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AI/ML - The Medical Workplace Multiplier

This eBook from Boston Engineering explains how AI and ML can enhance the medical workforce's abilities, improve clinical outcomes and patient care, and ultimately improve the way people work and live. Artificial intelligence and machine learning are emerging technologies that have immense potential to reshape healthcare delivery and medical practice. While some view AI as a potential job replacement threat, the reality is that these advanced capabilities are better positioned as "workforce multipliers" that will amplify the abilities of doctors, nurses, technicians and other medical professionals.

Rather than automating away human expertise, AI/ML can offload laborious tasks, provide diagnostic assistance, personalize treatment plans and streamline clinical workflows. This will enable medical teams to practice at a higher level, seeing more patients and delivering better care outcomes. Patients, in turn, will experience more seamless, data-driven and personalized care journeys. Ultimately, the synergy between humans and machines will elevate how healthcare organizations achieve their mission of helping people live healthier, more productive lives.

Chapter 1: The AI Augmentation Advantage

Applying AI solely to automate and replace human activities is a narrow and flawed view of the technology's potential, particularly in the medical field. Healthcare remains a uniquely human experience founded on the doctor-patient relationship and trust in the clinical team's expertise. Al's greatest value comes from augmenting those human practitioners, not replacing them entirely.

By rapidly processing large, complex datasets like medical images, genomic data, sensor readings and electronic health records, AI systems can extract insights and analytics that even highly-trained medical staff may miss. Those data-derived insights can then be fed back to doctors and care teams through intuitive user interfaces and visualization tools. This symbiotic relationship combines AI's computational prowess with human expertise for more accurate and timely diagnoses, personalized treatment plans, proactive health monitoring and preventative interventions.

Rather than operating autonomously, AI shall remain a decision support tool with human oversight. But the amplification of existing workforce abilities is immense. Studies continue to find that AI-assisted screenings are able to enhance radiologists' clinical accuracy and recall rates. Recent advances and the use of "ambient AI scribes" can automatically generate clinical documentation through conversational AI applied to clinician-patient dialogue, with the potential of revolutionizing the field by freeing up time to spend with patients

Chapter 2: Intelligent Workflow Efficiencies

At its core, healthcare is an information science where success hinges on collecting, integrating and analyzing diverse structured and unstructured data sources across the patient care continuum. Unfortunately, healthcare organizations are overwhelmed with data volume growing at increased rates. Valuable clinical insights are obscured under mountains of administrative documentation, repetitive manual tasks and workflow inefficiencies that prevent staff from focusing their full attention on patient needs.

Al/ML shines here in its ability to automate routine, repetitive data-centric workflows and streamline operations. By leveraging techniques like natural language processing, robotic process automation and machine learning, AI can ingest information from electronic health records (EHRs), clinician notes, medical literature and other sources to:

• Automatically generate detailed case summaries for physician review

• Assist with clinical coding, authorization requests and billing tasks

• Optimize scheduling and care coordination across services

• Surface relevant treatment information, guidelines and research for care teams

• Triage lower-acuity cases and messages for clinical staff prioritization

• Alert staff to potential gaps in care or compliance with best practice protocols

This operational scalability allows care teams to shift attention away from tedious administrative minutiae toward higher value activities like clinic time with patients, reviewing complex cases, participating in research initiatives and further honing their skills. Al's heavy lifting frees up human intelligence that is often burdened by bureaucracy.

Chapter 3: Advancing Diagnostic Excellence

One of AI/ML's most promising applications in healthcare is using advanced pattern recognition, classification and anomaly detection capabilities to support more accurate and timely clinical diagnoses. By training machine learning models to recognize patterns and anomolies in medical images, genomic data, biomarker inputs and other highly dimensional data sources, AI could augment care teams with:

Rapid triage of urgent cases like stroke CT analysis

- Early disease detection for intervention, prevention
- Improving accuracy in radiology, pathology and anatomic analysis
- Enabling precision medicine through predictive genotype-phenotype modeling

 Comprehensive clinical decision support integrating full patient data profiles In the field of radiology, radiologists face challenges in routine screenings that can affect diagnosis, such as low interpreter confidence, human fatigue and distractions. Applying AI to review images for suspicious lesions could potentially aid in reducing these missed findings. AI assistance may improve radiologists' sensitivity and accuracy, while also decreasing reading times.

Beyond diagnostic imaging, AI/ML could enhance a broad array of diagnostic processes including pathology assessment of tissue samples, reconciling complex EHR data with clinical guidelines for disease prediction, integrating genomic sequencing insights, and supporting personalized treatment selection.



Throughout these emerging diagnostic workflows, humans remain the ultimate arbiters. But their decisions are now amplified by highly advanced data integration and analysis augmentations that would have been impossible to process manually. The result is an elevated standard for clinical precision, proactive and preventative care capabilities, and optimized treatment plans hyper-personalized to each patient.

Chapter 4: Data-Driven Care Experiences

For too long, patient care experiences have been frustrating, fragmented and paper-laden as unintegrated data streams and bureaucratic processes have created inefficiencies and blind spots. Patients feel like a human pinball bouncing between



multiple providers, duplicative testing, communication breakdowns and an overall lack of care continuity. Meanwhile, doctors are burned out wrangling disparate data sources and administrative busywork rather than focusing on their calling.

By unlocking and integrating data flows through intelligent automation, AI/ML applied in a secure, compliant manner stands to revolutionize the care experience into truly unified care delivery journeys. Consider these future scenarios enabled by AI and complementary technologies like the Internet of Medical Things (IoMT):

• Continuous, ambient health monitoring through smart home sensors, wearables and IoMT devices that detect potential issues early and trigger virtual or in-person interventions

• Unified longitudinal patient records that combine clinical, genomic, device, social and lifestyle data into rich personalized profiles

• Al-based virtual health assistants and smart clinical decision support tools that customize care plans intelligently based on whole-person context

• Seamless interoperable data exchanges and care coordination across the provider network

• Automated next-best-action guidance to nudge patients towards preventative behaviors, medication adherence, lifestyle adjustments and other self-care accountability



Imagine an intelligent care journey that starts with early predictive screening applying AI to identify high-risk individuals. They immediately get enrolled in a virtual health coaching program supplemented with connected devices for continuous remote monitoring. When potential issues arise, the system automatically coordinates with the care network for prompt specialist review and interventions guided by personalized AI-assisted treatment protocols. Fast-forward through a seamless, data-guided care experience facilitated through human-AI teamwork.

Patients get the "white glove" experience tailored precisely to their needs, with providers alerted only for higher-order tasks requiring empathetic human expertise. Preventable escalations, unnecessary costs and missed care opportunities are mitigated through Al-driven automation. Both parties enjoy a more frictionless, intelligent and mutually satisfying care journey. Difficult as it may be to envision today's disjointed healthcare paradigm transforming into such a harmonious experience, human-centered Al/ML integration is the great enabler.

Conclusion: Elevating the Human Element

When implemented properly and harmoniously with human experts, AI and machine learning carry phenomenal potential to enhance the healthcare workforce's abilities and impact in several critical dimensions:

Efficiency: Automating administrative tasks like clinical documentation, coding and processes can reclaim physician time. This shifts human energy towards higher value activities with patients and on more complex cases.

Scale and Access: By streamlining operations, optimizing scheduling, and enabling remote care pathways, AI can ease backlog issues and expand patient access while maintaining human care quality. It opens the door to groundbreaking care delivery models tailored to each community's and individual's needs. Accuracy and Personalization: Al's pattern recognition prowess can elevate diagnostic precision, treatment plan optimization and preventative/ predictive capabilities - all personalized through whole-person data integration versus today's fragmented view. The potential to improve mortality rates and wellness outcomes is tremendous.

Human-AI symbiosis is the true multiplier effect. The transformed landscape facilitates medical professionals working at an elevated level to provide more impactful, customized care for more patients and populations through always-on, data-guided care journeys. By embracing AI as enabling technology rather than an automation threat, healthcare stands to scale and amplify its human-centric mission more powerfully than ever before: improving the way we all live and work.

About the Authors

Brian Kononchik

Director, Innovative Digitial Technologies Boston Engineering

Brian's 15+ years of experience spans developing advanced IoT, AR, and AI technologies that optimize productivity, including designing a mixed reality tool for submarine manufacturers and an AR diagnostics solution for automotive plants.

Paul O'Connor

Director, Medical Development Boston Engineering

Paul has extensive experience driving product innovation and commercialization at Smith & Nephew Orthopedics, where he led major launches, grew new product revenues, and directed product strategies. He now leverages his medical device expertise to advance technologies for clients at Boston Engineering.



About Boston Engineering

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Contact us: <u>boston-engineering.com</u> info@boston-engineering.com 781-466-8010

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