AMS Healthcare Conference 2024

REPORT

June 2024

Optimizing **AI** in Ontario Healthcare

from point solutions to **scale**

AMS Healthcare

Contents

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Summary

The AMS Healthcare Conference 2024 convened 170 healthcare stakeholders from across Ontario to discuss the timely and ethical scaling of AI in healthcare in the province's healthcare sector. The context is important. Ontario's healthcare system is facing unprecedented capacity challenges and accelerating uptake of promising innovations needs to be part of the solution. We know that one in five Ontarians does not have access to a regular family physician, contributing to an increased demand on other parts of the system. Healthcare providers report high levels of burnout, and hospitals struggle to maintain reasonable wait times in their emergency department. By enhancing human capabilities, AI innovations can improve diagnostics, advance research, boost patient engagement, and support administrative tasks, improving both the quality of care and the provider experience. The challenge, as we heard at the conference, is to do this at pace and scale incorporating the human dimensions of care for patients, their caregivers and providers.

At this year's conference, it was clear that Ontario's AI healthcare ecosystem is dynamic and innovative. Ontario is recognised as a leader in AI technology, with a wide range of AI point solutions being used in various healthcare research institutions across the province (Appendix A). Despite these promising developments, we heard that most AI point solutions remain confined to smaller, project-specific applications that have not yet achieved widespread adoption across Ontario's broader healthcare system.

Pre-conference interviews (Appendix B), a comprehensive literature search, keynote presentations, tabletop exercises (Appendix C), group discussions, and post-conference recordings provided valuable insights into the present state of AI in healthcare and the actions that will be required to scale AI across Ontario's healthcare system.

It was agreed that while Ontario is at the forefront of AI research and innovation, it lacks the regulatory and policy landscape required to safely and effectively assess and scale these much-needed technologies. Insights were shared about how Duke's Institute of Health Innovation has successfully developed and scaled AI technologies for healthcare (Access Here). There was also consensus among the delegates that there is an urgent need to deploy AI solutions to the most capacity-challenged part of the healthcare system, more specifically in primary care, to reduce workforce burnout and improve workflows. AI innovations, such as the AI scribes, are gaining traction, and their scaling needs to be accelerated. The conference closed with a focus on leadership, compassion and collaboration, essential components for the successful integration and scaling of AI in healthcare.

Who Attended

The AMS Healthcare Conference 2024 delegates included representatives from government agencies and organizations, academic institutions and research organisations, professional associations, hospital associations, hospital leadership, homecare organizations, patients and caregivers, advocacy groups, industry, digital health organisations, think tanks, and consultant and regulatory organisations.

The Emerging Consensus About the Scaling of AI in Healthcare in Ontario

1. Ontario has a vibrant AI innovation ecosystem.

- Ontario has a vibrant AI innovation ecosystem within hospitals, the private sector, academic and government institutions, and other organizations such as the Vector Institute and Scale AI. In addition, Ontario's single-payer healthcare system provides a vast pool of patient data for the AI ecosystem.

2. Federal regulation would facilitate the scaling of AI innovations.

- AI applications in healthcare are not regulated under a single act or statute in Canada but are governed by various existing laws, such as privacy and intellectual property laws.
- Significant steps are being taken towards establishing a structured regulatory framework to ensure AI is used responsibly and ethically in healthcare, such as Bill C 27, known as the Artificial Intelligence Data Act (AIDA). This is the first attempt to implement federal AI legislation that will establish a national framework for the design, development and use of AI in healthcare. However, the terms and provisions will be fleshed out in specific regulations.
- A single federal regulatory scheme was seen as highly preferred to multiple and different provincial approaches.
- The approach to regulating AI in healthcare must be cautious yet proactive, balancing the need to foster innovation while maintaining safety, privacy, and ethical standards.

3. AI innovations need to be used by humans they do not replace humans.

- AI innovations can improve healthcare workers' capabilities, existing workflows, and patient outcomes if used in conjunction with compassionate and empathetic human input.
- More attention needs to be directed to the education and training needs of users of AI, including health professionals, administrators and the public at large.

4. AI innovations that warrant investment and scaling ("High-Impact") must solve the most urgent healthcare issues and demonstrate economic benefits.

- One in five Ontarians does not have a primary care physician and this is projected to grow in the coming years. Health care providers including primary care physicians, nurses and PSWs are all reporting burnout.
- The Ontario government has increased the number of positions available for medical school students. However, it will take several years before this policy improves the number of trained physicians entering the workforce.
- AI innovations, such as AI scribes, when implemented well can immediately reduce workforce burnout.

5. AI innovations must not leave marginalized individuals or sectors behind.

- AI solutions must provide benefits beyond research-intensive hospitals and include home and community care.
- Some deficiencies AI is meant to overcome, such as inequitable variation in medical practice, permeate historical data. If biased data is used to train AI algorithms, these algorithms will have inherent biases contributing to under diagnosing certain populations.
- Hospital data is not enough. Population health and whole-person data are critical to improving health equity.

6. AI innovations and implementation should be driven by people (patients, healthcare providers and caregivers).

- Principles of compassion, collaboration and quality of care are fundamental to implementing AI in healthcare.
- Do not underestimate the power of patients and their communities.
- Patients want access to their data.
- Education is key: Patients and caregivers must understand what can and can't be done.

7. If we fail to scale AI health technologies, other countries will advance the technologies and capitalize on their scaling.

- Using private sector expertise will be critical to integrating and scaling AI use cases into Ontario's healthcare system because scaling is a business function.
- The scaling of AI has the potential to provide essential productively gains and help to address the ongoing labour shortages in healthcare.

What We Learned from Previous Implementation Journeys.

Suresh Balu, the director of the Duke Institute for Health Innovation (DIHI), demonstrated how his institution has catalyzed transformative AI innovation in healthcare using the following guiding principles: build to show value, build to integrate, build to scale and build responsibly.

Foundational to their success:

DIHI's Algorithm-Based Clinical Decision Support (ABCDS) system provides a structural framework for the governance and evaluation of AI tools used within Duke Health. This system emphasizes the importance of transparency, quality, and accountability throughout the development and post-development phases. ABCDS operates under a "people, process, technology" framework designed to ensure a balanced approach to system implementation that aligns human capabilities, efficient processes, and effective technology (Appendix D).

Duke is also part of the Health AI Partnership (HAIP). This a collaboration that includes the Mayo Clinic, UC Berkeley and other partners (legal and financial) focused on establishing industry best practices for leveraging AI in medical settings. This partnership aims to: 1/standardize procedures for the procurement integration and lifecycle management of AI tools within healthcare, 2/provide open-source educational resources and 3/empowers healthcare professionals to safely and effectively implement AI technologies in healthcare. It has identified 8 key decision points for AI Adoption (Appendix E).

A Case Study: Sepsis Watch™ (Appendix F)

Proposed Actions for the Responsible Scaling of AI in Healthcare

Work differently.

Create a coalition of the willing (government, academics, healthcare providers, industry, patients and the public) to innovate and scale but build on the many healthcare networks that already exist.

To harness the full potential of AI, healthcare must become a learning health system that continuously integrates data and experiences from clinical practices to improve patient care and health and provider outcomes.

Establish a Clearing House/Directory/Inventory.

This enables information sharing (successes and failures) and provides a mechanism for continuous quality improvement.

This has been done previously in the health sector and has been helpful in wayfinding and reducing duplication on large complex endeavours similar to scaling AI.

Educate, Train and Incentivize healthcare system leaders, providers, patients, caregivers and the public to understand and adopt AI innovations.

It is critical to keep humans informed and in the loop.

AI is a tool for humans to use, but it does not replace humans.

Keeping humans in the loop ensures that healthcare remains compassionate and human centred.

Advocate for pan-Canadian regulation and governance of AI applications in healthcare.

With federal regulation, the start-up ecosystem won't need to jump hurdles in each province.

AI regulation must work in tandem with AI technology. It should not be reactive or punitive but instead a continuous feedback loop.

Address the current HHR challenges in Ontario by supporting the scaling of AI point solutions that decrease workforce burnout and improve workflows.

Inclusion of all parts of the healthcare system, including community care, home care, and long-term care, to ensure the benefits of AI are realized across the system.

For example, AI can be used to support people in the community avoiding hospital admissions rather than to treat patients once they're admitted.

How can AMS Healthcare help? What's Next?

AMS Healthcare's mission is to advance Ontario's healthcare system through innovation and technology while remaining rooted in compassion. We convene networks, develop leaders and provide grants and fellowships to support healthcare research, education and clinical practice.

AMS Healthcare's core strength is developing health system leaders- leaders who are grounded in compassionate and are skilled in navigating the complexities of modern healthcare transformation. AMS Healthcare will lead in maintaining the centrality of compassionate care in today's revolution of care. We aim to maintain this balance through strategic initiatives and funding that align with our mission and vision, incorporating a focus on Equity, Diversity and Inclusion (EDI).

The AMS Conference 2023, "Planning Now for the Future of Technology-enabled Healthcare Work in Ontario," addressed Health Human Resource (HHR) challenges and the potential for technologies to mitigate these challenges. At the 2024 conference, the discussions focused on scaling AI innovations, highlighting how tools like AI scribes can significantly alleviate administrative burdens, enhance the quality of care and reduce workforce burnout.

AMS Healthcare Action Plan

First, AMS Healthcare has produced and distributed this paper summarizing the consensus from the conference including recommended actions from the working sessions and the expert panels.

Second, AMS Healthcare will convene a number of smaller group events over the next year to keep momentum going on some of the actions that align with our mission. Some early thinking includes:

- Convening around compassion with a particular focus on enhancing diversity and inclusion, including patients and caregivers
- Convening around coordinated efforts across the healthcare system

Third, AMS Healthcare will use the output from the conference as an input to plan the April 2025 conference. There is an opportunity to bring AMS Healthcare's full mission - Compassion and AI and the History of Healthcare – to the discussion. AMS Healthcare will look to commission work on what our history can teach us about this important moment in healthcare.

Fourth, AMS Healthcare is continuing to explore expanding our work in developing leaders to include education on AI for health sector executives and board members. Discussions on scope and potential partners are underway.

Appendix A:

How AI Innovations Can Transform Healthcare

The examples below highlight some of the AI Point Solutions currently being deployed to improve healthcare services and outcomes in Ontario.

1. AI-Enhanced Emergency Care: The University Health Network, in collaboration with Hero AI, integrates advanced AI technologies to monitor high-risk patients, optimize resource allocation, and enhance communication in emergency departments.

2. Wound Care Assessment: The William Osler Health System is collaborating with Swift Medical to implement cutting-edge wound care technology. This technology is designed for more accurate assessments, better documentation, and improved patient care.

3. Mental Health Triage: Kingston Health Sciences Centre, in partnership with OPTT Inc., is using AI-assisted triage, online psychotherapy programs, and AI symptom monitoring to reduce wait times and improve access to mental healthcare

4. Smart Cardiac Emergency Care: The Ottawa Heart Institute is collaborating with Badal.io to implement a secure mobile-enabled platform designed to streamline communication between emergency doctors and interventional cardiologists, which aims to reduce costs and improve efficiency.

5. AI for Diabetes Prediction & Prevention: In the Peel region, a novel framework is being developed for deploying machine learning models to predict diabetes risk. This project, involving health system practitioners and community members, aims to overcome barriers to adoption and implement AI-based technologies responsibly.

6. CHARTWatch is an AI tool that serves as an early warning system for doctors and nurses. It analyzes various patient data points to predict which patients are at risk of needing intensive care within 24 hours. This tool has been particularly useful in identifying deterioration in patient conditions early, allowing for timely intervention and potentially saving lives.

7. AI scribes are digital tools designed to automate time-consuming tasks such as data entry or note-taking. It uses artificial intelligence to summarize spoken conversations with consenting patients into electronic and clinically relevant medical notes. Ontario MD is currently leading an evaluation study of AI scribes in collaboration with Women College Hospital and the ehealth Centre of Excellence. This study is currently underway with 150 primary care providers selected from diverse demographic groups, technical backgrounds and geographic areas.

Appendix B:

Key Stakeholders Views: Scaling AI Innovations in Healthcare Across Ontario.

Stakeholder	Interview Comments: Scaling AI for Healthcare in Ontario
Research Expert	The tech is there. Why don't we take a few easy cases, deploy them, and learn from them? The government is not being innovative or brave enough to say, "Why don't we have a real-time data system that is managed by the province, not by individual hospitals?" because this is creating more silos. Before regulating, we need to do a couple of large-scale pilots and learn about what you're going to regulate because if you regulate now, you're going in blind with only hypotheticals.
Research Institute	Fostering public private partnerships is allowing some scalability to happen on a very small level. We need to be more strategic about how we drive this forward, and this requires coordination amongst various partners. Researched institutions create innovative technologies; the hospitals work to test and evaluate, get it up and running, and measure the benefit to their patients and their providers. Then the companies come in and play a part in the scalability. We're putting safe things into the system, but what is more concerning is what happens once they are up and running. Do we have the investments we need in cyber security to make sure the systems are not vulnerable? We have created tools that are built on data and data is an international currency. Right now, more than money.
Bioethics Expert	One of the challenges faced by larger-scale pilots is dealing with multiple research ethics approvals and the lack of institutional policies. We need to get away from system-level competition and have more collaboration in AI innovation. There is a need for transparency in order to build trust. Ironically, the public does not trust AI companies; however, they do trust Google and Facebook.
Hospital Executive	We need strong, robust data platforms, frameworks, and people who understand data. There needs to be centralized oversight because AI has its risks. AI initiatives need to be around helping the population, not the provider. However, healthcare providers need to like it (AI innovations). AI innovation requires a huge investment, and the ability to roll it out depends on medical and clinical leadership support. At the end of the day, it's useless if they're not going to use it.

Government	If AI is used in the back-office, it may not need regulation, but where it involves decisions about outcomes and allocations of resources, where it is more deterministic, it should be regulated.The government is a natural body to do this, bringing the players together, putting the framework in place, and then setting expectations. We are not moving fast enough to enable innovators to do what they want. They can develop the algorithm quickly but deploying it into the system and commercializing it is a challenge. Governance and standards will do more to advance AI than a lot of other things because this frees people up from legal conversations that slow everything down.
Mental Health	The data conversation is massive. There is a lot of data being replicated within silos. There are various players. The question is a very Canadian question is this a provincial or federal responsibility? The mental health space is fraught with apps. It is unclear what level of evidence we are OK with allowing it to move along the spectrum of scale up? There is a large cohort of executives in leadership roles that need some boot camps at a level that is appropriate for leadership executive. This will be very different to an entry to practice direct care person might need
Home Care	Home care has no digital data. The systems are still manual. Hospitals can show their wait time, but home care cannot. It is impossible, in real-time, to project service gaps; therefore, it is difficult to direct our very limited resources to the areas that are in the most need.
Patients	I understand the tech. I think it's great, but I am not willing to give my data in return for an outcome. First define the problem. It is not about researchers' ideas. It's about aligning with the values of health care in Ontario. Transparency, education and engagement with patients and caregivers, removing the fear of the unknown is key to its success.
Healthcare Professional Association	If a regulatory body asks where the standards are, I would ask the question where is the education for the clinicians that must meet these standards. Professional associations approve academic programs and need to be an integral part of setting standards. Health care providers can be on the lookout for biases and provide feedback

Appendix C:

Summary of Roundtable Consensus: What Should be Done Over the Next Year.

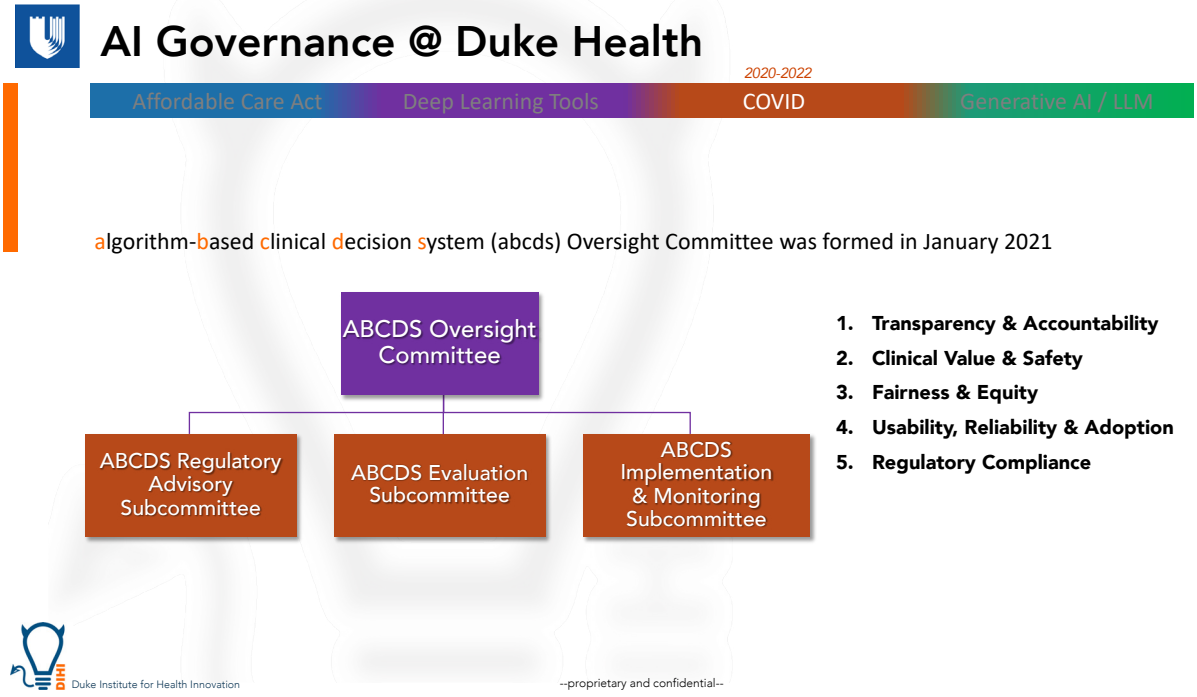
Seven Practical Actions: Enabling the Scaling of Responsible AI in Healthcare	The Action Plan: Developed from Ideas Shared at the AMS Healthcare Conference 2024	What We Heard: Feedback from Conference Attendees
1. Promote Health Equity through Appropriate Data Collection, Analysis and Use.	Engage stakeholders from equity deserving groups in creating infrastructure for data collection, analysis and use. * Review existing patient data sets to determine areas lacking representation. Acknowledge and address gaps. * Develop a replicable approach to engaging marginalized communities in collecting data. * Establish data standards and process is that will assess and measure changes in healthcare equity in Canada in response to AI and other innovations	Invest in data infrastructure but don't recreate. Leverage what exists and spread. Private / Public partnerships. Regulation of data collection / sharing/use should be an enabler. Post-market surveillance is a priority. It will need to be done differently. Ongoing / tighter feedback loops. Change management is essential.
2. Improve Transparency in order to Build Trust and Establish Accountability	Establish a provincial working group comprised of patients, providers, innovators, the MOH/OH, and legal, privacy and security organisations to develop a provincial AI framework that will guide the sector with respect to selection, use and evaluation of AI tools. Create a patient privacy Bill of Rights with accountability mechanisms.	Do not underestimate the voice of the patient.

* These action plans were not presented to the group but were consistent messages in the feedback forms.

Seven Practical Actions:	The Action Plan:	What We Heard:
3. Invest in Digital Infrastructure and Workforce Capacity	Prioritize standardization and a central overarching structure provincially. Create one system.	Build the infrastructure and processes to support scaling AI not just implementing pilot projects to include sites that currently don't have the capacity. Create a bridge to Canadian health data with AI innovations coming from outside of Canada. Tech is redefining Health Service jobs.
4. Develop Health System (Executive and Clinical) AI Innovation Leaders	Expose health system leaders to AI applications and how they advanced healthcare system goals. Provide training to existing leaders on the capabilities/applications, resource requirements and governance frameworks required to develop, adopt and implement AI to establish a common language and expectations amongst leaders within and organization and in between organisations.	
5. Communicate Success and "Create a Buzz" about AI in healthcare	Use patient stories an experience with AI innovations to build trust and confidence.	Do not underestimate the power of the patients and communities.
6. Improve Access to Data while Ensuring Privacy and Security	Create a Master Data Sharing Agreement signed by all health care providers (private companies/ public entities). Include a template for appendices for each project. *Adopt standard interoperability frameworks (FHIR) provincially and mandate upload from public providers while enacting Application Program Interface (API) regulation.	People want full access to their own data We need tools to integrate the data and provide access
7. Foster Collaboration Amongst Diverse Stakeholders	Develop a hub (AHSC-Connect Care/ Large learning health system) and spoke (PHC,Community, HC,tech) model human assets along the health system cascade to enable ownership for a shared goal outcome (ie. alcohol withdrawal).	Not just hub and spoke but more integrated holistic approach centered on patient and community. Patients and communities will drive progress more quickly.

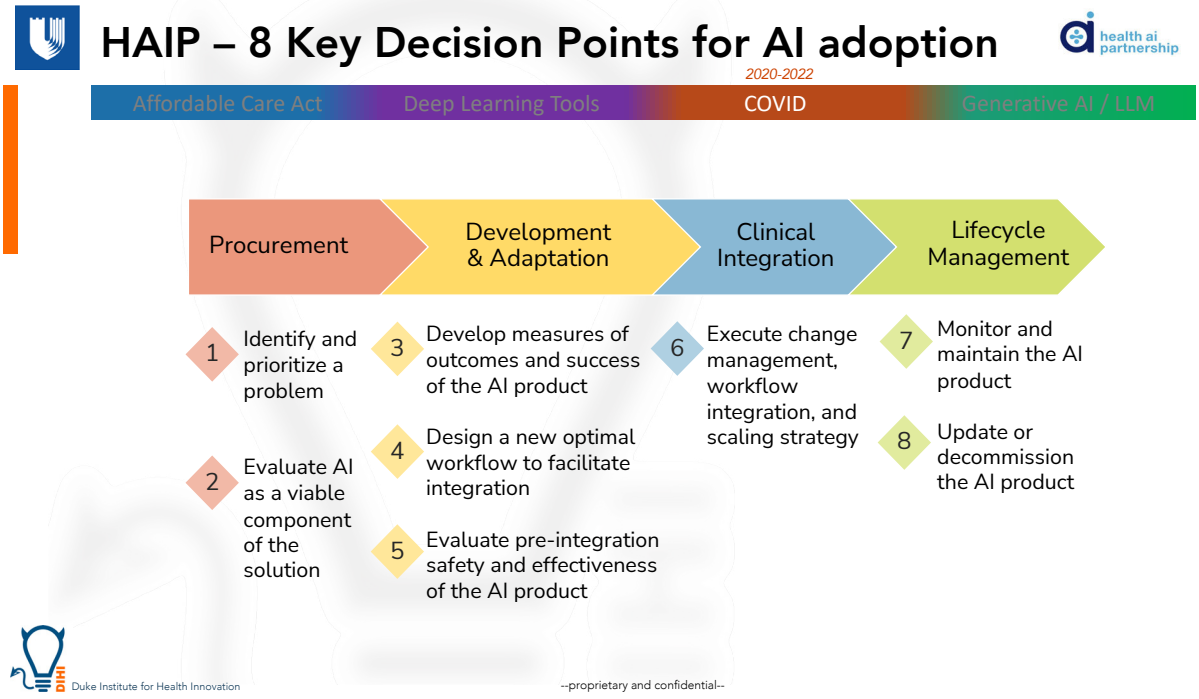
Appendix D:

AI Governance: Algorithmic Based Clinical Decision System (ABCDS)



Appendix E:

Key Decision Points for AI Adoption



Appendix F:

A Case Study: Sepsis Watch

Sepsis Watch™

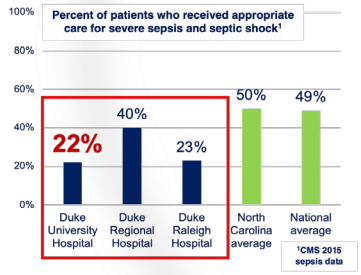
2015-2019

Affordable Care Act | Deep Learning Tools | COVID | Generative AI / LLM

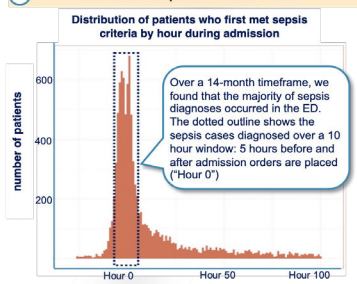
Summary :: What is Sepsis Watch?

The Problem: Struggle with sepsis

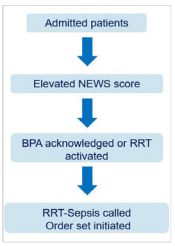
1 What is the problem? *Sepsis*



2 Where does the problem occur? *The ED*



3 Why are we failing to solve the problem today? *Slow, false alarms*



(fake) NEWS

- Only 6.8% of patients with NEWS (National Early Warning Score) BPA had discharge diagnosis of sepsis
- BPA fired 447 times/day on 42 unique patients/day on average (up to ~100x/patient).
- 63% of BPAs canceled.

The Solution: Sepsis Watch

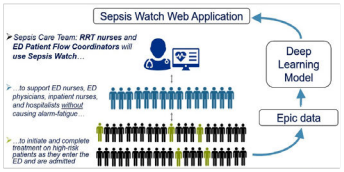
1 Define adult sepsis at Duke

2 or more SIRS criteria	- Temperature >38°C or <36°C (6 hours) - HR >90 (6 hours) - RR >20 (6 hours) - WBC count >12, <4, or % bandemia >10% (24 hours)
Suspect Infection	- Blood culture order (24 hours)
1 element of end organ failure	- Creatinine >2.0 (24 hours) - INR >1.5 (24 hours) - Total bilirubin >2.0 (24 hours) - SBP <90 or decrease in SBP by >40 (6 hours) - Platelets <100 (24 hours) - Lactate ≥2 (24 hours)

2 Create machine learning model to predict sepsis quickly and accurately

- **42,000+ inpatient encounters analyzed** at Duke Hospital over 14 months, **21.3%** with a sepsis event.
- **32+ million data points incorporated**: 25 million vital sign measurements, 2 million med admins, 5.2 million labs.
- **34** physiological variables (5 vitals, 29 labs).
  - At least one value for each vital in 99% of encounters.
  - Some labs rarely measured (2-4%), most measured 20-80% of the time.
- **35** baseline covariates (e.g. age, transfer status, comorbidities).
- **10** medication classes (antibiotics, opioids, heparins).

3 Design web application to show real-time model results and track treatment



Sepsis Watch is a custom-built tool to support identification of patients at risk of sepsis in the hospital. Access Sepsis Watch App at **https://sepsiswatch.dhe.duke.edu/**

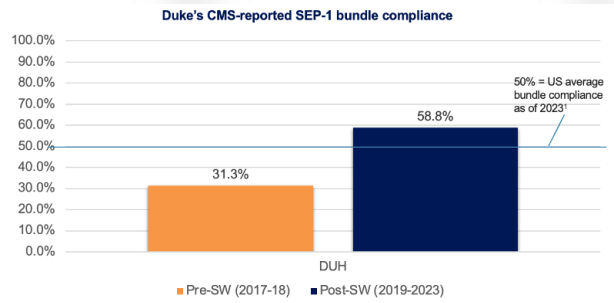
Sepsis Watch™ Impact

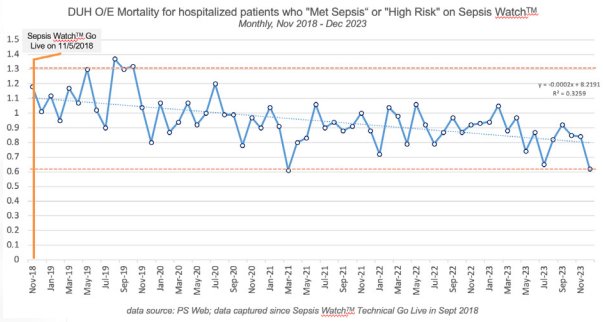
2015-2019

Affordable Care Act | Deep Learning Tools | COVID | Generative AI / LLM

	SEP-1 Bundle Compliance – reported to CMS
DUH 2017 Q1 – 2018 Q3. → 2018 Q4 – 2023 Q4	▲ 89% (31.3% → 58.8%)

	O/E Mortality for Sepsis Watch patients
DUH Nov 2018 – Dec 2023	▼27% (1.10 → 0.80 trend line)





Appendix F: (continued)

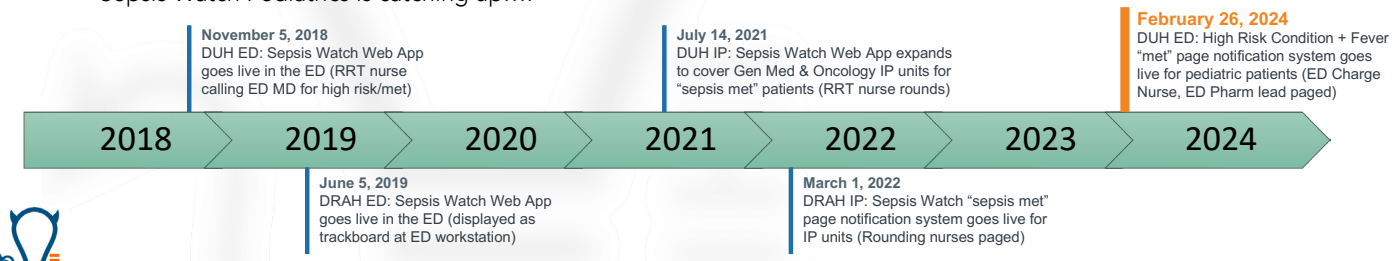
A Case Study: Sepsis Watch

Sepsis ….. fast forward to 2024

2023-2024

Affordable Care Act | Deep Learning Tools | COVID | Generative AI / LLM

- Sepsis Watch dashboard and page notifications support live workflows at DUH and DRAH since 2018, with observed positive impact so far on bundle compliance, O/E mortality and O/E length of stay
- The "Sepsis Watch Program" now has two components:
  - (since 2018) Real-time prediction of and identification of the CMS real-time definition of sepsis
  - (new in 2024) day-after-discharge bundle compliance full report on all patients who met CMS real-time definition of sepsis
- The Sepsis Watch real-time solution has two delivery methods:
  - Web App: Sepsis Watch Web application (since 2018): Custom-developed Web UI to support identification of sepsis and bundle tracking once sepsis is identified
  - Secure paging: Sepsis Watch real-time "high risk" and "met sepsis" notifications can be pushed via secure page to front line clinician users for just-in-time review and intervention
- Sepsis Watch Pediatrics is catching up….



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