

Leveraging Data, New Tools, and AI to Address the Crisis

Primary Care Crisis 2023 Symposium – December 1st 2023

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Chaires
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Institute of Health Policy, Management and Evaluation
UNIVERSITY OF TORONTO



Sinai
Health

Lunenfeld-Tanenbaum
Research Institute

Crisis points from yesterday

Shortage issue
(team-based
care needs)

System
inequities

Complexity and
fragmentation

Inadequate
funding and
payment

Outdated
infrastructure

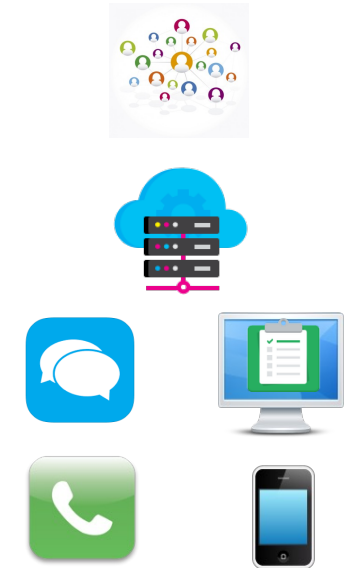
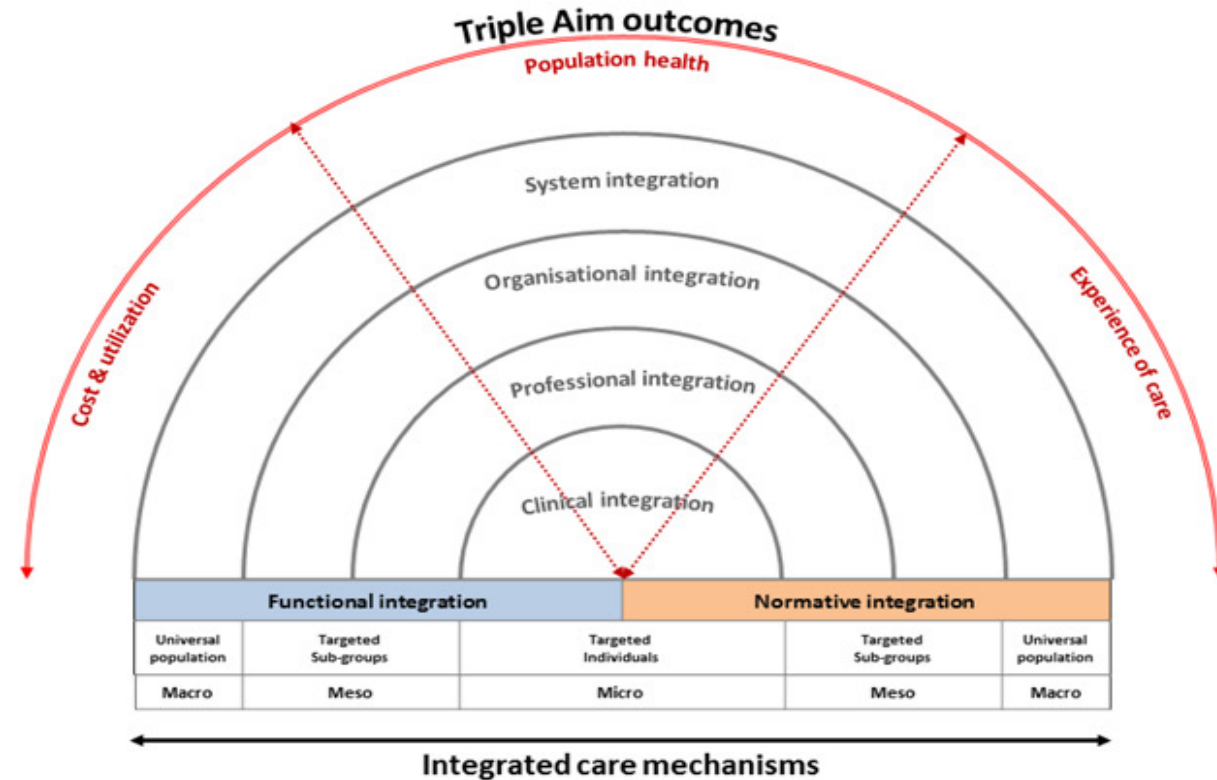
Inefficiencies

Governance
disconnect

Implementation
and evaluation
done ad hoc

Escalating
demands

Overly disease-
focused

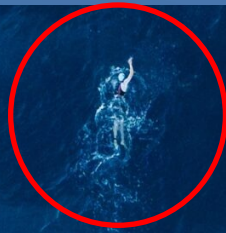
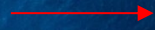


Valentijn PP et al. Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. *IJIC*. 2013;13:e010.

Steele Gray , Gagnon , Guldmond, Kenealy. (2021), "Digital Health Enabling Integrated Care", Kaehne, A. and Nies, H. (Ed.) How to Deliver Integrated Care (European Health Management in Transition), Emerald Publishing Limited, pp. 115-136.



Lucy Charles
Barclay



Everyone
else



The same holds for digital health and AI in primary care

We won't win the primary
care crisis with digital health
and AI alone. But we can most
certainly lose
(if we don't get it right)



Original Paper

The Influence of Electronic Medical Records on Physician Burnout: Cross-sectional Study

Tania Tajirian^{1,2}, MD; Marcos Sanches³, MSc PhD

Journal of the American Medical Informatics Association, 26(2), 2019, 106–114

doi: 10.1093/jamia/ocy145

Advance Access Publication Date: 5 December 2018



Open access

Original research

BMJ Open Electronic medical record-related


Research

Physician informatics

Rebekah Sara Popl

JOURNAL ARTICLE

Electronic medical records and physician stress in primary care: results from the MEMO Study ^{FREE}

Stewart Babbott  Linda Baier, Maxwell, Roger Brown, Frid Montague, Eric Williams, Mark Schwartz, Erik Hess

Mark Linzer

Journal of the American Medical Association

<https://doi.org/10.1001/jama.2018.11111>

Published: 04 September 2018



Original Investigation | Health Informatics

Association of Electronic Health Record Design and Use Factors With Clinician Stress and Burnout

Philip J. Kroth, MD, MS; Nancy Morioka-Douglas, MD; Sharry Veres, MD; Stewart Babbott, MD; Sara Poplau, BA; Fares Qeadan, PhD; Carolyn Parshall, MPH; Kathyne Corrigan, MS; Mark Linzer, MD

But there's hope

AI in primary care
Data to enable the Learning Health System
Technology to support team-based care





You

Tell me about how A.I. tools can be used in primary care settings

Risk prediction and prevention (digital triage)

Patient engagement and education

Administrative efficiency

Telehealth and virtual assistants

Data analytics (evaluation)



ChatGPT

Artificial intelligence (AI) tools have the potential to revolutionize primary care settings by enhancing efficiency, accuracy, and patient outcomes. Here are several ways in which AI can be applied in primary care:

1. Diagnostic Assistance:

1. **Decision Support Systems:** AI can assist healthcare professionals by providing decision support for diagnosis and treatment plans. By analyzing patient data, symptoms, and medical history, AI tools can suggest potential diagnoses and recommend evidence-based treatment options.
2. **Image and Pattern Recognition:** AI algorithms can analyze medical images such as X-rays, MRIs, and CT scans to identify abnormalities and assist in the early detection of conditions like tumors, fractures, or infections.

2. Risk Prediction and Prevention:

1. **Predictive Analytics:** AI can analyze patient data to identify individuals at risk of certain diseases or conditions. This allows for proactive interventions and personalized preventive care plans.
2. **Chronic Disease Management:** AI tools can help monitor and manage chronic conditions by analyzing patient data, providing reminders for medications, and offering lifestyle recommendations to improve overall health.

3. Patient Engagement and Education:

1. **Chatbots and Virtual Assistants:** AI-powered chatbots can provide patients with information about symptoms, medications, and lifestyle changes. They can also offer support for managing chronic conditions and answer frequently asked questions.
2. **Remote Monitoring:** AI-enabled devices can collect and analyze real-time data from patients, allowing healthcare providers to remotely monitor vital signs, adherence to treatment plans, and overall health status.

4. Administrative Efficiency:

1. **Scheduling and Appointment Management:** AI tools can streamline administrative tasks by automating appointment scheduling, reminders, and other routine tasks, freeing up healthcare professionals to focus on patient care.
2. **Billing and Coding Assistance:** AI can assist in coding and billing processes, reducing errors and improving the accuracy of reimbursement.

5. Natural Language Processing (NLP):

1. **Electronic Health Record (EHR) Documentation:** NLP can help healthcare providers streamline the documentation process by converting spoken or written language into structured data. This improves the accuracy and efficiency of EHR updates.

6. Telehealth and Virtual Consultations:

1. **Virtual Health Assistants:** AI-powered virtual assistants can help facilitate virtual consultations, answer patient queries, and assist in the collection of relevant information before a telehealth appointment.

7. Clinical Trials and Research:

1. **Data Analysis:** AI can analyze large datasets from patient records to identify trends, potential treatment outcomes, and contribute to clinical research efforts.



ChatGPT

While AI offers numerous benefits, it's essential to address challenges such as **data privacy, ethical considerations**, and the need for **ongoing validation of AI algorithms** in clinical settings. *Integrating AI tools into primary care* requires collaboration between healthcare professionals, technologists, and policymakers to ensure responsible and effective implementation



You

Please expand on the challenges listed

Ethical considerations

Interoperability

Training and acceptance



ChatGPT

- Certainly, integrating AI tools into primary care settings presents several challenges that need to be addressed for successful implementation. Here are some key challenges:
 1. **Data Privacy and Security:**
 1. **Sensitive Health Data:** Healthcare data is highly sensitive, and the use of AI involves the analysis of large amounts of patient information. Ensuring the privacy and security of this data is crucial to maintain patient trust and comply with regulations like HIPAA (Health Insurance Portability and Accountability Act) in the United States.
 2. **Ethical Considerations:**
 1. **Bias and Fairness:** AI algorithms can inherit biases present in the training data, leading to disparities in healthcare outcomes. It's essential to address bias in AI systems to ensure fair and equitable treatment across diverse patient populations.
 2. **Informed Consent:** Implementing AI tools requires clear communication with patients about how their data will be used. Obtaining informed consent and ensuring transparency about AI-driven decision-making processes are essential ethical considerations.
 3. **Interoperability:**
 1. **Compatibility with Existing Systems:** Many healthcare facilities use different electronic health record (EHR) systems, and integrating AI tools with these systems can be challenging. Achieving interoperability is crucial for seamless data exchange and collaboration among healthcare providers.
 4. **Validation and Regulation:**
 1. **Evidence-Based Practice:** The effectiveness and reliability of AI algorithms in clinical settings must be rigorously validated through clinical trials and real-world testing. Ensuring that AI tools meet established standards for evidence-based practice is essential.
 2. **Regulatory Compliance:** Healthcare is a heavily regulated industry, and AI tools must comply with regulatory standards. The lack of clear guidelines and regulations for AI in healthcare can hinder widespread adoption.
 5. **Healthcare Professional Training:**
 1. **Education and Training:** Healthcare professionals may need training to understand and effectively use AI tools. Training programs should address how AI complements clinical decision-making, and professionals should be familiar with the limitations and uncertainties associated with AI-generated recommendations.
 6. **Patient Acceptance:**
 1. **Trust in Technology:** Patients may be skeptical or hesitant to trust AI-driven recommendations. Building trust through transparent communication and demonstrating the benefits of AI in improving healthcare outcomes is crucial for patient acceptance.
 7. **Cost and Resource Allocation:**
 1. **Financial Barriers:** The initial cost of implementing AI systems and ongoing maintenance can be significant. Healthcare organizations may face challenges in allocating resources for AI integration, especially smaller practices with limited budgets.
 8. **Legal and Liability Issues:**
 1. **Liability Concerns:** Determining responsibility in cases where AI tools provide inaccurate or incomplete information can be complex. Clear legal frameworks need to be established to address liability and accountability in AI-assisted healthcare.



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Addressing these challenges requires a multidisciplinary approach involving healthcare professionals, technologists, ethicists, policymakers, and patients. Collaborative efforts can help create guidelines, standards, and frameworks that ensure the responsible and ethical use of AI in primary care settings. **Ongoing research, development, and stakeholder engagement are essential for overcoming these challenges and maximizing the benefits of AI in healthcare.**



You

Thank you. Can you please reference your previous answers.



ChatGPT

I can provide information and insights based on my training data, but **I don't have the ability to access external databases or retrieve specific references to cite.** If you have any specific questions or if there's a particular topic you'd like more information on, feel free to let me know, and I'll do my best to assist you!

RESEARCH ARTICLE

Implementing artificial intelligence in Canadian primary care: Barriers and strategies identified through a national deliberative dialogue

Katrina Darcel^{1,2}, Tara Upshaw^{1,3}, Amy Craig-Neil¹, Jillian Macklin^{1,2,4,5}, Carolyn Steele Gray^{6,7}, Timothy C. Y. Chan⁸, Jennifer Gibson^{4,5}, Andrew D. Pinto^{1,5,9,10*}

Priorities for Artificial Intelligence in Canadian Deliberative Dialogue with Patients and System Leaders

Tara L. Upshaw, Amy Craig-Neil, Jillian Macklin, Carolyn Steele Gray, Timothy C. Y. Chan
The Journal of the American Board of Family Medicine April 2023, 36 (2) 210-220; DOI: <https://doi.org/10.1186/s12911-022-01984-6>

Terry et al.
BMC Medical Informatics and Decision Making (2022) 22:237
<https://doi.org/10.1186/s12911-022-01984-6>

BMC Medical Informatics and Decision Making



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Procedia Computer Science 167 (2020) 75–84

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RESEARCH

Open Access

Is primary health care ready for artificial intelligence? What do primary health care stakeholders say?

Amanda L. Terry^{1,2,3*}, Jacqueline K. Kueper^{1,4}, Ron Beleno⁵, Judith Belle Brown², Sonny Cejic², Janet Danz², Daniel Leger², Scott McKay², Leslie Meredith², Andrew D. Pinto^{8,9,10,11}, Bridget L. Ryan^{1,2}, Moira Stewart², Merrick Zwarenstein^{1,2} and Daniel J. Lizotte^{1,4}

International Conference on Computational Intelligence and Data Science (ICCIDS 2019)

Design and Development of Diagnostic Chabot for supporting Primary Health Care Systems.

Bushra Kidwai*, Nadesh RK

School of Information Technology and Engineering, VIT Vellore, 632014, India

PROVIDERS AND HEALTH

JOURNAL OF MEDICAL INTERNET RESEARCH

Blease et al

Original Paper

Artificial Intelligence and the Future of Primary Care: Exploratory Qualitative Study of UK General Practitioners' Views

Charlotte Blease^{1,2}, PhD; Ted J Kaptchuk¹, OMD; Michael H Bernstein³, PhD; Kenneth D Mandl^{4,5,6}, MD, MPH; John D Halamka^{7,8}, MD, PhD; Catherine M DesRoches⁹, DrPH

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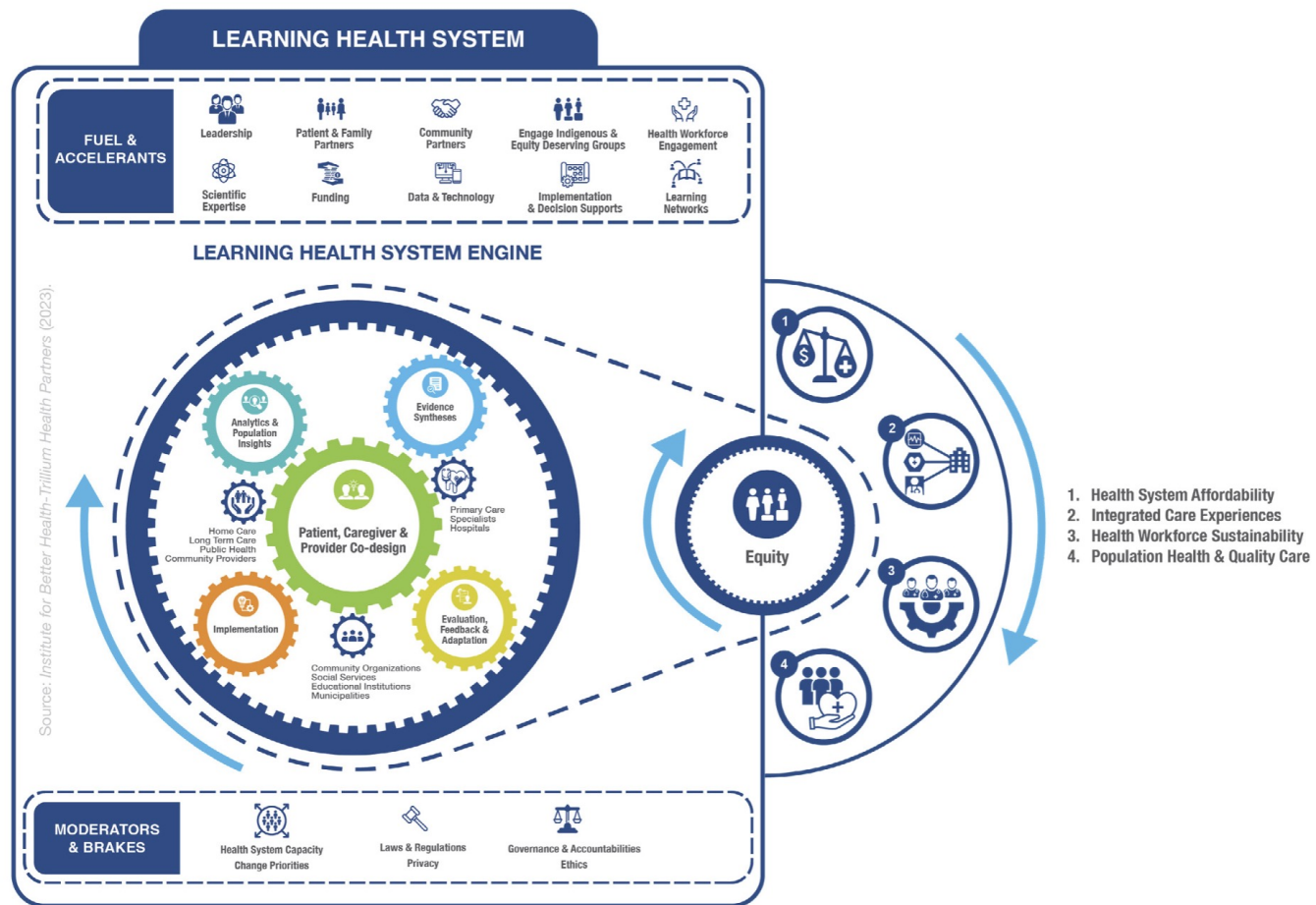
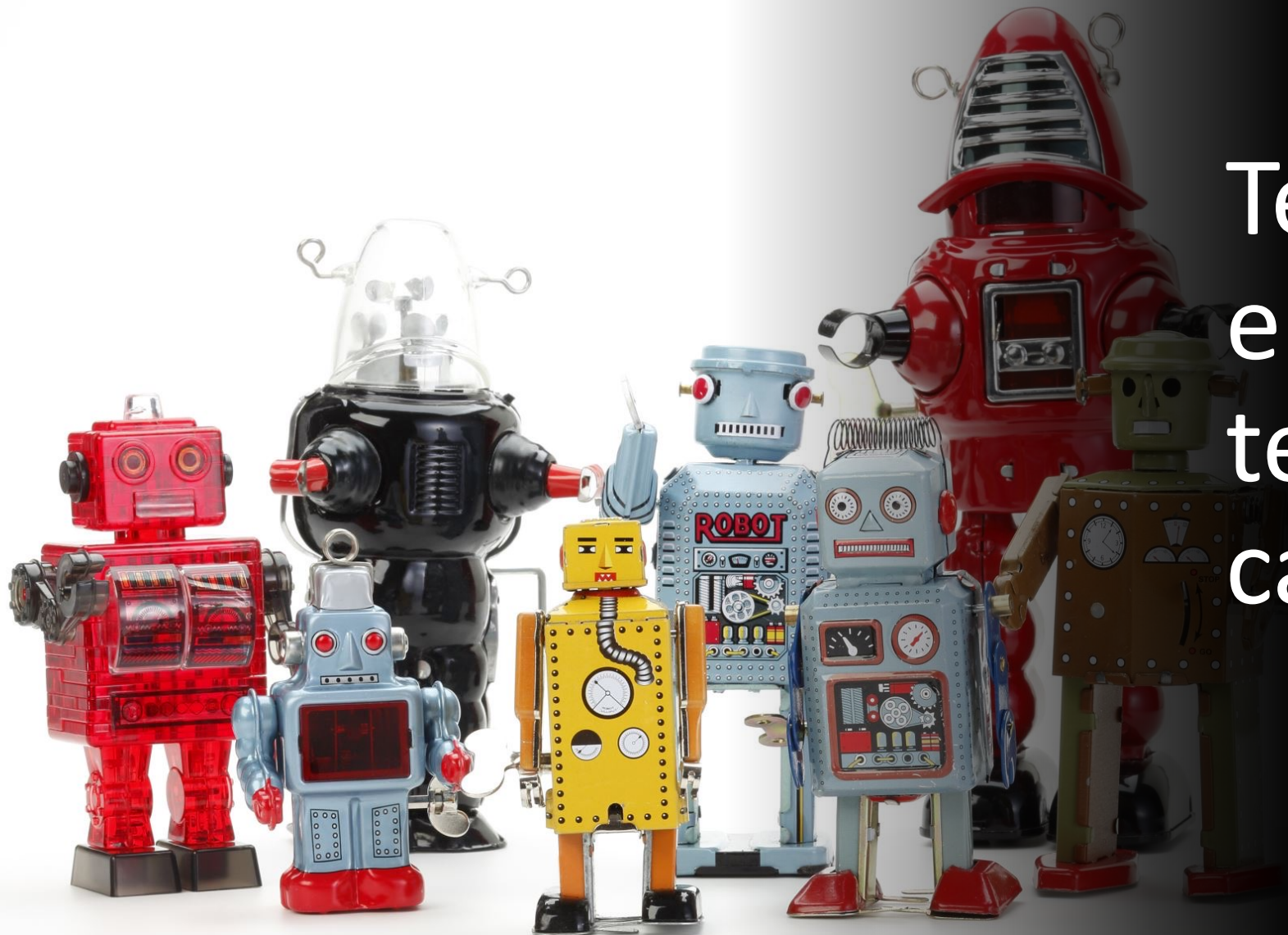


Figure 2. Learning Health System Action Framework

- Data is foundational to move the gears of a Learning Health System.
- The challenge is whether we have the right data available at the right time to drive decisions.



Technology
enabling
team-based
care

Collaborative workflows of interprofessional teams

We can consider where technology supports the tasks and behaviours of the team

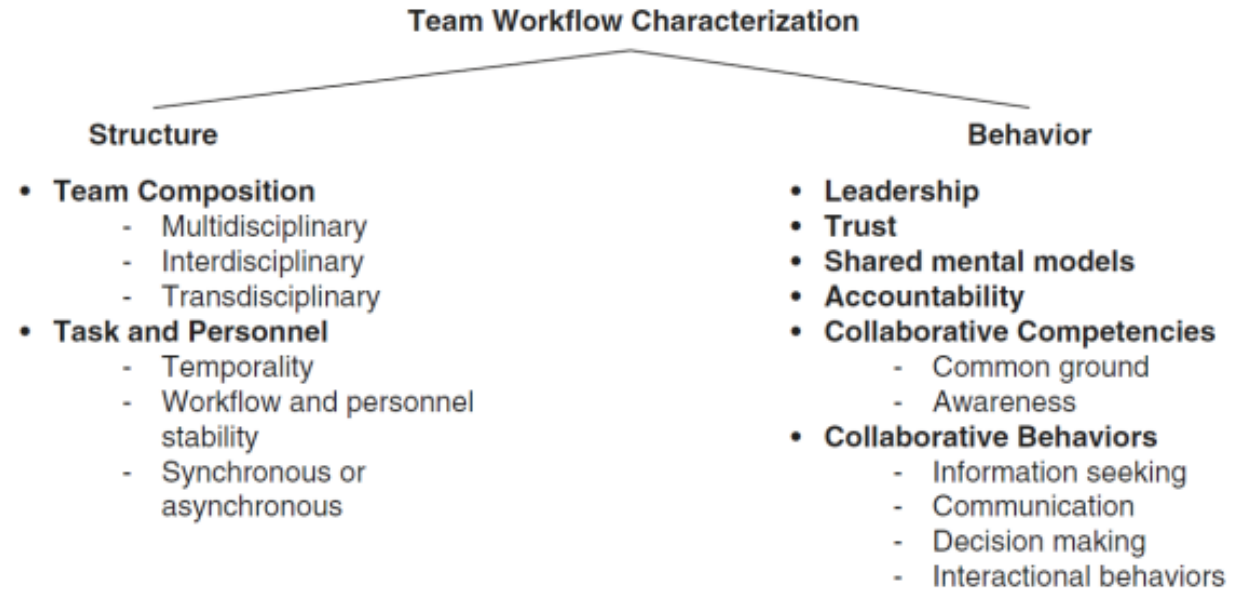


Fig. 6.1 Team-based workflow characterization based on structures and behaviors

Kuziemy, C.E., J. Abraham, and M.C. Reddy, Characterizing Collaborative Workflow and Health Information Technology, in Cognitive Informatics: Reengineering Clinical Workflow for Safer and More Efficient Care, K. Zheng, et al., Editors. 2019, Springer International Publishing: p. 81-102.

Distributed cognition theory

- Emphasis on human-computer interactions
- Cognitive processes are shared amongst a group
- The “group” includes technology – technology can do part of the “thinking of the group”

Hazlehurst B. When I say ... distributed cognition. Med Educ. 2015;49(8):755-756. doi:[10.1111/medu.12672](https://doi.org/10.1111/medu.12672)



We can consider where technology can alleviate, rather than exacerbate cognitive burden.



We need to consider how we integrate digital technologies as a member of the team



DISCUSSION

So what would make digital technology a good team member?

What is in the way?

Need to evolve

Not just doing the same old faster, we need to leverage these tools to transform



Digitally-
enabled
primary care

