

IMPLEMENTING AI IN PRIMARY CARE

By:

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Challenges in Primary Care



Access

Only 1 in 5 have same or next day access to their own provider



Productivity

Providers spend around 19 hours a week on admin tasks



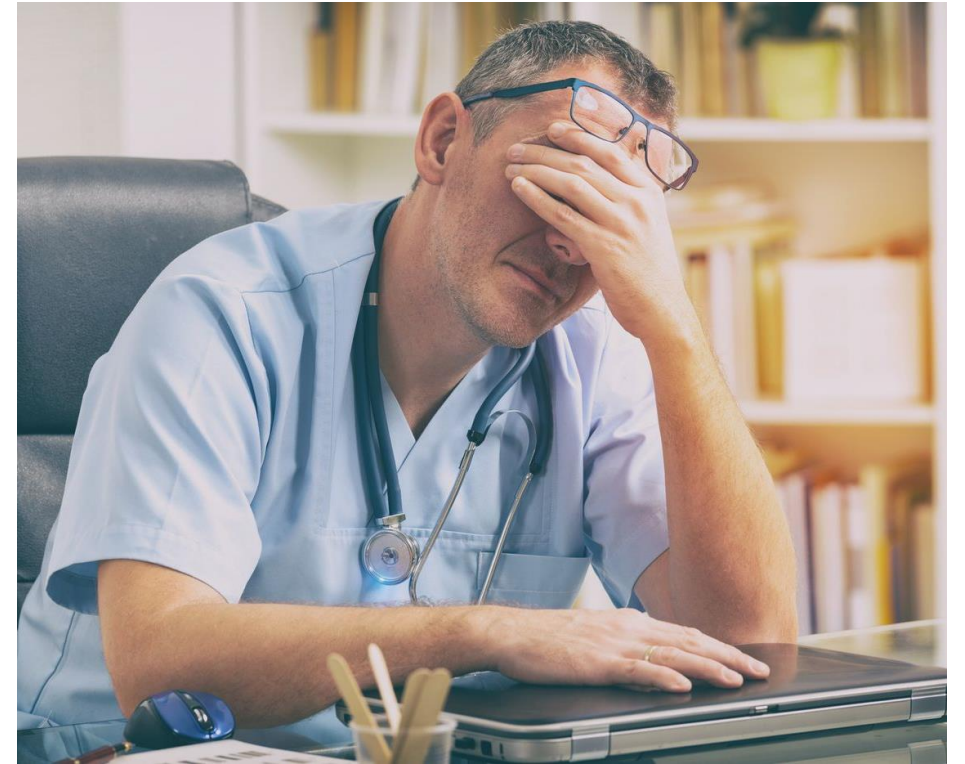
Human Resources

Higher rates of retirement
Fewer med students choosing family medicine

Looking forward...

- 16% of family physicians are over the age of 65
- Burnout continues to be a top contributor for retirement among health care providers

The IT Productivity Paradox



How can digital help us do better?



Build better tools



Reimagine the work

AI Scribe Pilot and Evaluation

Evaluation Activities

PCPs (n=152) were randomly assigned to one of three scribes: AI Scribe #1 (n=50), AI Scribe #2 (n=51), AI Scribe #3 (n=51)

Pre-Implementation Survey

To capture baseline data on practice demographics and characteristics, current use of technology, and current workflow processes and administrative burden.

Semi-Structured Interviews

To understand patient and PCP experiences.

Change Management Focus Groups

To identify implementation and change management considerations.

Simulated Clinical Encounters

To determine amount time saved on documentation from AI scribes.

Simulated Workflow & Time Series Study

To determine potential amount of time saved from the bot.

Post-Implementation Survey

To assess how the use of an AI scribe impacted their workflow, administrative burden, and ability to delivery care.

To understand PCPs perceptions of the bot.

Vendor Data

To understand change management and implementation supports provided by vendors and to identify patterns of engagement and use over time.

Simulated Encounters: Documentation Time

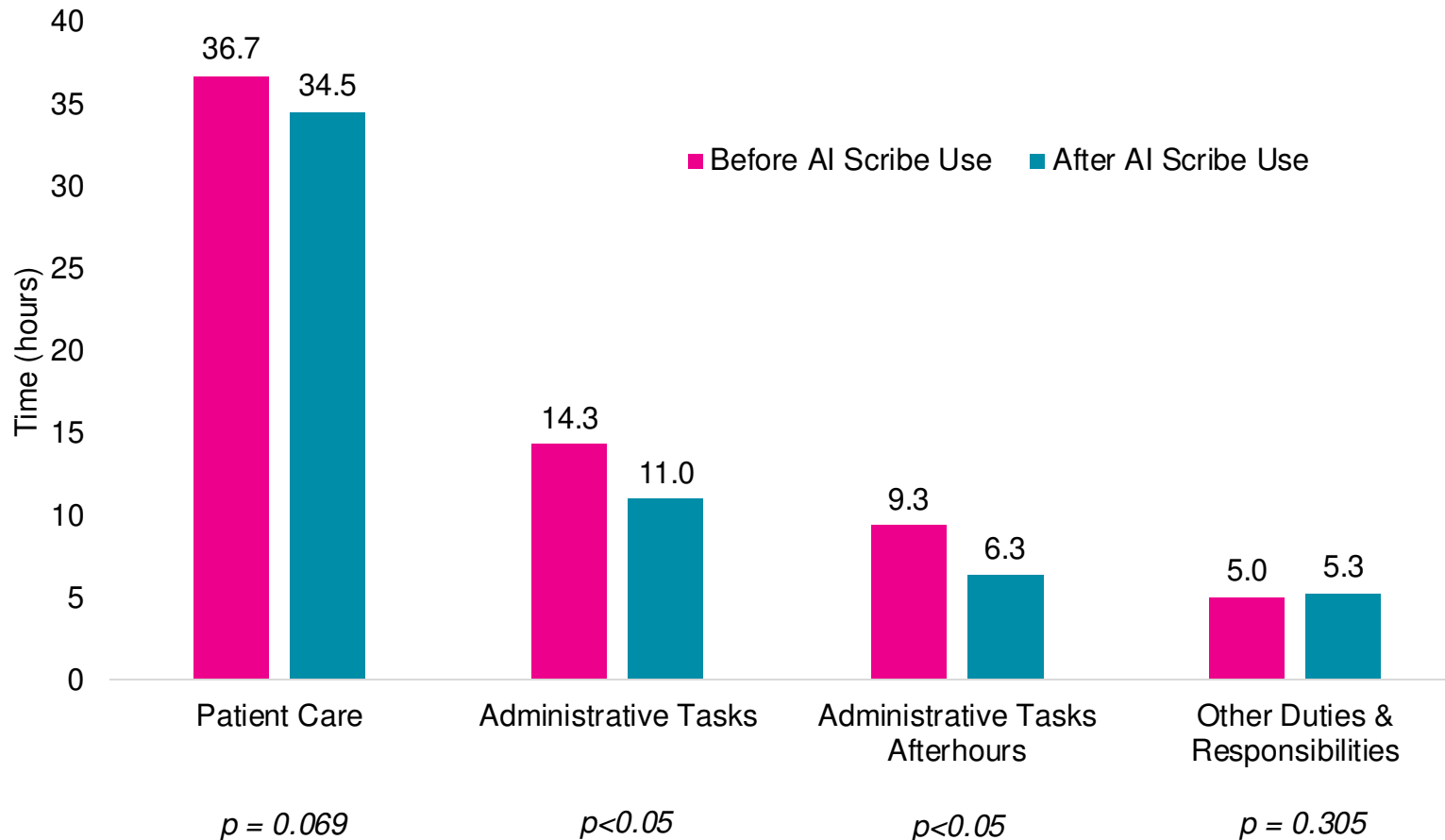
PCPs participated in a simulated clinical encounter, each conducting four encounters with standardized patients: two with PCPs completing documentation in the EMR (i.e., without using an AI scribe) and two without any PCP documentation (i.e., using an AI scribe).

Table 1. The amount of time, in seconds, spent by PCPs on various behaviours with and without use of an AI scribe.

Effectiveness Measures	Without AI Scribe		With AI Scribe		Difference
	Mean Proportion	SD	Mean Proportion	SD	
Typing During Visit	144.66	97.05	0.00	0.00	-144.66
Typing After Visit	187.59	108.81	79.23	66.91	-108.36
Total Documentation Time	332.25	110.96	82.31	63.47	-249.94

On average, PCPs **spend over five and a half minutes on documentation per encounter**, without an AI scribe. With use of an AI scribe, **PCPs saved more than four minutes on documentation per encounter.**

Effectiveness of AI Scribes



After implementing an AI scribe, on average, **PCPs saved over three hours per week on administrative tasks, with most of the time savings being realized afterhours.**

Figure 2. Average time, in hours per week, spent on various tasks before and after implementation of an AI scribe (n=152).

Impact of AI Scribes on Cognitive Load

*"I never realized how stressful it has been these last several years to listen, formulate diagnosis or differentials, pay attention to details and document at the same time. **It feels like a weight was lifted with AI taking on much of the cognitive burden.**"*



Family Physician, Woman

"A freedom from cognitive burden during patient visits. I can rely on the AI scribe to capture a list of all the items discussed and the plan I made with the patient. I don't have to try to remember all the details afterwards if I got sidetracked during my day and did not get my note completed - which used to happen all the time prior to using an AI scribe."



Family Physician, Woman

- 76% of PCPs reported a **significant improvement in their cognitive load** during patient consultations
 - PCPs were able to rely on the AI scribe to **capture details** of clinical encounters which they could refer to when reviewing later in the day or week
 - PCPs liked **having a note to edit** as opposed to writing a whole note themselves

Impact of AI Scribes on Work-Life Balance

- PCPs indicated that the use of an AI scribe **improved or significantly improved:**
 - Level of stress and/or burnout (55%)
 - Work-life balance (53%)
 - Time for personal/family life (49%)
 - Perception of job satisfaction and professional fulfillment (59%)

"...my friends and family were surprised at me coming home at a reasonable time and having the energy to participate in activities, community volunteering events and other functions. I felt much better about being a comprehensive long term family doctor. I never thought I'd say this, but I'm beginning to experience the magic of grass roots primary care again!"



Family Physician, Woman

"I don't think I've been late once going home. I always take my lunch. I have an extra half an hour admin time always blocked later in my afternoon and I have like given that up now [because I don't need it]."



Nurse Practitioner, Woman

Impact of AI Scribes on Patient Experience

*"It allowed me to **focus on the patient interaction** and be able to move more quickly between patients knowing that the information would be accurately documented for review later. Also, it help me structure appointments better in order to formulate a better AI generated note which in and of itself helps patients stay on track and **make the appointment shorter.**"*



Family Physician, Man

*"**I have been more engaged with patients.** I am no longer staring at my computer trying to type as they talk, instead I am able to have proper eye contact with patients during our conversation. Additionally, by not focusing on the screen **I was not distracted by messages or alerts that would pop up on the EMR.**"*



Family Physician, Woman

- Patients perceived AI scribes positively due to:
 - **Improved engagement**, attentiveness, change in the body language of their provider
 - Ensured **accuracy** in documenting their encounters
- Patients **did not express significant concerns about data privacy and security**, largely attributed to their long-term relationships with their provider whom they trusted
 - The majority of PCPs (86%) expressed confidence in their ability to explain the consent process to their patients, but some found it time-consuming and burdensome

Findings: Facilitators and Barriers to Implementation

Workflow Compatibility

- Integration with existing EMR systems and current workflow

Cost and Resources

- Cost associated with acquiring and maintaining licenses and hardware

Training and Education

- Comprehensive training and education regarding AI in healthcare for PCPs and patients

Data Privacy and Security

- Privacy and security measures to address misuse of patient information

Regulatory Support and Guidelines

- Regulatory frameworks and governance on appropriate use of AI and automation in healthcare

Ethics and Biases

- Bias mitigation strategies that address equity and accessibility concerns

Informed Consent Process

- Defined procedure and meaning to obtaining informed patient consent

"[The AI scribe] is not gonna chart exactly like you...And what you can do is train it and give it guidance so it does the correct things most of the time, but you have to also accept too...that the AI is not going to be perfect. It's not gonna write a perfect note..."



Primary Care Provider

*"I don't think there's yet been a patient that consented that [has] given informed consent for AI scribes. Maybe the doctor asked them if they consent, but was it informed? **Does the patient know what's what they're consenting to? ...** For video visits, we have very clear this is what you need for consent. For AI scribes, we don't yet."*



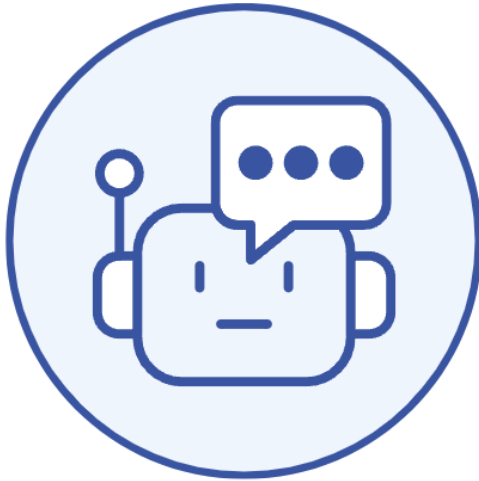
Primary Care Provider

Proposed Plan for AI Scribe After Evaluation Study

- The value for AI Scribe is strong
- Goal between partners:
 - Mitigate identified privacy and liability issues
 - Make it easy for doctors to adopt
 - Change management support for those that need it
- Understand how we can replicate the success of this project for other AI and digital health tools!

LIVING LABRATORY

AI is a Growing Ecosystem



NLM + LLM

=

SIMPLE CHATBOT



NLM + LLM + ASR

=

SCRIBE



NLM + LLM + OCR + ML
+ Email + Fax

=

OFFICE ASSISTANT

Evaluating Components in Context

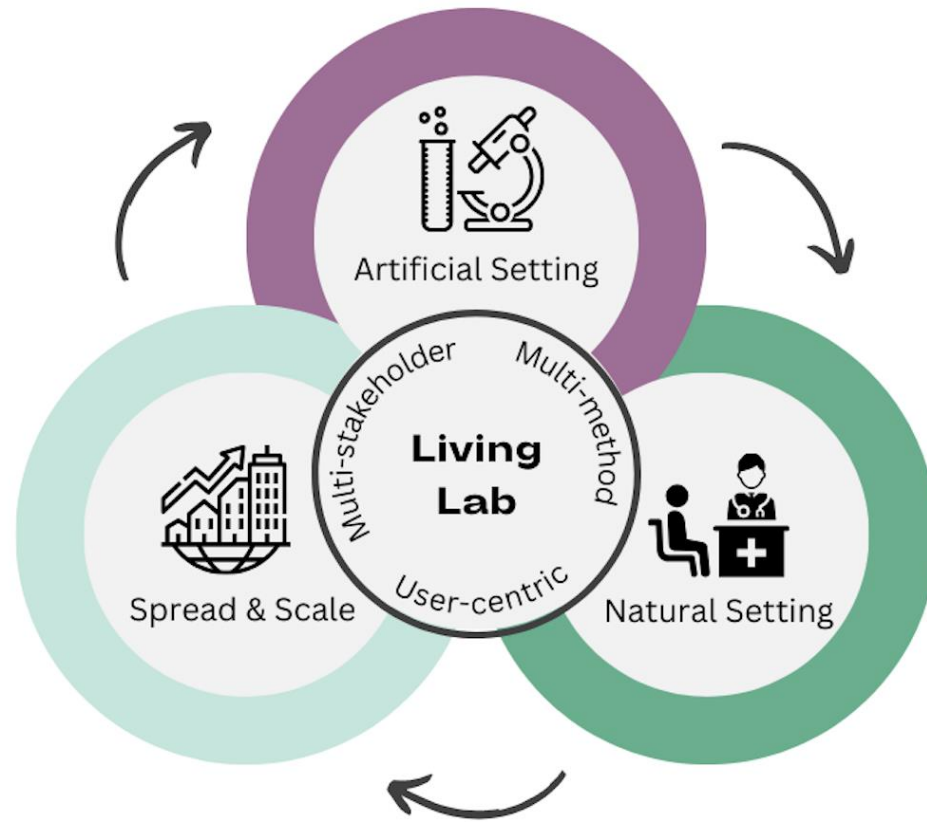


- Secure messaging + Inbox management
- Agenda setting + automated triage
- Image recognition + diagnostics
- Remote monitoring + analytics

Key Components of a Coordinated Approach

- **Alignment with regulatory requirements and best practices**
- **Minimum standards and compliance**
- **A programmatic framework**

Living Lab: Informing Policy from our Clinics



Schuurman D, De Marez L, Ballon P. Open innovation processes in living lab innovation systems: Insights from the LeYLab. *Technology Innovation Management Review*. 2013;3(11).

The Living Lab: Artificial Settings

Simulated Clinical Encounters

Clinical encounter between a **standardized patient and primary care provider using a tool** to assess performance and impact in a controlled lab environment.

OVERALL OBJECTIVES:

1. **Create baseline measures**
2. **Compare with other workflows**

What Happens:

- A primary **care digital test environment** is created (EMRs, additional tools, test patient data)
- Participation will either be virtual or in-person. The in person **environment is set up as a typical clinical office**
- Participants conduct a clinical interview with a standardized patient and will work through **patient cases with different workflows**
- As participants go through these workflows, the **time taken to complete these tasks will be collected through screen recordings**
- Utilize methods from **user centered design, human factors and industrial engineering** to measure and compare workflows

The Living Lab: Natural Settings

Clinical Observations

Observing digital workflows supporting clinical encounters and administrative tasks in real world primary care clinics across Ontario

OVERALL OBJECTIVES:

1. **Baseline measures:** How **long do tasks take** in a regular clinic environment?
2. Understand **how often** are different tasks done?
3. Overserve the the complex interplay between **tools, people and process?**

What Happens:

- Researchers **overserve real world clinical** settings under an REB framework. Data collection may include:
 - Recordings of computer screens during clinical encounters and/or admin time
 - Observing waiting rooms
 - Observing clinical encounters (directly or through video)
- Utilize methods from **user centered design, human factors and industrial engineering** to measure and compare workflows, look at frequency of tasks, key opportunities for improvement etc.
- Develop a **community of diverse practices** across Ontario
- Methods could be leverage to understand **current state**, inform the **spread and scale of tools** and **test the impact of new tools**

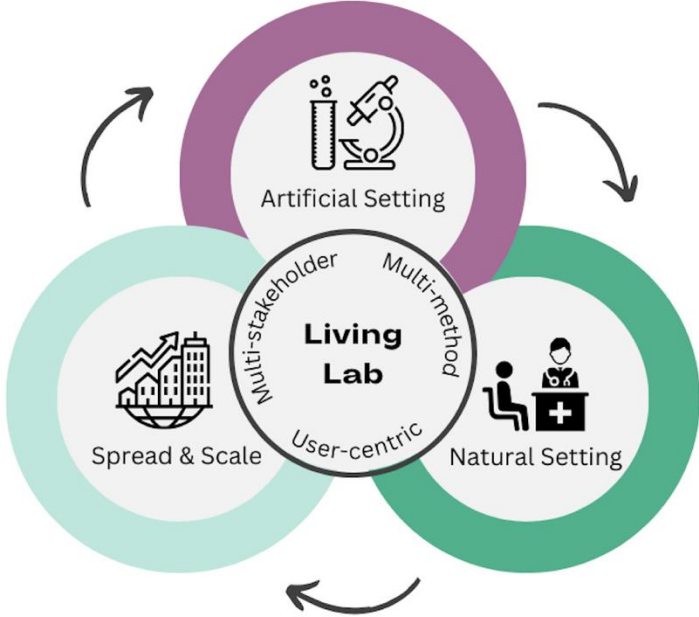
Keys to Success: Partnership

- Expertise in:
 - IT, digital health and health informatics
 - Real world Implementation
 - Methods in user centered design and engineering
 - Healthcare Evaluation
 - Health Policy
- Requires strong input and cooperation with clinicians
 - Observations in clinics
 - Participation in simulations
 - Ongoing feedback and engagement
- Feedback loop with:
 - Vendors
 - Policy makers
 - Other decision makers

Turning the corner on productivity



Improve the tools we get



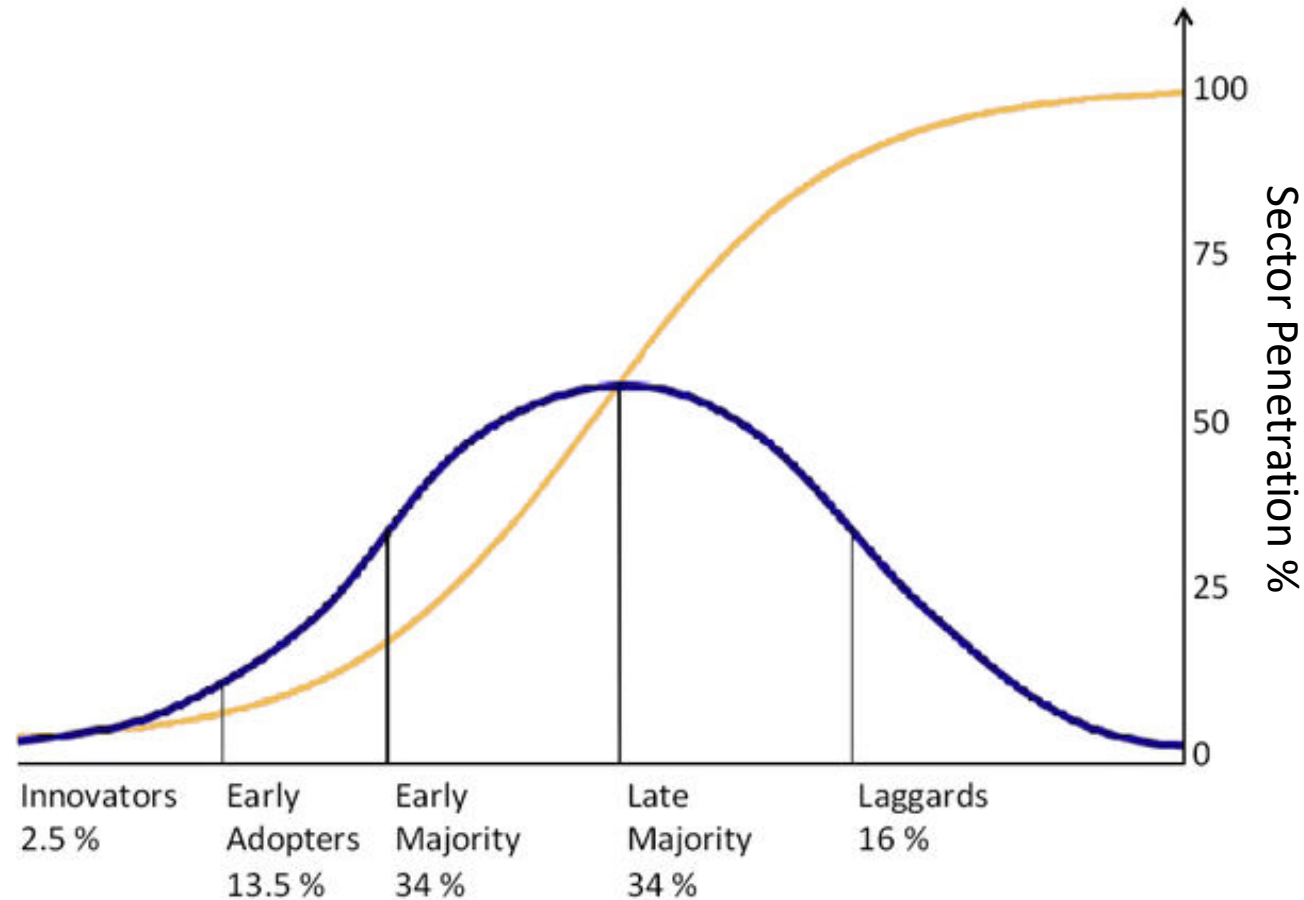
Understand and reimagine the work

Spread and Scale for System Impact

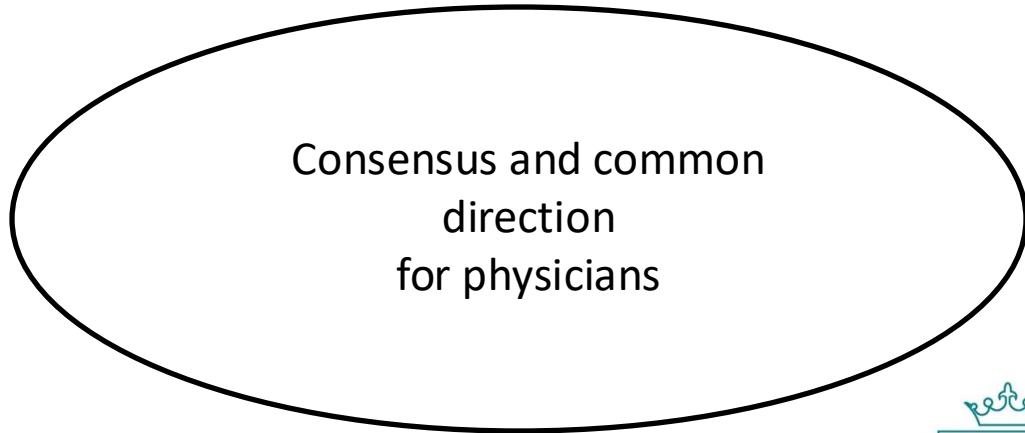
Proposed Plan for AI Scribe After Evaluation Study

- The value for AI Scribe is strong
- Goal between partners:
 - Mitigate identified privacy and liability issues
 - Make it easy for doctors to adopt – **including address price**
 - Change management support for those that need it
 - Understand how we can replicate the success of this project for other AI and digital health tools!

How do we achieve system impact of AI



Identifying privacy and liability issues with AI Tools

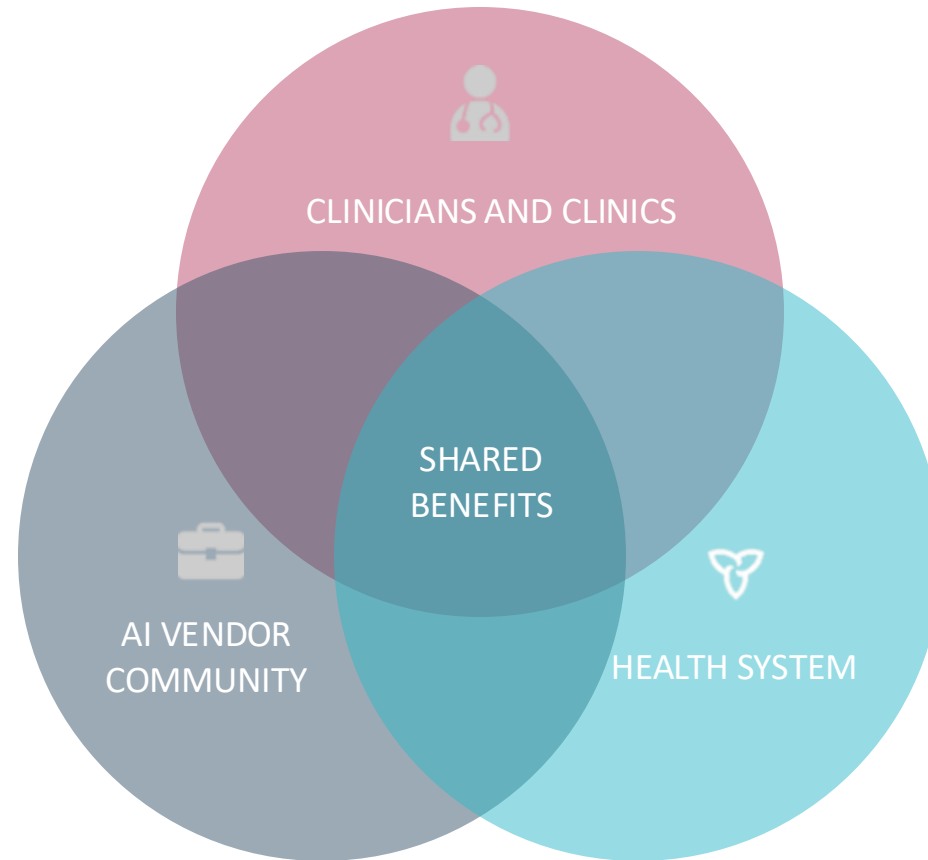


Solutions we have heard from Doctors

Curate the market

- Vet the vendors for quality
 - Mitigate/Navigate legal, privacy and liability issues on their behalf
 - One place for doctors to find their AI and digital business needs
-
- Digital Services as a Managed Service
 - Set up master contracts with bulk pricing
 - Offer IT and data management services for physicians to access – including AI enabled technology

Aligning Interests





Appendix

Data Collection

The WCH Virtual Care Lab (VCL)

- Controlled research environment to evaluate digital health tools and models of care in an environment that simulates real-world use (Women's College Hospital Launches First of Its Kind Virtual Care Laboratory, 2021)
- Valid approach to measure clinical workflows (*cf* (Doberne et al., 2015; Loomis & Montague, 2022))
- Uses audio, video and screen recording data (Borycki et al., 2010)
- Set-up to resemble a primary care clinic (supporting in-person and remote visits)



Findings: Competitive Analysis

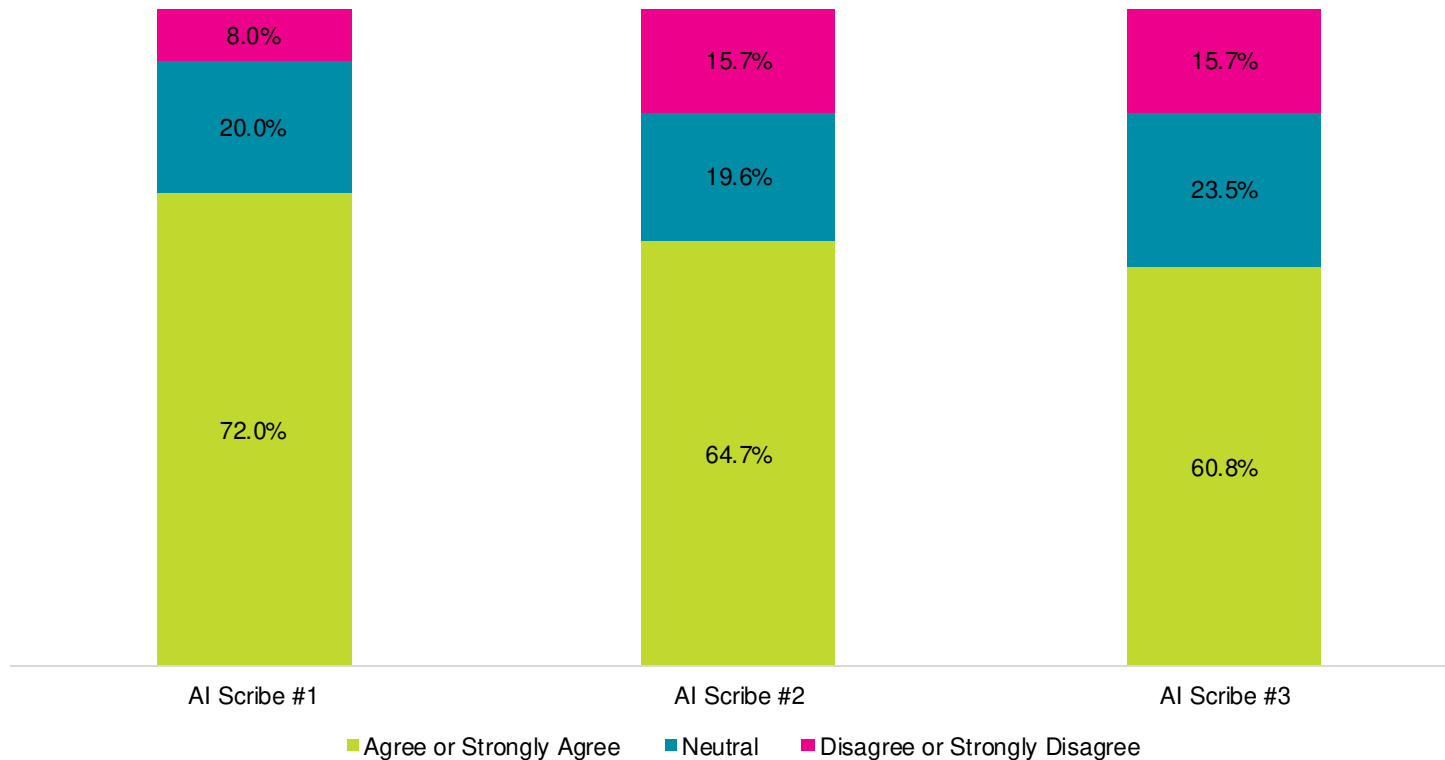
AI Scribe	Scribe #1	Scribe #2	Scribe #3	Scribe #4	Scribe #5	Scribe #6
Technical Performance						
Average documentation time	Case 1: 50.68 sec Case 2: 33.05 sec	Case 1: 42.08 sec Case 2: 1:05 min	Case 1: 50.50 sec Case 2: 35.10 sec	Case 1: 1:48 min Case 2: 1:32 min	Case 1: 38.71 sec Case 2: 26.09 sec	Case 1: 19.25 sec Case 2: 22.07 sec
Recovery from interruptions	Excellent	Good	Good	Good	Good	Poor
Speaker differentiation	Excellent	Good	Good	Excellent	Good	Good
Irrelevant information	Excellent	Good	Excellent	Good	Poor	Poor
Accent and slang comprehension	Good	Good	Good	Poor	Poor	Poor

Findings: Competitive Analysis

AI Scribe	Scribe #1	Scribe #2	Scribe #3	Scribe #4	Scribe #5	Scribe #6
Accuracy and Quality in Documentation[†]						
Errors (missing words, incorrect medical terms, critical errors)	N/A	Omission of some HPI, lifestyle, and social history	Omission of some HPI, lifestyle factors	Omission of some HPI, lifestyle, and social history	Omission of some HPI	Omission of some HPI, lifestyle, and social history
Transcript	Excellent	Good	Good	Good	Good	Excellent
Medical Note	Excellent	Excellent	Excellent	Good	Good	Good

[†]Composite measure based on assessment of individual features and functions of each AI scribe.

Performance of AI Scribes



Challenging Clinical Scenarios

- Simple encounters
- Mental health encounters
- Physical examination
- Differential diagnoses
- Education

Complicating Factors

- Multiple speakers
- Languages other than English or French
- Equipment and technical infrastructure

Figure 3. Overall Accuracy of Clinical Notes Generated by AI Scribe (n=152)