

Future of Healthcare and Artificial Intelligence (AI)

Practical Insights and Diverse Perspectives on AI in Healthcare Project Management¹

Healthcare Technologies: Healthcare AI and Project Management for Pharmaceuticals and Medical Devices²

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and

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INTRODUCTION

Healthcare technologies [a broad term that includes pharmaceuticals (drugs) and medical devices] are not isolated entities but a fabric of close interactions and influences on each other. As a group, these interrelated industries are the health economy. The complex relationship between these three industries has the potential to shape the landscape of modern medicine, impacting everything from research and development to public health and, most importantly, patient care. This interwoven relationship constantly evolves with continued innovations in the three entities, presenting challenges and opportunities.

While Artificial Intelligence isn't entirely new to the medical device industry, its role has significantly evolved and grown in recent years. With Generative AI making waves across the health economy, it's time for the trio to embrace it more meaningfully. AI has been active in the pharmaceutical and medical device industries across various stages of drug development and production in the entire value chain, clinical trial optimization, enhanced

¹ Editor's note: This series is by Dr. Deepa Bhide, a practicing pediatrician with additional experience in information technology and project management. Her 2023 series of articles introduced readers to a range of important issues related to programs, projects and PM in healthcare. In this new series, Dr. Bhide is interviewing experienced healthcare, IT and project professionals around the world to reflect on the impact of artificial intelligence on global healthcare. This month's article is co-authored by Tiffany Brewer, a technology specialist based in the United States. Learn more about Dr. Bhide and Ms. Brewer in their author profiles at the end of this article. To read previous works by Dr. Bhide, visit <https://pmworldlibrary.net/authors/dr-deepa-bhide/>

² How to cite this paper: Bhide, D. and Brewer, T. (2024). Healthcare Technologies: Healthcare AI and Project Management for Pharmaceuticals and Medical Devices: Practical Insights and Diverse Perspectives on AI in Healthcare Project Management, series article, *PM World Journal*, Vol. XIII, Issue IV, April

design and monitoring of medical devices, manufacturing and supply chain, regulatory compliance, and marketing and sales.

Let's gain insight into experiences and perspectives on AI from a few experts in the pharmaceutical and medical devices industries.

Healthcare Technologies - Pharmaceuticals and Medical Devices

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A few experts in medical devices and pharmaceuticals interviewed wished to contribute anonymously.

The Interviews

Q 1: Do you use AI in any form in your current work area? If yes, how do you currently utilize AI in your day-to-day work?

Artificial Intelligence (AI) and Machine Learning (ML) have been used in pharmaceutical and medical devices for many years. These technologies have the potential to improve patient outcomes and reduce healthcare costs.

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“As a leading healthcare service provider, leveraging AI across customer relationship management, business intelligence, backend support, and supply chain management is a trend,” Ernie mentioned.

“A ton of data has been collected over the years with medical devices (micro-pacemakers, cranial and spinal robotics, etc.). Because of its unique ability to create entirely new data, Generative AI has opened up opportunities for creating innovative, personalized, and smarter systems,” Michael added.

“We started to use AI in outpatient pharmacy to predict workload based on historical data. Using the Linear Regression model, we can predict future workload patterns. This

allowed for better resource utilization and improved patient waiting time,” Tarek was keen to respond.

“AI technologies such as natural language processing, computer vision, and deep learning have been used for various applications, including drug discovery, clinical decision support, predicting drug efficacy, identifying potential side effects, and optimizing dosage regimens and remote monitoring,” Michael.

Summary: AI, in its nascent form, has been used in many technologies, including medical devices, wearables, and patient-facing applications. The pharmaceutical industry, including pharmacies, has used it in its supply chain processes and resource optimization. Generative AI has opened new opportunities for democratizing the use of AI and creating innovative products and services.

Q 2: What's the landscape of AI in the pharmaceutical and medical device industries?

AI is changing the landscape of medical devices and pharmaceutical industries vigorously. From research and development to sales and marketing, using AI throughout the entire development lifecycle of the drug discovery process has many benefits. For medical devices, AI can assist in identifying patterns and optimizing designs, creating more advanced and effective products. These industries can use AI to both optimize the patient journey and gain a better understanding of diseases.

“Previously, AI and ML were commonly applied to medical devices, such as IoT intelligent wearables. However, with advancements in generative AI, it is now possible to analyze vast amounts of data, including doctor's prescriptions and serialization numbers. This capability is particularly valuable in regions where regulations differ, allowing some medicinal products to be purchased without a prescription or reuse the prescription.

AI platforms can facilitate patient warnings and friendly reminders and streamline doctor decision-making by consolidating all relevant data in one place. By leveraging AI, doctors can make more informed clinical decisions based on comprehensive patient records,” Ernie added.

“Across the board, AI technology has demonstrated clinical utility and promise in treating conditions such as atrial fibrillations (AF) with AI-enabled wearable technology to aid in the passive detection of cardiac arrhythmias and enhance the diagnostic power of ECG. Generative AI has improved the prediction and detection of AF that will ultimately help direct new treatment protocols,” Michael mentioned.

“Predicting future workload patterns, predicting medication consumption patterns, and helping in verifying prescriptions (discovering drug-drug interactions and contraindications) are a few everyday tasks or areas in hospital pharmacies where you see AI being utilized. It helped us better utilize our resources and improved patients' experience as clinical/hospital pharmacists.

Based on prior consumption of medications, we are developing a regression model to predict future consumption and prevent out-of-stock situations to optimize drug inventory management and prevent shortages,” Tarek added.

Summary: The landscape of AI in both the pharmaceutical and medical device industries is thriving and rapidly evolving, with significant potential to revolutionize drug discovery, patient care, and overall healthcare delivery in areas such as drug discovery and development, AI-powered image analysis tools for improved diagnosis, personalized medicine, remote monitoring, and predictive maintenance, overall data-driven decision-making.

Q 3: What are the benefits of AI to healthcare professionals or patients in the pharmaceutical and medical device industries?

Imagine a patient with heart failure who requires careful and continuous monitoring of his condition and changes in his care plan based on his cardiac parameters. Traditionally, they might rely on regular hospital visits and manual monitoring of his vital signs and other parameters. However, with an AI-powered implantable device, there can be continuous real-time monitoring with the help of a device that monitors the patient's heart function and transmits data wirelessly, followed by AI-based analysis through a complex set of algorithms that analyze the data, predict potential complications, and alert the healthcare provider if necessary. Most importantly, physicians can proactively adjust the care plan before the patient experiences critical symptoms. This scenario showcases how AI can empower patients to manage their health proactively, improve disease management, and potentially prevent serious complications.

“AI-powered medical imaging analysis stands out as a competitive product. Anticipating future benefits such as improved diagnosis and personalized care via early disease detection, accurate diagnoses, minimizing the risk of errors, and enhanced effectiveness through personalized treatment plans.

Through medical devices, treatment and monitoring are enhanced by optimizing treatment protocols and improving response rates, as well as remote patient monitoring to enable proactive intervention and early complication detection, faster recovery, and reduced hospital stays,” Ernie added.

“Providing revelatory insights into patients' medical conditions in real-time, chronic disease management can be simpler than earlier times with AI-enabled smarter devices. AI produces opportunities to reduce human error and provide patient services 24/7,” Michael added.

“AI has helped with medication dispensing or error checking. For example, in a hospital pharmacy setting, it can predict the patients most vulnerable to adverse drug reactions,” Tarek quipped.

“Using AI, the pharmaceutical industry has benefited multifold in its processes such as identification of potential drug molecules. When it comes to virtual screening, AI algorithms can virtually screen millions of potential drug candidates to identify those with the desired properties for a particular target, molecule design and optimization where the new candidate molecules are tested and then designed with specific characteristics, optimizing their effectiveness, and minimizing side effects. This improves the chances of drug development and clinical safety,” - anonymous.

Summary: Leading technology ecosystems like IBM Watson and Google AI, utilized by Fortune 500 pharmaceutical and medical device companies, are transforming healthcare. This allows efficient onsite support allocation and empowers staff with the knowledge to assist healthcare providers effectively.

Q 4: How did you navigate the challenges of managing AI projects within the highly regulated medical devices and pharmaceutical industries?

Healthcare AI projects involve stringent data confidentiality security, regulatory compliance related to safe and trustworthy AI standards, and a commitment to upholding stringent privacy regulations. A project management approach that accommodates strict guidelines and changing project scope (including the basic technology requirements) is important to ensure the project is successful.

“We must ensure thorough assessments for compliance and safeguarding patient confidentiality. Internal compliance is crucial, with established standards governing AI use in healthcare projects (for example, HIPAA standards and local regulations. This encompasses defining communication channels and delineating prediction scopes. For instance, in deploying AI for prognosis prediction, strict adherence to internal compliance guidelines ensured the ethical and responsible use of predictive analytics. This proactive approach was highly helpful in maintaining high ethical standards in our healthcare AI initiatives. We needed to ensure commitment to professionalism in AI product use, addressing healthcare professionals' needs through clinical support, skill development, and instant analysis,” Ernie mentioned.

“We have a challenge with a lack of knowledgeable and trained resources possessing the required depth of knowledge and steep learning curve in these new technologies. This is a core need to address, in my opinion.

AI is not a test and trustworthy technology today, and we need time to understand its implications. A quick change in the direction of this industry may not happen and should not be expected. Multiple cycles of validation are required to gain the trust.

Strict regulations for its use in the healthcare industry are also needed. The entire lifecycle of these AI-enabled systems is yet to evolve, and the new complexities that might crop up will need to be addressed.

Also, the software for medical devices changes all the time. It's complicated to build that “change” muscle, especially when dealing with health conditions,” Michael added.

“Ethical implications and patient data privacy are top challenges in our setting. The biggest challenge in implementing AI in hospital pharmacies is tailoring the regulations to match this new technology. Who will be ultimately responsible if the AI model predicts a wrong diagnosis or returns a wrong decision?” Tarek added.

“IT training on integrating patient wearables and devices for clinicians is essential for proper documentation and guidance toward diagnosis. Finding time for the clinicians to train is the main obstacle in this mission. A unified and uniform integration would be ideal for training, interoperability, and patient monitoring” Michael.

Summary: While AI adoption seems exciting, many challenges exist, such as:

- *Integrating data from diverse sources and ensuring its validity and security*
- *Finding the right professionals with expertise in life sciences, compliance, and data science*
- *Navigating evolving regulations around AI-driven research and development*
- *High investment in hardware, software, and expertise*
- *Addressing concerns about AI bias, ethical considerations, data privacy, and potential job displacement*

These challenges continue to impact adopting AI projects in the health economy.

Q 5: What features or latest trends in AI excite you from a practical standpoint?

There is much to be excited about AI and its potential in the pharmaceutical and medical device industries.

“As AI plays a more significant role in healthcare, understanding its decision-making processes becomes crucial. Advances in explainable AI (XAI) are making algorithms more transparent and building trust with healthcare professionals and patients alike. Personally, I am very excited about the development of AI tools from various angles.

- Using patient data to train healthcare providers (HCPs) and guide communication without geographic boundaries. In remote settings, it is difficult for HCPs to leave their station to commute, receive training, and get up-to-date information on Medtech.
- An AI-powered platform provides them with continuous learning, skill development, and remote mentorship support.
- AI can also analyze public health forums and social media data to identify common concerns and questions associated with the suspected diagnoses.
- HCPs can incorporate this knowledge into their communication, proactively addressing patients' anxieties and ensuring accurate information dissemination,” Ernie mentioned.

“I am excited about the prospect of a quick, efficient, cost-effective drug development process. What would take a humongous project effort would now be reduced significantly, allowing more candidate molecules to be tested and verified. This will ultimately help treat new diseases and complex medical conditions,” Michael.

Q 6: What are the critical attributes of project management or PMO in AI-related projects?

“Project management needs to step up to meet the needs of this complex project requirement. There is no one-size-fits-all. I feel there is a lot of opportunity for project management and its standards to catch up to meet the needs. Despite technology and processes, humans are the core for improving the quality of any product. Academia and product teams need to collaborate on a practical approach,” Michael mentioned.

“The Project Management Office (PMO) is pivotal in driving AI's seamless integration and adoption within medical device companies. I see the following functions of the PMO in AI projects.

- Ensuring responsible development, deployment, and ethical considerations by establishing AI governance frameworks.
- Effectively managing AI talent and resources, the PMO allocates skilled personnel to diverse projects, fostering collaboration between technical teams and business stakeholders.
- Nurturing innovation and continuous improvement by identifying new AI applications, promoting knowledge-sharing platforms, and staying abreast of industry trends.
- Serving as a central hub to integrate company-wide AI initiatives, reducing resource waste and optimizing the transformative impact of AI technologies across the organization.

“From the pharmaceutical project management standpoint, managing both spectrums of project management approaches, such as being flexible in the initial drug development approach and then a disciplined approach for clinical trials, is a must,” Michael said.

Q 7: How do you manage cross-functional teams across regions in global operations when implementing AI-driven projects?

A successful cross-functional team for AI projects in healthcare requires diverse expertise to navigate various technical, ethical, and practical considerations. The following can be an outline for a project team.

- Clinical and healthcare professionals such as physicians, nurses and clinical staff, clinical informatics specialists, public health specialists, and pharmaceutical and medical device experts are responsible for providing medical expertise. Their expertise can be used to create clinical workflows, translate clinical requirements into technical specifications, provide data access, and troubleshoot

implementation challenges. Additionally, they will ensure the AI solution aligns with clinical needs, addresses relevant problems, and delivers real-world benefits to the patient care process.

- Technical professionals include data scientists, software engineers, AI engineers, and data engineers. These professionals will manage data analysis, model building, and developing and deploying AI solutions. They will also manage AI frameworks, libraries, tools, data infrastructure, and integration. Another aspect that requires technical expertise is user experience (UX). UX designers will focus on designing intuitive and user-friendly interfaces for healthcare professionals and patients for ease of adoption and positive experience.
- Non-technical and regulatory teams such as legal and regulatory experts and bioethicists guide on data privacy, ethical considerations, regulatory compliance, and potential risks associated with AI use in healthcare and evaluate the ethical implications, address biases, fairness, and transparency issues.
- Project managers who lead the team manage timelines, budgets, and resources, ensuring smooth project execution and communication. Importantly, they break down silos between all the above functions, leading to seamless communication and aligned expectations.

“While some tasks will be automated, it's essential to understand that AI primarily complements existing roles. We anticipate upskilling and reskilling of the workforce, where employees will need to learn new skills to work alongside AI tools. For example, getting healthcare professionals to dedicate time to the latest skills is challenging, but that will be a requirement as this group works closely with the AI team. With the automation of mundane and repetitive tasks, shifting roles and responsibilities will focus on higher-level tasks like strategic planning, critical thinking, and scientific interpretation,”
- anonymous.

Summary: Enterprises see the most success when AI projects involve aligned and highly communicative cross-functional teams. For true impact, AI projects should involve data scientists plus a line of business owners and IT teams. A cross-functional team invested in the process feels accountable for the results and is involved throughout the project lifecycle, which is necessary to propel AI project success.

Q 7: For the project managers managing the AI projects, what skills do you think are essential to be successful?

“This is a tricky question for all project managers who wear multiple hats. Here is what I think is essential.

- Developing expertise in AI healthcare requires a foundational grasp of AI concepts, staying updated on industry trends, and understanding specific AI applications within the organization. As a market-savvy professional, I actively scan for advancements, identify opportunities, and strategically guide AI-driven projects.
- Serve as an AI champion by effectively communicating project benefits, fostering collaboration, and promoting a culture of innovation.
- Embrace agile project management methodologies, adapt to the fast-paced nature of AI, and prioritize flexibility and risk management.
- Additional essential skills include strong analytical abilities, effective communication, leadership, and decision-making skills to navigate the complexities of AI projects successfully.

“Prompt engineering (designing prompts that are helpful, informative, and user-friendly) has demonstrated the birth of new job opportunities with novel roles in AI and ML projects. Particularly in healthcare, where accuracy and clarity are paramount, this field, other than clinical and technical skills, requires empathy and user-centricity by understanding the needs and expectations of healthcare professionals who will use the AI tool is crucial for. Awareness of potential biases, attention to detail, and ability to learn and adapt are critical.” - Michael.

“Machine Learning skills are critical to succeed in this field” - Tarek

“Being research-minded, attention to detail, proficient in risk management, and having patience is critical for success in the pharmaceutical industry,” Michael.

Summary: Ensuring one is cognizant of the newer skills needed to not only survive but be successful in changing project and technology landscapes is critical. Other than the technical skills such as prompt engineering and data engineering, PMI's power skills, such as accountability, adaptability, collaborative leadership, empathy, for-purpose orientation, and so on, are important.

Q 8: What is the most critical factor in the project management of AI in healthcare projects, in your opinion?

“The most critical factor in AI healthcare projects lies in understanding and addressing the HCPs. Patients naturally seek the best options for their situations, but HCPs are crucial in identifying gaps in treatment, diagnosis, and solutions. Their experience and insights into the practical application of new tools are invaluable.

Therefore, tailoring AI solutions to meet the specific needs and challenges that HCPs face is critical to enhancing AI's effectiveness and acceptance in healthcare projects”, Ernie mentioned.

“From a project management perspective, apart from the technical project management skills, shared vision, stakeholder alignment, clear communication channels, effective

collaboration and agile project management approach, data governance and sharing, change management and user adoption empathy, leadership and continuous learning are some essential skills” – Nisha mentioned.

Summary: A patient-centered approach, aligned with the expertise and perspectives of HCPs, needs to be created to successfully integrate AI technologies in improving overall healthcare outcomes.

Q 9: What is the role of AI-enabled pharmaceutical or medical devices industries in primary care or community healthcare?

“Community healthcare, particularly in primary care, was a key focus in my previous role. The challenge often lies in providing timely and comprehensive support due to limited HCP availability and resource constraints. AI can address these challenges by analyzing critical patient, geographical, and disease data. This analysis can help identify focus areas, such as specific patient populations or disease areas, enabling HCPs to receive targeted training and helping determine the most needed products or treatments for patients.

AI can support remote HCP, facilitating systematic training and knowledge sharing. For instance, in the past, neurosurgeons could remotely guide HCPs in critical situations, like stroke care, even without AI. With the integration of AI, the possibilities expand further,” Ernie mentioned.

“Blend of AI and artificial sensors provide intelligent, convenient, and secure services for next-generation healthcare and biomedical applications. For example, AI-enabled devices such as oxygen sensors are widely used for detecting and monitoring respiratory diseases. The latest versions of Apple Watch use AI systems to assist consumers in managing and monitoring their health, including enhanced sleep monitoring software and a sensor to measure blood oxygen,” Michael added. “These “cool” wearables can be effective means of collecting and harnessing data from patients in remote areas to monitor their health conditions, specifically chronic diseases such as heart health, mobility, fall detection, activity, and medications.”

“AI-enabled supply chain processes to ensure the presence of medicinal supplies and other healthcare supplies is essential in primary care to save lives,” Michael.

Q 10: Any additional comments?

“AI integration in pharmacy domains has many benefits, such as improved patient experience, better utilization of resources, more accurate diagnosis, and selection of medications.

AI is the future of medicine and pharmaceutical practice. Some fear that many jobs will be lost, but I believe it will open the door to many new jobs and career paths,” Tarek mentioned.

“The role of governments is crucial in bringing AI to patients and HCPs. Instead of developing their AI models, governments can leverage the research capabilities of large organizations to use patient data for training models. Governments can encourage data sharing to train AI models on diverse datasets, develop ethical and responsible regulatory frameworks, provide financial support and incentives for AI research, and foster collaborations for knowledge exchange and innovation,” Ernie added.

Key Takeaways

From drug discovery to patient care, AI holds immense potential to improve efficiency, accuracy, and personalization. Significant progress in AI and ML technologies is proving to be game-changing for drug development, formulation, and dosage form testing in pharmaceuticals. By applying AI algorithms that examine vast amounts of biological data, such as proteomics and genomics, scientists can pinpoint targets linked to disease-associated targets and predict potential drug interactions. This offers a more targeted approach to drug discovery.

By fostering collaboration, transparency, and shared goals, the healthcare, pharmaceutical, and medical device industries can work together to ensure a future where innovation translates into better health outcomes for all.

- Understanding and addressing the needs of healthcare professionals and a patient-centered approach are crucial.
- Data privacy, ethical considerations, regulatory hurdles, and the need for skilled professionals pose significant challenges.
- Integrating AI seamlessly into existing workflows and gaining user acceptance is crucial for success.
- Cross-functional teams with expertise in medicine, technology, ethics, and regulation are essential.
- Strong project management with clear communication, agility, and a focus on user needs is paramount.

Disclaimer: The views and opinions expressed in this interview series are those of the speakers and do not necessarily reflect the views of any entities or associated parties. Proprietary names of AI applications have been avoided unless explicitly mentioned by the interviewees.

Acknowledgments: Our sincere thanks to Sunanda Gundavajhala, PMP®, DASSM, Director, DispatchTrack, India, and Gaurav Dhooper (PAL-I®, PMI-ACP®, SAFe4®, CSM®, LSS-GB) President, PMOGA® India Hub for their excellent suggestions that have helped shaped this interview.

About the Authors



Dr. Deepa Bhide

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Dr. Deepa Bhide, MBBS, DCH, PMP, has over 20 years of professional experience where she has blended medical practice and research with IT and Project Management. She juggles consulting, training, and operations and is proficient in clinical medicine, project management, and healthcare information technology. Starting her career as a medical practitioner, she has worked with varied organizations before her current stint as director and clinical expert for Inventurus Knowledge Solutions.

Deepa's growing interest and work in these areas, born from her day-to-day patient interactions, helped her view Project Management as a backbone of progressive healthcare. Her paper on "Patient Care - A Project Management Perspective" has received global recognition and acclaim. With a physician background as a solid foundation to leverage IT/PM skills and knowledge, Deepa has blended her broad-based experience and learnings to present a unified, holistic, and wholesome view of Project Management and Healthcare, a cross-domain confluence. Through various webinars, events, talks, and writings across platforms, Deepa has been an evangelist in championing global project management during the COVID-19 pandemic.

A Gold medalist from Osmania University for standing First in the MBBS course, she pursued her DCH in Pediatrics and Child health. Deepa has served various roles in local and global Project Management Institute (PMI) regions. She remains actively engaged with PMI and has been a participant and speaker for various national and global meetings and online events.

Deepa lives in Hyderabad, India, and loves traveling, singing, and experimenting with global cuisine. She can be contacted at deepa.bhide@gmail.com.



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Tiffany Brewer has 20 years of professional experience across supply chain, operational excellence, and technology, with a particular focus on the pharmaceutical and medical device industries. Throughout her career in supply chain, she has honed her skills in business transformation, integrated business planning, and corporate strategy.

She is passionate about applying technology, data, and processes to solve business problems and has a background implementing tools and systems in supply chain environments. She's worked both on the customer and service provider side and has a love for supporting customers through change and understanding their needs.

As Director, Life Sciences Industry Strategy, she counsels global companies on industry-leading best practices and technology advancements. She also collaborates with Blue Yonder's product development and innovation teams to align on addressing the challenges these industries face today.

Tiffany has degrees in Operations Management and Supply Chain from The Ohio State University (Go Bucks!) and an MBA from Indiana University. She lives in Memphis, Tennessee with her family.