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Leveraging AI in clinical settings to enable doctors to do what they do best.

Providing the best possible care for their patients and themselves.

Executive Summary

Physicians' concerns about the reliability, transparency, and ethical use of AI in healthcare are valid and well-recognized.

AI developers, healthcare organizations, and regulators are actively addressing these issues by focusing on creating explainable AI systems, ensuring robust data security, and integrating AI tools seamlessly into clinical workflows.

Rigorous testing, diverse training datasets, and continuous updates are helping to improve AI accuracy and reliability, while maintaining human oversight ensures that **AI remains a valuable support tool, not a replacement for clinical judgment**. With these solutions in place, physicians can feel reassured that AI is evolving to complement their expertise, enhance patient care, and ease their workloads, rather than introduce new risks.

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Contents

Introduction

Health care professionals have a long history of bringing a tough-minded, fact-based approach to claims of breakthroughs in the practice of medicine.

Our goal is in this paper is to provide a clear overview of how to think about incorporating AI into your clinical practice – both drawing on our experience in working with practitioners and Sully's R&D efforts.

1 AI in Clinical Practice: Enhancing Efficiency and Patient Experience.

AI technologies are becoming integral to clinical practice by reducing the burden of routine tasks, enhancing diagnostic accuracy, enabling personalized treatment, and improving patient interactions. These improvements not only save doctors time but also lead to better health outcomes and higher patient satisfaction by providing more efficient, timely, and precise care.

In our experience, early adopters are seeing the following benefits.

Timesaving for Doctors.

Three benefits stand out: First, AI systems can automate administrative duties such as appointment scheduling, note-taking, and billing, allowing doctors to spend more time with patients.

Second, AI-powered diagnostic tools (e.g., for radiology, pathology, and genomics) provide fast, accurate assessments, helping doctors reach diagnoses faster. And finally, AI-driven Clinical Decision Support Systems can analyze medical records and provide evidence-based recommendations. Doctors can rely on these systems for quick,
data-backed treatment suggestions, saving time in decision-making.

Improved Accuracy and Precision.

AI allows doctors to provide more personalized care by analyzing large sets of patient data to identify tailored treatment plans for consideration. This increases the likelihood of successful outcomes, improving both efficiency and patient trust in care. AI models are also being used for early detection of diseases (e.g., cancers, diabetic retinopathy, and cardiovascular conditions) through pattern recognition in medical images, lab results, or patient data. This helps reduce diagnostic errors and increases the accuracy of diagnoses, improving overall patient satisfaction.

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Increased Patient Satisfaction.

AI chatbots and virtual assistants can help patients schedule appointments, receive reminders, and access follow-up information. This reduces waiting times and improves communication, leading to a better overall experience. Patients benefit from quicker diagnoses and more accurate treatment plans, which can lead to better outcomes and fewer follow-up visits. AI-powered virtual health assistants can also provide patients with 24/7 access to health advice, symptom checkers, and medical information outside traditional office hours, increasing accessibility and convenience.

In short, AI helps doctors focus on what they do best—caring for patients—while automating or assisting with tasks that are time-consuming or prone to error.

Table: AI time-savings in clinical practice

CLINICAL TASK	TRADITIONAL TIME (WITHOUT AI)	TIME WITH AI ASSISTANCE	ESTIMATED TIME SAVED	DESCRIPTION OF AI IMPACT
Administrative Duties (e.g, scheduling, note-taking, billing)	2-3 hours per day	2-3 hours per day	2-3 hours per day	Automate repetitive tasks
Diagnostic Interpretation (e.g, radiology, pathology)	30-60 minutes per patient	10-15 minutes per patient	20-45 minutes per patient	Provides fast, accurate assesments, reducing the time required to interpret results
Clinical Decision Support (e.g, treatment recom-mendations)	15-20 minutes per patient	5-10 minutes per patient	10-15 minutes per patient	Analyzes patient data and suggesrs evidence-based tratment plans
Patient Interactions (e.g, virtual assistants, chatbots)	5-10 minutes per patient	2-3 minutes per patient	3-7 minutes per patient	Chatbots handle rou-tine questions, sched-uling and follow-ups
Remote Monitoring (e.g, chronic disease management)	30-45 minutes per follow-up visit	10-15 minutes per follow-up visit	20-30 minutes per follow-up visit	Monitors real-time data and alerts doctors only when necessary

2 Understanding the Risks.

Successfully integrating new technologies rightly requires a full understanding of the risks. In our experience the top three are reliability, explainability and bias. But all these risks are valid and need to be managed.

Reliability and Accuracy of IA.

While AI has made strides in diagnostics, doctors worry that over-reliance on AI could lead to errors, especially in complex cases. AI systems may make incorrect diagnoses due to incomplete or biased datasets, and there is concern that these systems may not be able to handle rare or nuanced medical conditions.

* A related concern is liability. If an AI system makes an incorrect recommendation or diagnosis that leads to patient harm, doctors are concerned about who is legally responsible.

Explainability.

Many AI systems, particularly those using deep learning, function as "black boxes" where the reasoning behind the AI's decision or recommendation is not transparent. Doctors are hesitant to trust or rely on AI systems if they cannot understand or explain how the AI arrived at a conclusion.

Bias in Algorithms.

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Data Privacy and Security.

One of the primary concerns for doctors is the protection of patient data. With AI systems processing large amounts of sensitive medical information, the potential for data breaches and unauthorized access is heightened. Doctors are also concerned about who owns and controls patient data once it's fed into AI systems. This concern is amplified when working with third-party AI tools or platforms.

Impact on Doctor-Patient Relationship.

Doctors are concerned that patients may lose trust in their care if they perceive that AI, rather than their physician, is making medical decisions. Patients may be uncomfortable with the idea of being diagnosed or treated by an algorithm, especially if it's not well explained. also exists - where patients feel like they are receiving more robotic than human care. Doctors also worry about a depersonalized approach to care and reduction in the value the human touch and empathy.

Over-Reliance on AI.

Some doctors worry that over-reliance on AI tools may erode their clinical judgment and diagnostic skills over time. There is concern that AI might replace critical thinking with automated processes, leading to deskilling or complacency.

Integration and Workflow Disruptions.

AI systems that do not seamlessly integrate with existing Electronic Health Records (EHR) systems can disrupt clinical workflows.   Doctors also worry about the time and effort required to learn how to use AI systems effectively, which can be challenging in already busy clinical environments.

Ethical and Legal Concerns.

Doctors are concerned about ensuring that patients are properly informed when AI tools are used in their care. Patients may not fully understand how AI influences their treatment, and ensuring transparency about AI's role is a major ethical issue. There is fear that AI could undermine physicians' autonomy in decision-making. If AI tools become widely accepted, doctors may feel pressure to follow AI recommendations even when they believe clinical judgment should take precedence.

Regulations and Standards.

There is currently a lack of consistent regulatory frameworks governing the use of AI in healthcare. Doctors are concerned about the uneven quality and safety of AI tools, especially since different systems may not adhere to the same standards or certifications.

3 Strategies for Addressing Reliability Concerns.

Addressing concerns about the reliability of medical AI is crucial for gaining doctors' trust and ensuring AI systems are safe, effective, and dependable in clinical practice. Here are some strategies to overcome these concerns.

Improving Data Quality and Diversity.

AI systems must be trained on high-quality datasets that are representative of diverse populations. This includes data from different age groups, ethnicities, genders, and geographic regions to avoid biases and ensure that AI performs well across various patient demographics. Developers should also conduct thorough audits to detect and mitigate biases in training datasets.

Rigorous Testing and Validation.

Extensive testing in real-world clinical environments is required. This means conducting clinical trials or pilot studies in diverse healthcare settings to evaluate how the AI performs in diagnosing, treating, or assisting in medical decisions. Subjecting AI models to peer review and independent audits can enhance trust in the system's accuracy and safety. Continuous performance monitoring through long-term studies allows for the assessment of AI reliability over time.

Ensuring Explainability and Transparency.

This is critical to overcoming reliability concerns. Doctors need to understand how the AI arrived at a particular recommendation or decision. AI systems should be designed to provide clear, interpretable reasoning behind their suggestions, rather than functioning as opaque "black boxes." AI systems should also provide an **audit trail** that documents how a decision was made. This transparency allows doctors to review the AI's process and ensure that its conclusions align with clinical judgment. It also helps in addressing liability concerns if something goes wrong.

Integration of Human Oversight.

AI should be positioned as a tool to **support, not replace**, human decision-making. Emphasizing the role of AI as an aid to enhance clinical judgment can alleviate fears that the system might take over critical decisions. Doctors should always retain final decision-making authority, using AI to confirm or complement their own expertise. Many AI systems can offer a "dual validation" model, where both the AI and the human doctor review the results before making any critical decisions. This hybrid approach leverages the strengths of both human expertise and machine accuracy, reducing the likelihood of errors.

Clear Regulatory Standards and Certifications.

Ensuring AI systems meet rigorous regulatory standards (e.g., FDA, CE marking) provides a baseline for reliability and safety. Regulatory bodies should develop clear and stringent guidelines for the development, testing, and deployment of AI in healthcare. This can help doctors trust that approved AI tools have undergone thorough vetting.

Continuous Monitoring and Updates.

Once an AI system is deployed, continuous monitoring is essential. Regular audits, updates, and recalibration based on new data or evolving medical knowledge ensure that the AI remains accurate and relevant over time. Developing AI systems that incorporate **real-time feedback from clinicians** can also improve reliability.

Enhancing Robustness for Edge Cases.

AI systems must be trained to handle rare and edge cases effectively. While common conditions are usually well-represented in datasets, rare diseases or unusual presentations can challenge AI systems. Implementing fail-safe mechanisms that flag uncertain or unclear cases for human review ensures that the AI doesn't make critical decisions when it lacks sufficient confidence. This can significantly reduce the risk of incorrect diagnoses or treatment suggestions in complex cases.

Education and Training for Doctors.

Providing healthcare professionals with comprehensive training helps them better understand AI's strengths and limitations. Increasing digital literacy will also enable them to engage more critically with AI system recognizing when AI outputs require further investigation or modification

Pilot Programs and Gradual Implementation.

Introducing AI systems gradually through pilot programs can help address concerns about reliability. A phased approach allows clinicians to test the system in real-world settings, provide feedback, and assess its impact before fully integrating it into regular practice. Ensuring that AI tools are developed in close collaboration with healthcare professionals guarantees that they are designed with practical clinical needs in mind.

4 AI Innovations in Outpatient-Patient Treatment.

One of the most exciting and immediate areas to apply AI innovation is in **out-patient care**, helping to enhance the patient experience, streamline clinical workflows, and improve treatment outcomes. Here are some key AI applications that are making a significant impact in this area.

Virtual Health Assistants and Chatbots.

AI-powered virtual assistants, such as chatbots, help streamline patient communication, answering routine questions, managing appointment scheduling, and providing personalized health advice. These tools can triage patients by asking them about their symptoms and providing guidance on next steps (e.g., booking a consultation or seeking urgent care). Virtual assistants help out-patient clinics manage high patient volumes, saving physicians time by handling routine inquiries and preliminary triage tasks. This results in shorter wait times and improved patient satisfaction.

AI-Powered Remote Monitoring.

Wearable devices and remote monitoring systems powered by AI allow for continuous monitoring of chronic conditions like diabetes, hypertension, and cardiovascular disease. These systems track real-time data such as blood sugar levels, heart rates, or blood pressure, and use AI algorithms to analyze trends and detect anomalies. Remote monitoring reduces the need for frequent in-person visits for patients with chronic conditions and can alert physicians to early signs of complications.

Personalized Treatment Plans through Predictive Analytics.

AI systems analyze patient data (e.g., medical history, genetics, lifestyle factors) to predict disease progression and recommend personalized treatment plans. AI can suggest medication regimens, lifestyle changes, or adjustments to current treatments based on real-time data and predictive modeling.

AI-Assisted Diagnostic Tools in Primary Care.

AI diagnostic tools assist clinicians in out-patient settings by rapidly analyzing medical data, such as imaging scans, lab results, or patient-reported symptoms, to help with diagnosis. These tools can flag potential health issues, making it easier for primary care physicians to identify conditions that might otherwise be missed.

AI-Enhanced Decision Support Systems.

Clinical decision support systems (CDSS) powered by AI provide real-time assistance to physicians by analyzing patient data and offering evidence-based recommendations. These systems can alert doctors to potential drug interactions, suggest alternative treatment options, or flag high-risk patients for further investigation.

AI for Drug Adherence and Management.

AI applications help improve medication adherence by reminding patients to take their medications, providing dosage instructions, and tracking their adherence over time. AI can also analyze patient data to predict which patients are at risk of poor adherence and intervene early.

Telemedicine with AI-Enhanced Diagnostic Capabilities.

Telemedicine platforms integrated with AI provide remote consultations while AI analyzes patient data in real-time to assist doctors during virtual visits. AI can assess symptoms, review medical history, and recommend diagnostic tests or treatments. AI-enhanced telemedicine expands access to healthcare, particularly in rural or underserved areas.

Conclusion

In conclusion, the integration of AI in clinical practice is reshaping the healthcare landscape, providing significant improvements in both operational efficiency and patient outcomes. By automating routine tasks, enhancing diagnostic accuracy, and offering personalized care plans, AI empowers physicians to focus more on direct patient care while maintaining high standards of clinical judgment.

As with any technological innovation, challenges such as reliability, explainability, and data privacy must be carefully managed to ensure trust and safety in its application. As AI systems continue to evolve with robust testing, regulatory oversight, and transparent design, they hold the promise of becoming indispensable tools that support rather than replace the expertise of healthcare professionals, ultimately improving the overall patient experience and