Getting the Most from AI in MedTech Takes Data Know-How

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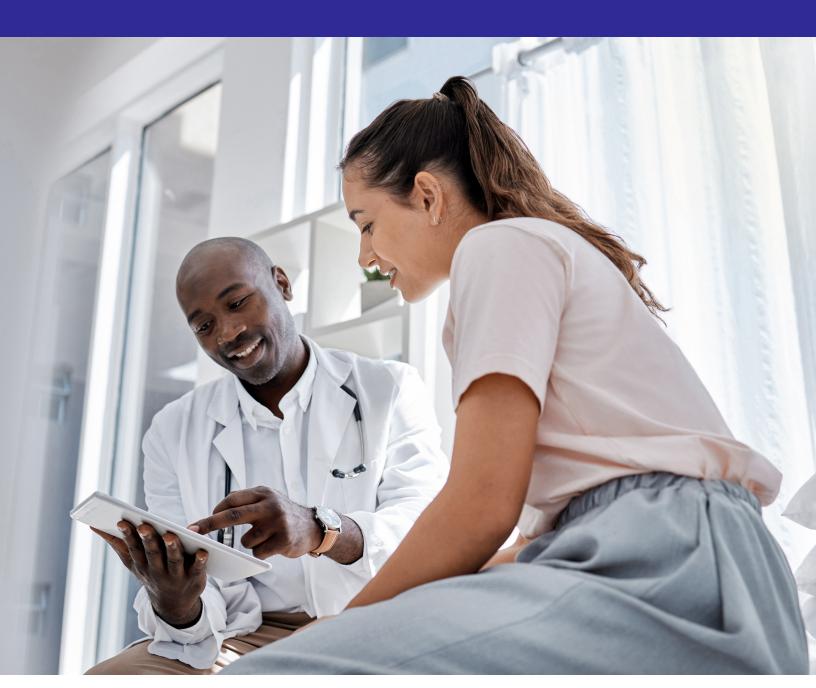# Getting the Most from AI in MedTech Takes Data Know-How

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The use of artificial intelligence (AI) in wearables, monitoring, and imaging is forecast to save hundreds of thousands of lives, and hundreds of billions of dollars, a year by helping individuals make healthy lifestyle decisions and helping physicians detect disease early.[1] Yet, AI alone can't guarantee a runaway product success. MedTech companies seeking to incorporate AI into their product portfolio — either as "table stakes" or as a competitive differentiator — will only realize its potential if they solve challenges related to data acquisition, interoperability, data cleansing and privacy.

InterSystems, a pioneer in healthcare data platform development, has learned, understood, and incorporated pivotal insights from its extensive experience in digital health solutions. That experience points up the need to give AI a strong foundation. In this white paper, we expand on these insights and discuss how MedTech companies can build on these lessons to succeed in AI.

Data Interoperability and Aggregation Fuel AI Advancements

AI models are only as good as the data on which they are built. An AI application can sift through vast amounts of data and identify patterns within the bounds of its model, but it doesn't know what data might exist outside of those boundaries.

"If I ask, 'what risk factors does the patient have for stroke', AI can only answer based on the information that's there. So, if you don't have a complete, aggregated view of patients' clinical and non-clinical data, the model isn't going to be as good," Alex MacLeod, who heads healthcare solution innovation at InterSystems, said.

The need for comprehensive, aggregated data means the development of MedTech AI poses some challenges that are specific to the industry. AI in MedTech and healthcare organizations must train on data collected from multiple sources including data from the device, data from the electronic health record (EHR), and then a number of others, depending on the specific technology.

"One of the benefits of InterSystems is that our business is much broader than a single EHR. We're actually the connective tissue between all of the different systems that you might have in your bigger healthcare system, and therefore we're able to offer you that comprehensive picture," Benjamin De Boe, who leads analytics at InterSystems, said. A

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MedTech AI application may need to bring in data from 10 different EHR environments, next-generation sequencing labs, patient questionnaires and more — to say nothing of the device itself — making that connective tissue essential to success.

Multi-source datasets depend on interoperability — the ability to exchange information in a way that ensures sender and receiver understand the data the same way. The HL7® FHIR® (Fast Healthcare Interoperability Resources) standard is breaking down barriers between different systems to make data accessible, computable, and usable. A MedTech AI application can unleash the potential of HL7 FHIR but may be required to be equally comfortable working with legacy standards such as HL7® V2, and non-standard or even non-clinical data sources. This means MedTech companies can't just lean on their currently used standard, but should consider all those in which relevant data is captured in the market, or build on a platform that does.

"We have all the healthcare formats covered if you're creating a medical application," MacLeod said. "And you'd be surprised, there's always some older long-standing system around that gives you a flat file or some other non-standard format. So, the fact that our technology is so flexible, integrating all these different systems, is huge because then you're getting all that data to inform your model."

That interoperability underpins partnerships with companies including Guerbet, INFINITT, and IMSI that rely on integration with hospital information systems to overcome workflow obstacles.[2]

Clean Data Is a Must

Pulling data in from a wide range of sources creates other challenges beyond the initial acquisition. If the data fed into an AI is incomplete, error-ridden, or otherwise flawed, the conclusions drawn from its analysis will be similarly flawed and suspect.

Because raw data rarely comes in tidy, normalized, structured tables, data scientists often perform preprocessing, cleaning, and labeling to prepare data.

Preprocessing transforms data into a format that is suitable for use in AI applications, from source formats that may range from raw device data to modern or legacy messaging standards. In the cleaning step, data scientists reconcile data from the combined sources, and fix errors and omissions to improve quality.

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Robust machine learning algorithms commonly used in AI, such as neural networks, can take care of some of this preprocessing and cleaning through interpreting patterns in the training data, and thereby automating parts of the implementation. This is especially helpful when the data includes natural language text or other datatypes that are nontrivial to deal with programmatically.

However, the quality of AI based preprocessing is limited to what it can infer from the data it was trained on, and therefore a good balance is needed between "leaving it up to AI" and programmatic preprocessing and cleaning. An AI application requires a platform that includes a broad range of proven pipelines that aggregate data from across sources based on a thorough understanding of those sources' formats, complemented with AI-based techniques where it makes most sense.

Labeling entails adding tags or fields that explain or provide more information about a sample point. The labels are critical when training supervised machine learning models. High model performance is tied directly to the amount and quality of labeled data.

A platform should also simplify labeling and aggregate health data in a single patient-centric model ready for analysis.

"It's a standard data model that makes it easier for you to identify and automatically label a particular patient cohort, and then label another patient cohort and look for any interactions with, for example, a particular medication or a particular procedure," De Boe said.

A development platform should keep track of the full lineage of data. This allows subsets to be used to train predictive models, but the platform should also keep the link back to the full dataset, ensuring that the context is retained.

Privacy, Security, And Reliability Are Essential

Aggregated, clean data from a diverse set of sources enables the development and use of effective AI models for MedTech. Maintaining privacy and security is another important factor that MedTech product development and their compliance teams must apply to understand and comply with all relevant privacy and security regulations, which vary by region.

Therefore, technologies should be designed with privacy and security capabilities that MedTech AI developers can leverage for their compliance efforts. For example, MacLeod comments: "We encrypt all the data at rest and in flight, so as you're developing your software you can

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take advantage of the technology we provide to help you create solutions that conform with requirements like HIPAA in the U.S. and GDPR in Europe."

Another example MacLeod offered is tooling to account for state-to-state differences in U.S. laws around patient consent for sharing health data. There are similar regional requirements outside the U.S.

"There are many cases where a country, or sometimes even a region, says, 'Okay, this data cannot leave our territory'. Well, tough luck if you are offering your service only in a cloud region that does not cover that geography," De Boe said. "We offer a variety of deployment models, and we have customers taking advantage of that in many different geographies."

Privacy and security are two of the critical but less glamorous aspects of AI. Reliable connectivity is a third. A platform should meet needs across major deployments, such as InterSystems' work with a large nonprofit health data network, that connects tens of thousands of partners with patient information for more than half the citizens of the state.[3]

"Whether your device is connected at a small GP or a really big hospital, acting on the signals it generates may involve live data from third parties that may not be online the moment you need them. Your network is not necessarily reliable," De Boe said. "Being able to work with appropriate levels of redundant processing, work with queues, those are all techniques that are built into the connective tissue that is our software to empower teams to thrive in heterogeneous, geographically dispersed environments."

Working With the Right Partner

An ideal partner understands the importance of acquiring, aggregating, and cleaning data and the need for privacy and security regulations. InterSystems, drawing from best practices, has developed a platform that is tailor-made for the needs of AI projects.

The platform is part of a broader package of support that InterSystems provides to its partners. Rather than just sell software and provide the technical help needed to get started, InterSystems works closely with the company's partners to provide expert input on the specifics of their projects.

Those conversations are facilitating the success of AI-enabled medical technology. By providing access to expertise alongside a platform for preprocessing, cleaning, and labeling data, InterSystems is clearing the

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barriers to the development and deployment of technologies with the power to transform healthcare.

These capabilities are empowering InterSystems' partners to answer a pressing question: You have all this healthcare data; how do you connect to all the data in healthcare? How companies answer that question will determine if they thrive in the era of MedTech AI.

You can learn more about our support for MedTech innovation at InterSystems.com/MedTech

References

1. MedTech Europe - The socio-economic impact of AI in healthcare. MedTech Europe https://www.medtecheurope.org/resource-library/the-socio-economic-impact-of-ai-in-healthcare-addressing-barriers-to-adoption-for-new-healthcare-technologies-in-europe/ (2020).

2. Creating Next-Gen Enterprise Imaging Apps Using AI and Clinical Data. US Corporate https://www.intersystems.com/resources/creating-next-gen-enterprise-imaging-apps-using-ai-and-clinical-data/ (2019).

3. Partner news: California's largest nonprofit health data network selects InterSystems Health-Share® to achieve new vision for information delivery providers. Manifest Medex https://www.manifestmedex.org/californias-largest-nonprofit-health-data-network-selects-intersys-tems-healthshare-to-achieve-new-vision-for-information-delivery-providers/ (2019).

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InterSystems is founded on two core principles: excellence and customer success. As the leading provider of data solutions for industries with critical needs like healthcare, financial services, and logistics, we realize that lives and livelihoods rely on our technology.

That's why we put everything we have into creating robust technology that can meet today's toughest demands. No matter what the data challenge, we will build a solution. Because solving problems is what we do.

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