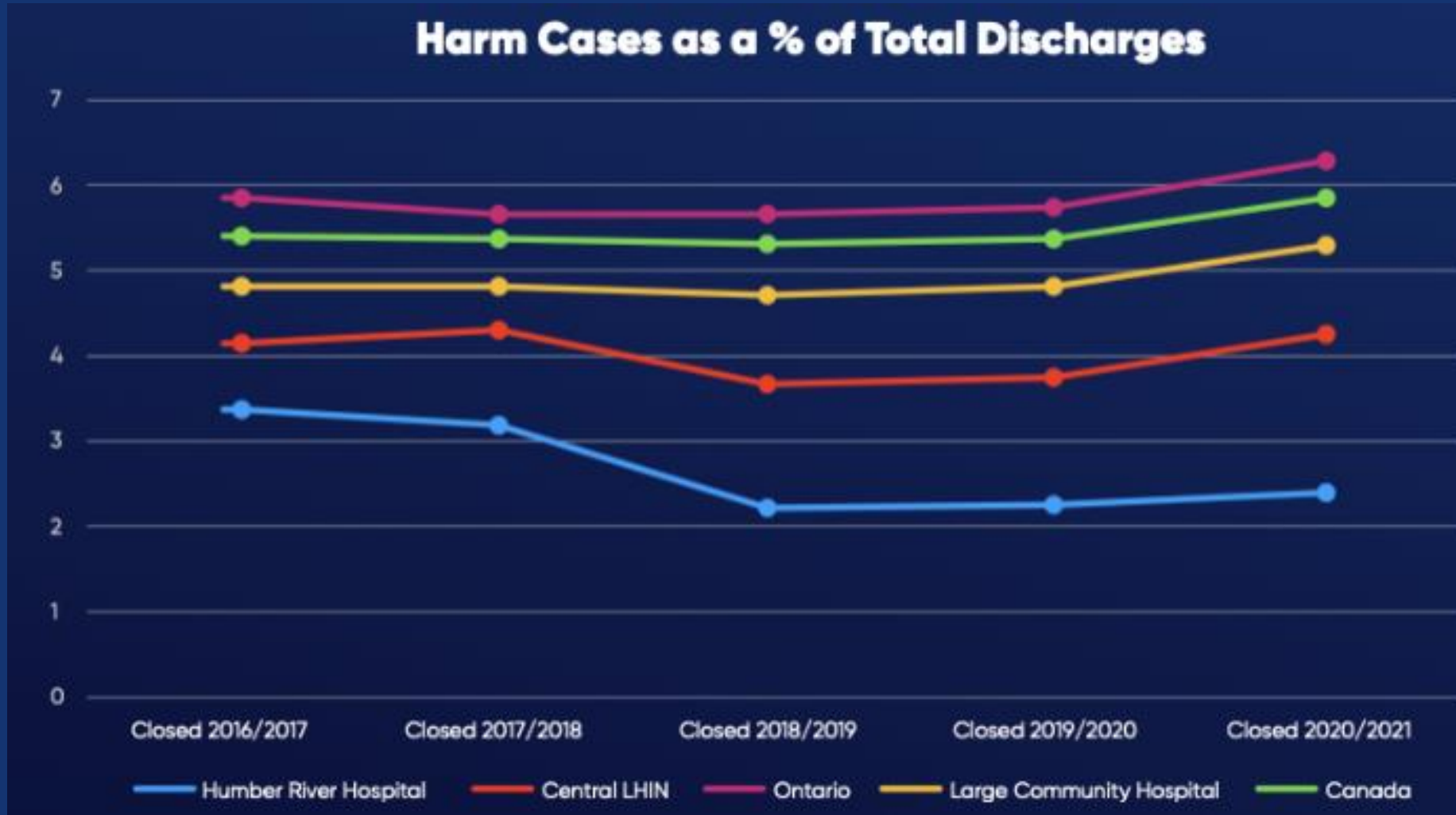
45%
reduction in the time to clean inpatient beds

52%
reduction in acute conservable medicine bed days

Reducing Patient Harm Outcomes

Harm Cases as a % of Total Discharges

▼ 29%

Legend: Humber River Hospital, Central LHIN, Ontario, Large Community Hospital, Canada

X-axis: Closed 2016/2017, Closed 2017/2018, Closed 2018/2019, Closed 2019/2020, Closed 2020/2021

Humber River Health *Lighting New Ways in Healthcare™*

After 8 Years of Operation

One of the most digital hospitals in the world

One of the most energy efficient hospitals in the world

One of the most cost efficient hospitals in Ontario

Lowest average ED admit time in Ontario VHV Hospitals

3.3M doses administered per year
0.001% medication error rate

0% lab specimen labelling error rate

One of the best patient harm outcomes in Canada

One of the most highly regarded hospitals in Ontario by patients

752 Bed Facility

850,000+ Citizens in catchment area

450,000 On-site clinic visits per year

1,828,282 Square foot facility

750 Physicians

2,500 Clinical staff

1,000+ Ancillary staff

TOUR

Inpatient Unit

Pharmacy

Command Centre

Lighting New Ways in Healthcare

Practitioner Workflows & Wellbeing

Patient Care & Experience

Cost to the Healthcare System

850,000+
Residents in our catchment area

139,800
Emergency patients each year

450,000
On-site clinic visits per year

**Empowerment of People
Comprehensive care closer to home
Innovation, Research and Academics**

Digital Infrastructure Platform	Innovation Excellence	Analytics & Data Drive Strategy	Software Engineering (DevOps)	Brand & Presence	Research & Education	Clinical Excellence
Skills and Capacity • IT, IS, DLT, etc. Digital Infrastructure • Applications (142) • Data centres • Point of Service • Connectivity • Cyber security • Cloud services • Communications • Medical devices	Skills and Capacity • QI, BA, PM Methodologies • Project delivery • Product management • Evaluation frameworks • Change management • Service design	Skills and Capacity: • ABI Data • Medical • Financial • Coding • Operations • Audits Tools • Databases • BI & Visualization • Command Centre	Skills and Capacity • Software developers • Product owners • Test engineers • UX/UI designers • Scrum managers • Team on-boarding Infrastructure • MS Azure DevOps • GitHub • Healix platform for rapid development of innovations	• Lighting New Ways in Healthcare • Member of TAHSN • Participation at multiple Provincial tables • Global recognition for Digital • OHT leadership	• Research Chairs • Clinical trials • Clinical research • Sim lab • FMTU • University affiliations • Medical learners • Nursing students • Other clinical professionals	• Bariatric centre • Laparoscopic surgery centre • Robotic surgery centre • Outpatient hip and knee surgery centre • Renal dialysis centre • Level IIC Neonatal Care Unit • Expertise in limb salvage • Senior's care

Humber River Health
Lighting New Ways in Healthcare™

3 to 5 Year Horizon
Revolutionary Change

Transform Innovation in Healthcare

Expanding Services

Humber Meadows LTCH
Quality care for Seniors

Seniors' Campus of Care

Clinical Services
Behavioural Services, Seniors Learning Centre, Outpatient Rehab, Day programs, ADL Suite
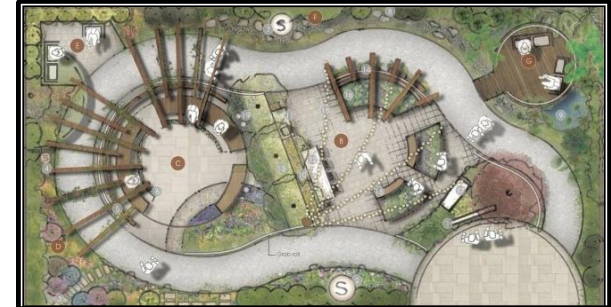
Pride of Workplace & Home
Indigenous Heritage, Landscaping, Murals, Signage, Beautification

Community Services
OHT, Family medicine, Walk-in Clinic, Daycare Services

Commercial Opportunities
Private labs, private clinics, retail, movie sets
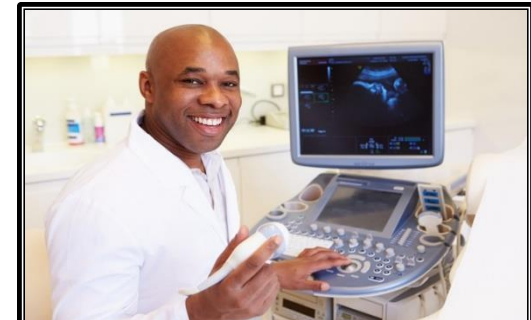
Diagnostic Imaging
X-ray, Ultrasound, EKG

Humber River Health *Lighting New Ways in Healthcare™*

Innovation Campus

- Centres of Excellence
  1. **Centre for Emergency Medicine Innovation**
  2. **Academy for AI & Optimization in Healthcare**
  3. **Command Centre Collaboratory & Exchange**
  4. **Precision Biomarker Technology Lab**
  5. **Digital Equity & Sensitivity Design Studio**
  6. **Surgical Robotics Revolution Hub**
  7. **Family Medicine Futures Network**
  8. **Senior Health Innovation Partnership**

- Simulation lab

- Landing Zone

- Auditorium to host conferences

- Educational forums and classes

- Health-tech and Age-tech demo area for tech demonstrations (schools and public)

1 to 2 Year Horizon
Evolutionary Change

Centre for Emergency Medicine Innovation

Academy for AI & Optimization in Healthcare

HRH is Developing an AI-enabled Virtual Intake and Queue Management App (EDQ) to Support Patient Triage and Capacity Planning in Eds

The concept is to advise the patient before they come to our ED whether they should:

Patient feels unwell

Online screening

STREAM A
CALL 911:
Call 911 to get an ambulance for the patient

Patient calls 911

Patient arrives at ED

STREAM B
COME RIGHT NOW:
Emergent/ Urgent patient who needs immediate in-person ED services

Patient advised to go to ED

Patient arrives at ED

Nursing Assessment & work-up in ED

Patient sees Doctor in ED

*This innovative stream **leverages AI** to predict ED patient queues and suggest an optimal timeslot per patient based on ED conditions (e.g., inflow, outflow, physician capacity)*

STREAM C
COME AT A PRE-ARRANGED TIME:
Less urgent patient who needs non-immediate ED intervention that can come later in the day/night

Patient in virtual queue & advised to visit ED at designated time slot

Patient arrives at ED

Nursing Assessment & work-up in ED

Patient sees Doctor in ED

Realizing Benefits for Patients, Physicians, & Health Care Staff

Reduced Wait Time in ED

- ↓ **Average Time to PIA**
- ↓ **Average ED Length of Stay**

Eligible low acuity patients saw **75%** of their total wait shifted to waiting virtually

Improved Patient Experience

- ➕ **Better Transparency**
- ➕ **Minimal Wait in ED**

Number of patients physically waiting in Fast-track for longer than 90 minutes was reduced by **95%**

Enhanced Operational Efficiency

- ➕ **Minimize Overcrowding**
- ➕ **Managed Patient Inflow**

Average reduction in the number of patients physically waiting in the Fast-track zone by **78%**

Improved Staff Experience

- ➕ **Informed resource allocation**
- ↓ **ED Staff Turnover & Overtime**

Improved visibility into incoming patient flow helps with informed resource allocations throughout the day

Note: Quantified benefits above are observations from simulations using future state parameters

Overall, Here's How the Solution Works Across the ED Patient Journey

1. Online screening
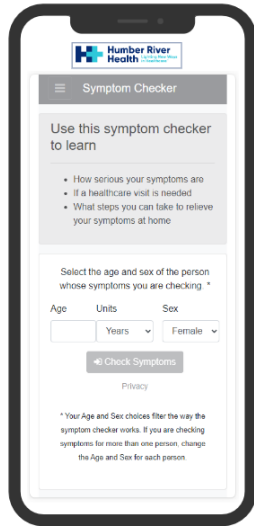
2. Arrival time estimation
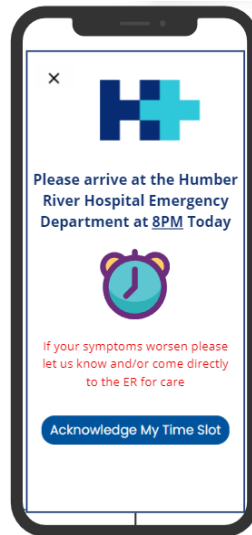
3. Self-serve check-in
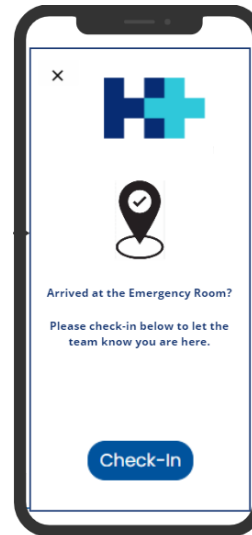
4. Invited to the triage window
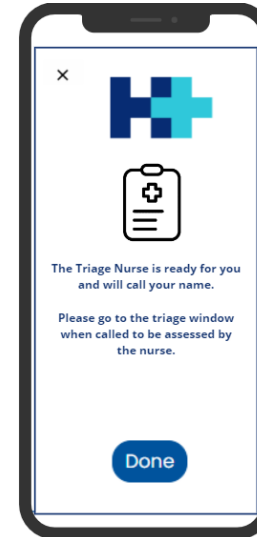
5. Invited to the registration desk
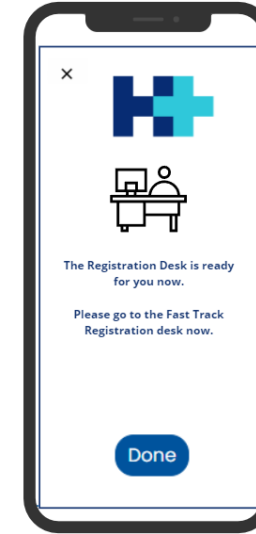
6. Physician Initial Assessment (PIA)
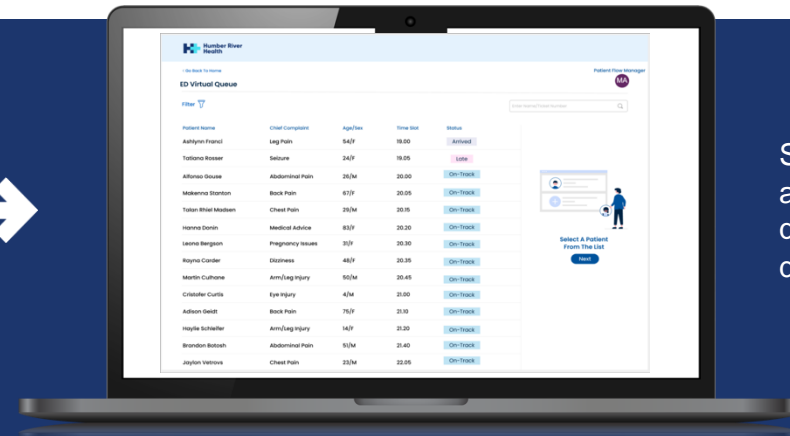

SelfCareDecisions
The trusted source for symptom advice

Based on patient input on symptoms, direct patients to call 911, visit ER now, or later

D. AI Engine

Generate arrival time slot and manage ED queue based on predictive models

Healix™

Enable the frontend patient and staff facing interactions

Staff are able to monitor and manage virtual queues from the dashboard below

EDQ was Designed as a Scalable Solution Across Various Contexts

ED's with Long Wait Times

EDQ can automate and streamline the intake process to reduce paperwork and minimize patient wait time.

Networks of Hospitals

Optimized patient care across diverse communities by reducing wait times to see a physician and determine the fastest care option among multiple hospitals.

Digital Front Doors

Advanced queuing technology underpinning the EDQ was designed to augment healthcare navigation to guide patients to appropriate community-based care based on acuity levels.

Digital Twins

Leverage real-time data from emergency departments to create or improve digital twin systems at hospital or system level

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The Future Vision for EDQ

Continue Product Development to Enhance Staff and Patient Experience:

Drive ongoing innovation to enhance the staff and patient experience. This includes refining the user interface and incorporating further integrations for more seamless care and capacity planning.

Integration with Telemedicine:

EDQ can be integrated with virtual care platforms, allowing for remote patient assessments and consultations as a means to alleviate EDs while getting patients immediate care assistance.

EDQ Evolution into New Opportunities:

EDQ has the potential to evolve into a highly intelligent tool, for example to identify patterns in patient data and prepare interventions, diagnostics, and more based on care pathways in time for patient arrival

Partnership Opportunities:

Collaborate with other hospitals and healthcare facilities to expand the reach and impact of EDQ.

What is Humber River Health doing to engage in GenAI

We are focused on applications furthest from Medical Decision-Making

1. Low-hanging fruit opportunities using consumable models and applications to realize quick returns
   - Text generation and summarization using GPT-4   **3**
   - Presenting relevant information using GPT-4   **2**
   - Ambient Digital Scribe in outpatient clinics   **11**
   - EMR search and summarization using Google Med-PaLM 2 in MEDITE **12**
   - Human assisted clinical coding using Semantic Health   **8**

2. Reinvention of business and customer engagement using models that are customized with the organization's data
   - Emergency Department AI-Enabled Virtual Queue and Time Management Application (ScaleAI project)   **~1**
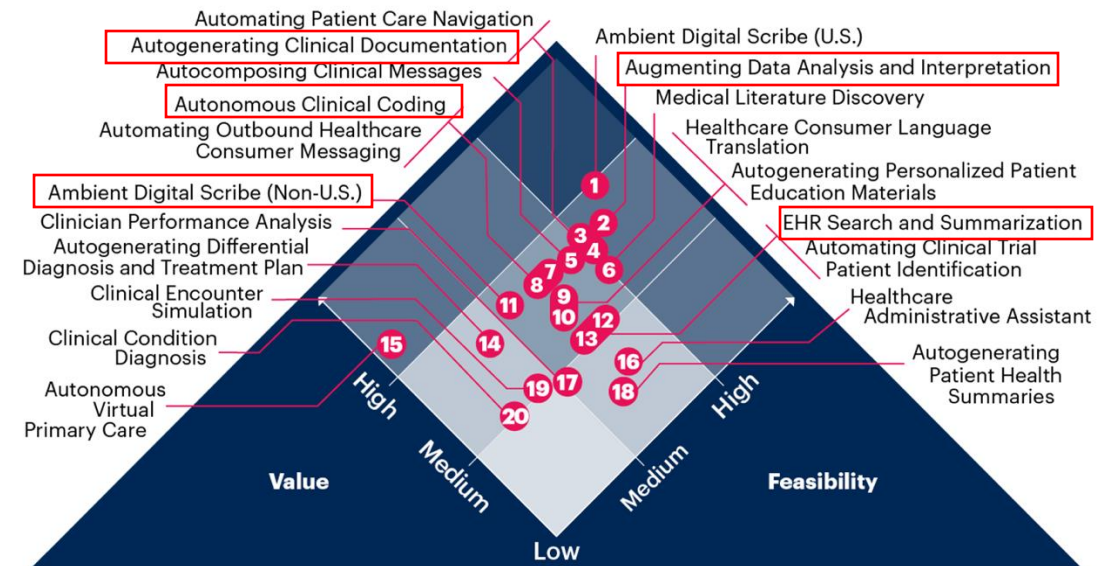
Deployment Model combines Build with Buy

Text Generation and Summarization

- Engineer GPT-4 prompts for different disciplines, scenarios and physicians
- Leverage medical records content to ground the prompt and eliminate hallucinations
- Leverage Enterprise OpenAI in Azure for a secure and PHIPA compliant environment
- Integrate with MEDITECH through Smart Launch and HL7 FHIR APIs

Presentation of Relevancy

- Explore grounded prompt engineering and GPT-4 as one approach
- Explore relationship with 3rd party vendors such as RYA Health
- Work with Health Gorilla and MEDITECH to support visualization of relevant information

Ambient Scribe

- Explore use of Suki, DAX or others that are already integrated with MEDITECH

EMR Search and Summarization

- Deploy MEDTECH AI tools as they become available

Human assisted Clinical Coding

- Continue to work with Semantic Health

EDQ

- Deloitte built the AI engines
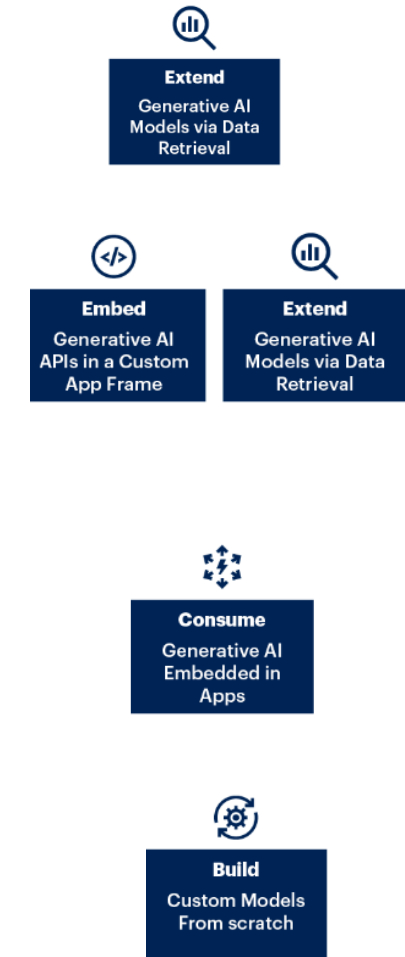
Extend
Generative AI Models via Data Retrieval

Embed
Generative AI APIs in a Custom App Frame

Extend
Generative AI Models via Data Retrieval

Consume
Generative AI Embedded in Apps

Build
Custom Models From scratch

Microsoft Azure Secure Tenant

| Dive in, with a business-driven mindset	Take a people-first approach	Get your proprietary data ready	Invest in a sustainable tech foundation	Accelerate ecosystem innovation	Level-up your responsible AI

We have a Microsoft Azure Tenant configured and operational

- The Deloitte AI engines and Healix are deployed in the tenant

AI Engine Conceptual Architecture
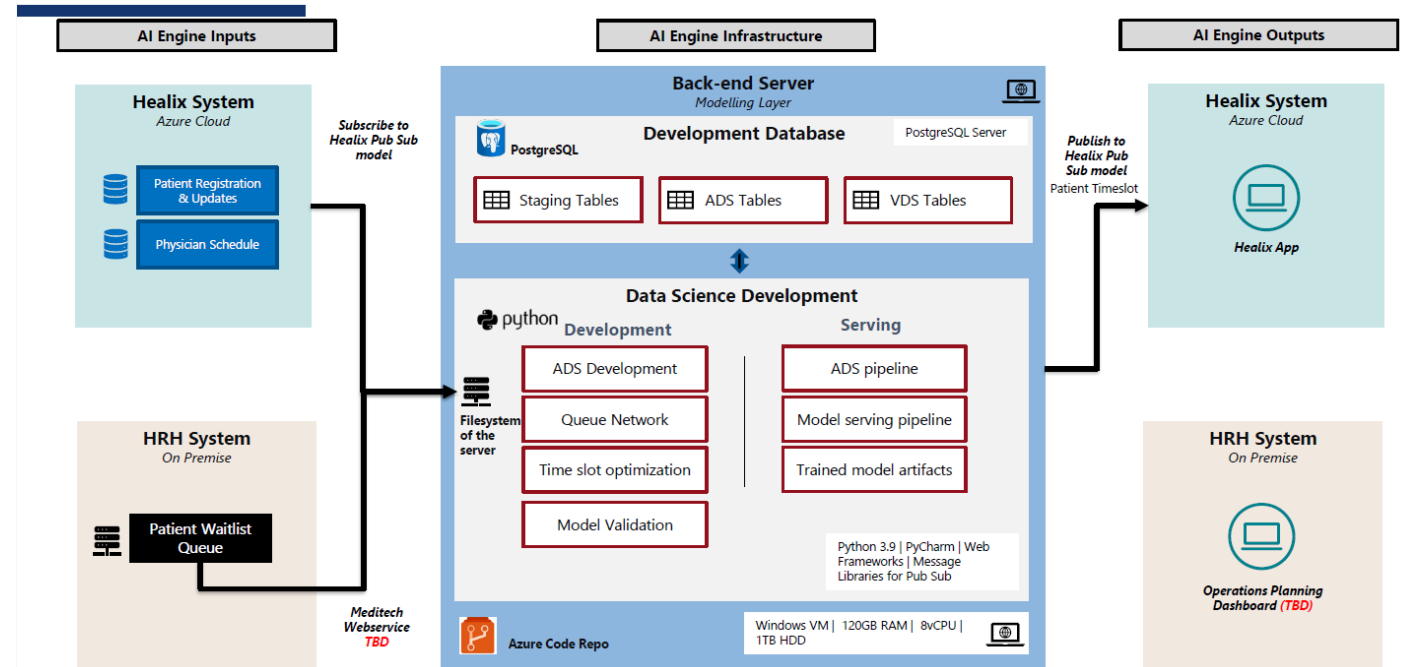
Microsoft Azure Secure Tenant

| Dive in, with a business-driven mindset | Take a people-first approach | Get your proprietary data ready | Invest in a sustainable tech foundation | Accelerate ecosystem innovation | Level-up your responsible AI |

We have completed expansion of the Azure Tenant to allow us to transfer medical record information

- Feed the MEDITECH Data Repository (DR) data to Azure tenant in real-time

Our Data Science team are engineering prompts

- Prepare MEDITECH DR data for grounding
- Develop applications using MEDITECH Smart Launch, FHIR APIs and OpenAI APIs

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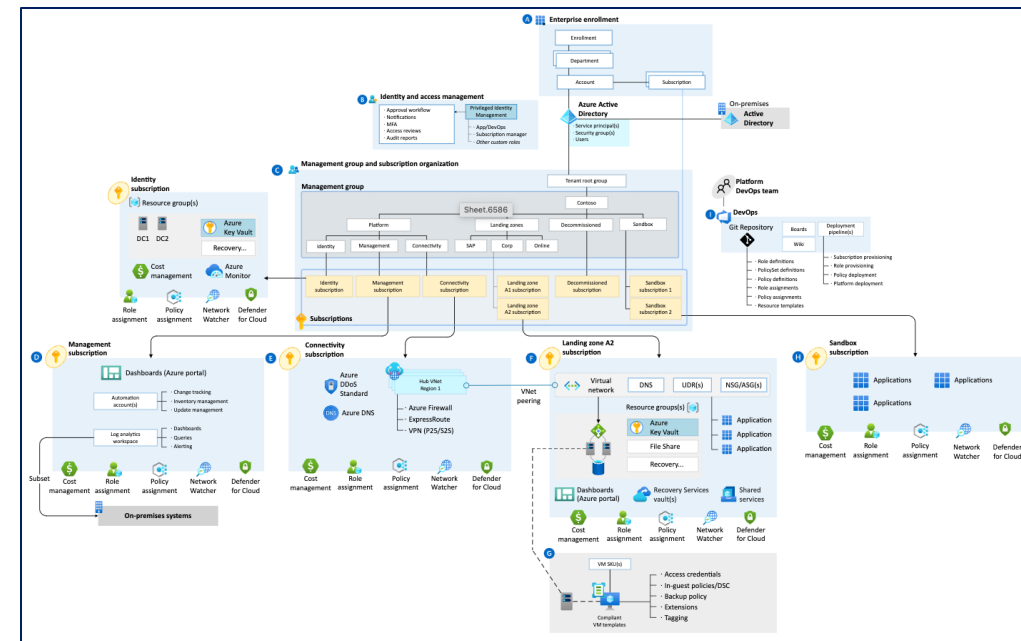
Academy for AI & Optimization in Healthcare

1. **Low-hanging fruit opportunities** using consumable models and applications to realize quick returns
   - Text generation and summarization using GPT-4
   - Presenting relevant information using GPT-4
   - Ambient Digital Scribe in outpatient clinics
   - EMR search and summarization in MEDITECH
   - Human assisted clinical coding and proactive CDI

2. **Reinvention of business and customer engagement using models that are customized with the organization's data**
   - Emergency Department AI-Enabled Virtual Queue and Time Management Application (ScaleAI project)

3. **Enabling collaborative care models and population health management with intelligent care journeys and digital twins**

What is Humber River Health doing with no-code platforms

Challenge

Healthcare is at an inflection point. It is undergoing novel and complicated digital transformation with an emphasis on personalized care, consumer experience, and patient empowerment.

Healthcare requires a new set of tools.

"What stands out is the need to transform experiences of care for patients and carers ("consumers") as well as healthcare workers. Other industries have met this new challenge through digital transformation."   KPMG International

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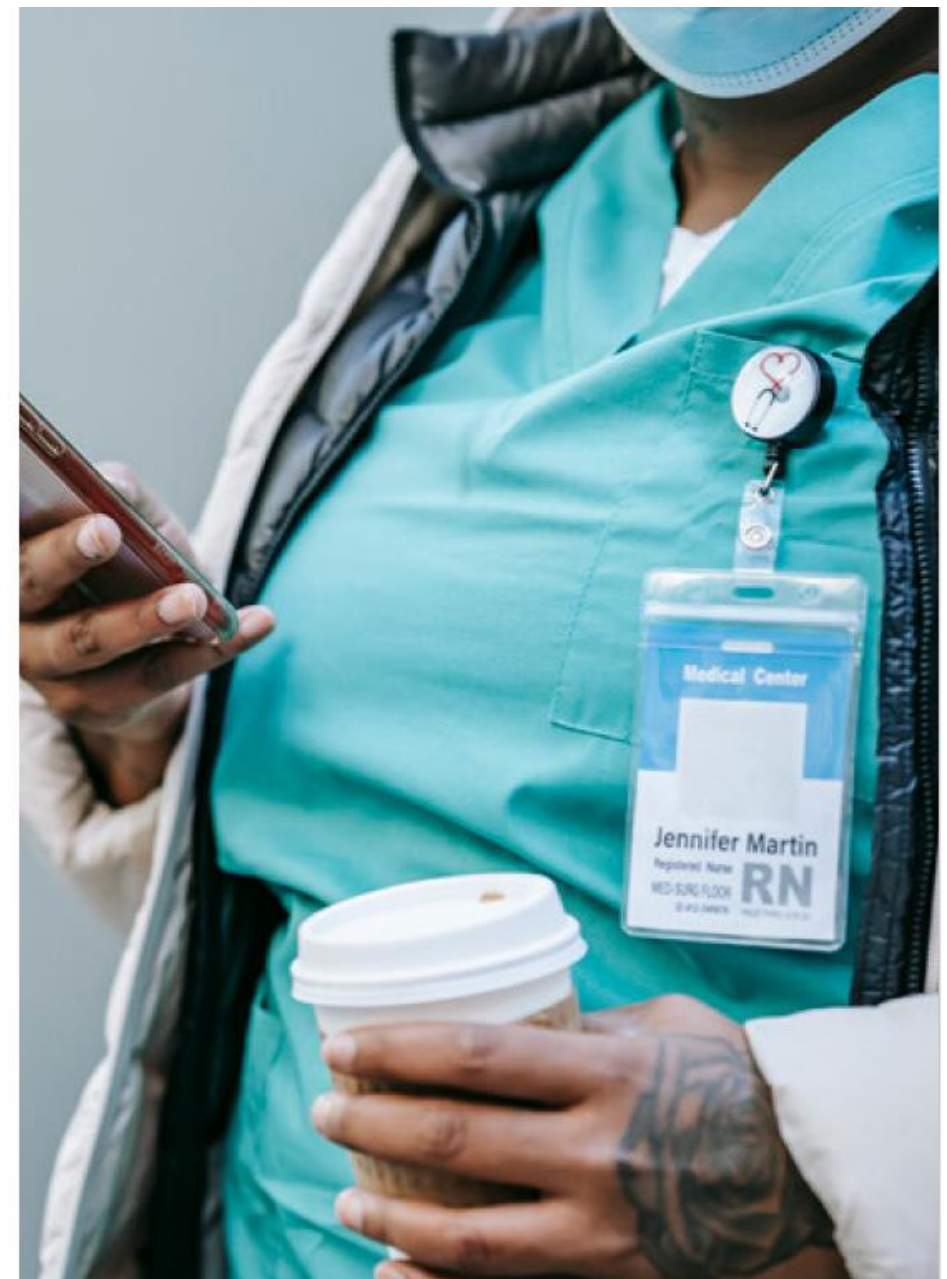
Solution

A Digital Health Platform that enables quick, easy and tailored solutions to a wide range of problems.

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Healix DHP

The Healix DHP is driven by Collaborative, Authoritative, Innovative, and Proactive themes, layered on top of a set of core foundations.

The foundational layer includes all the necessary components to support a variety of unique apps in the health and wellness space, automatically bundled in.

Healix Apps & Beyond

Apps designed by providers and clinical teams can be prescribed, recommended or requested by patients – just like medications!

Apps are based on actionable tasks, what information needs to be collected, who needs to be informed and under what conditions, and automated escalations.

A Platform for Rapid Innovation

Healix allows clinicians to intervene earlier and to support higher clinician-to-patient ratios compared to the typical ratios of 1 clinician to between 20-50 patients.

By intervening early, this significantly reduces the patient's need for emergency care, helping improve the patient's outcome and quality of life.

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Please follow us on social media: @HRHospital