BECKER'S
HOSPITAL REVIEW

workday.
Built for the future.™

HOW AI IS REVOLUTIONIZING HEALTHCARE OPERATIONS – 9 MUST-READS

TABLE OF CONTENTS

INTRODUCTION

Artificial intelligence is projected to reshape operations across industries. Arguably, healthcare is the sector where these changes are poised to be the most revolutionary. The promise of AI in healthcare bears out in market predictions. In 2014, the national AI healthcare market was worth $600 million. By 2021, the figure will rise to $6.6 billion, according to a 2018 report from Accenture.

The technology could also mean big savings for an industry facing perpetual cost increases. By 2026, AI applications could potentially generate $150 billion in annual healthcare savings in the United States, according to Accenture. As margins continue to shrink, and regulatory uncertainty continues to loom over the industry, such savings would be a fiscal boon for America's hospitals and health systems.

The breadth of AI's potential to transform healthcare extends beyond the confines of clinical care. From supply chain optimization to employee engagement and financial management, AI is already helping to streamline business processes across the spectrum of healthcare operations.

AI-powered tools such as natural language processing can increase the accuracy and ease of clinical and administrative documentation, which can help eliminate disruptions delivery of patient care. Automation in both the supply chain and the financial management process can not only help eliminate errors and waste but unlock the potential of human capital. The automation of mundane and tedious tasks common in these areas of operations allows staff to direct their energy and talents toward more human-centric endeavors. Since the rise of the EHR, provider organizations have been inundated with data. However, with AI's ability to analyze both structured and unstructured data, providers now have access to tools to help them glean actionable insights from the massive amounts of data stored in the cloud. AI's data combing abilities can also help address staffing shortages, which have proven to be a persistent problem facing the industry. Machine learning solutions can not only sift through staff data and coordinate work schedules, but they can also identify top candidates for open positions and match existing talent with provider needs to improve employee retention.

AI is already reshaping healthcare, and as the technology continues its evolution more changes will proliferate. Leaders from provider organizations of all sizes should not only stay apprised of AI's evolution but understand what specific benefits the technology can bring to their organization today.

This e-book contains nine articles that touch on the current and future role of AI technology in healthcare. Read on to learn more about which business systems AI will overhaul, the nine areas of healthcare where AI can make the biggest difference, and key AI takeaways from a Becker's 10th Annual Meeting Speaker Series article.

What business systems will AI overhaul? Most developers say ERPs

By Jessica Kim Cohen, *Becker's Hospital Review*

Artificial intelligence technologies will soon replace many of today's business processes, according to a recent survey of software developers.

For the survey, market research firm Evans Data Corp. polled software developers who are working with AI technologies in October. The survey focused on business processes that machine learning, deep learning, image recognition and other types of AI might replace in the near future.

The margin of sampling error for all respondents is plus or minus 4.3 percentage points.

Eighty percent of developers said enterprise resource planning software was the area most likely to be totally replaced by AI in the near future. ERP platforms are business management systems that centralize data from different areas of an organization, such as payroll and supply chain.
In fact, 58 percent of developers are adding or have already added AI to their ERP software.

Other business processes that developers forecasted as being replaced by AI were human resources (69 percent) and workflow automation (67 percent).

Viewpoint: With restructuring and retraining, AI will enhance – not steal – jobs

By Andrea Park, *Becker's Hospital Review*

Seemingly every artificial intelligence-powered discovery is met by a renewed wave of fear that robots will soon take over in the workplace, making human employees obsolete. In reality, according to Erik Brynjolfsson, PhD, director of the MIT Initiative on the Digital Economy, as long as companies are prepared to restructure and retrain as necessary, AI will be a boon, rather than a menace, at work.

In an interview with Wired, Dr. Brynjolfsson described how, especially in the field of healthcare, AI and robotics should be seen as a tool not only to improve accuracy, but also to free up humans to complete other, more in-depth tasks.

"A machine learning algorithm might be 97 percent accurate and a human might be 95 percent accurate, and you might think, OK, have the machine do it," he said of analyzing medical images in radiology. "You're better off having the machine do it and then a human check it afterwards. Then you go from 97 percent to 99 percent accuracy because humans and machines make different kinds of mistakes."

Beyond that, the human radiologist will do a much more efficient job on their own when it comes to comforting patients and coordinating with other physicians – essentially, any task requiring human connection. Successfully incorporating AI into the workplace, then, will require some restructuring and, if necessary, retraining to ensure humans are in positions where they are most needed.

"I think it's a little bit of a lazy mindset to look at a business process or a job and just sort of say, OK, how can a machine do that whole thing? That's rarely the right answer," Dr. Brynjolfsson said. "Usually the right answer requires a little more creativity, which is how can we redesign the process so parts of it can be done by a machine really effectively and other parts are done by a human really effectively, and they fit together in a new way."

KLAS recognizes vendors for financial, HIM, RCM solutions

By Kelly Gooch , *Becker's Hospital Review*

Five vendors earned top rankings from independent research firm KLAS for their financial, revenue cycle management and health information management solutions.

"Best in KLAS" rankings are based on KLAS examinations of leading software and services vendors in healthcare. They are given in software and services market segments with "the broadest operational and clinical impact on healthcare organizations."

For this year's rankings, KLAS Research looked at information from 2,500 interviews conducted monthly with providers and payers, representing the experiences of more than 4,500 hospitals and 2,500 clinics.

The financial/revenue cycle/HIM "Best in KLAS" category had five vendor solutions, ranked on a scale of 0 to 100, including feedback in six performance categories: culture, relationship, operations, product, value and loyalty.

The five vendor solutions and their rankings:

Enterprise resource planning

1. Workday HCM, Financial Management and Supply Chain: 89.4

Healthcare business intelligence and analytics

2. Dimensional Insight Diver Platform: 91.7

Patient Access

3. DCS Global Patient Access: 89.3

Patient accounting and patient management (large hospital/integrated delivery network)

4. Epic Resolute Hospital Billing: 89.5

Speech recognition: Front-end EMR

5. MModal Fluency Direct: 92.5

Read more about the rankings here.

5 supply chain technologies to watch

By Alia Paavola, *Becker's Hospital Review*

There are many promising technologies that aim to help the healthcare supply chain streamline operations and improve efficiencies. Below are five to watch, according to BBN Times, an online source of expert analysis on global issues.

1. Blockchain. Blockchain has the promise of bringing high-level traceability to the supply chain because managers can track the status of a product in real time. In addition, smart contracts, which are one of the applications of blockchain, have built-in automation, which may ease transaction and payment management for supply shipments.

2. RPA. Robotic Process Automation refers to software robots with machine-learning capabilities. They may be able to replace the manual, time-consuming and error-prone parts of a business. RPA products may help supply chain companies automate back office tasks to allow employees to focus on high-quality, complex matters.

3. Artificial intelligence. AI has a lot of potential applications in the supply chain. Chatbots are one example. They can handle all the paperwork with accuracy, efficiency and speed. Chatbots could have an application for tracking the order details of a shipment or taking care of invoices and transactions.

4. Internet of things. The most common method for asset tracking is sequence numbers and bar codes. However, IoT sensors and cameras can help supply managers find granular data on the product and its location at any point. IoT also has the ability to improve fleet management by connecting fleets and tracking shipments. Overall, with IoT, companies can expedite the tracking of goods and improve transparency.

5. Wearables. Product downtime causes revenue loss for organizations involved in logistics and supply chain. Product inspectors may be able to diminish these losses with the use of wearables. Augmented reality glasses have shown promise in helping inspectors detect glitches.

Becker's 10th Annual Meeting Speaker Series:

3 Questions with Giovanni Piedimonte, Chief Global Pediatric Research Operations for Cleveland Clinic Foundation

By Staff, *Becker's Hospital Review*

Giovanni Piedimonte, MD, FAAP, FCCP, serves as Chief, Global Pediatric Research Operations for Cleveland Clinic Foundation; Professor & Chair of Pediatrics, Cleveland Clinic Lerner College of Medicine; and Director, Center for Pediatric Research for Lerner Research Institute.

On April 3rd, Dr. Piedimonte will speak at Becker's Hospital Review 10th Annual Meeting. As part of an ongoing series, Becker's is talking to healthcare leaders who plan to speak at the conference, which will take place April 1-4, 2019 in Chicago.

To learn more about the conference and Dr. Piedimonte's session, click here.

Question: What do innovators/entrepreneurs from outside healthcare need to better understand about hospital and health system leaders?

Giovanni Piedimonte: There is no doubt that the healthcare industry is way behind when it comes to technological innovation, and painfully slower in the adoption of new ideas and paradigms. This delay is in significant part caused by "cultural inertia" and resistance to change, which is much more significant in our ecosystem than in other areas of modern society. However, it is critical that innovators and entrepreneurs understand that, for anything to work in the highly complex world of healthcare users, it's got to be easy! In particular, patients and caregivers can't be expected to be tech gurus. The majority of our patients are not PhDs, but still need to have a full understanding of what they need to do to stay healthy, how to get better when they are ill, and how to effectively access and interact with their healthcare providers. Importantly, no matter how disruptive the innovation implemented by any healthcare system, patient engagement and satisfaction will always be critical to better medical and financial outcomes.

On the other hand, doctors, nurses, and other caregivers can't be expected to manage myriads of applications and devices operating on different platforms that lack interoperability. Time is our most precious resource, and healthcare professionals are increasingly being pulled in too many directions and expected to master fundamentally new knowledge in biology, medicine, computer sciences, business performance, etc., all together and all with the same tight deadlines. One of the most striking paradoxes of today's medicine is that the same technology that is supposed to make our lives better and easier frequently turns to be more complicated and time-consuming...just ask any

practicing physician - especially the more senior ones - about using Electronic Health Records! There is a limit to what we can learn and do, especially when we have to balance work with family and personal well-being. Beyond that threshold looms the risk of physical and psychological burnout, perhaps the worst threat we have to face in healthcare today. I am convinced that people eventually will do the right thing to improve their health and the health of their patients, but only if it's easy and can be balanced with the many other needs and demands of today's life.

Q: Healthcare takes a lot of heat for not innovating quickly. What's your take on this?

GP: I think right now there is much confusion about technological innovation in healthcare. Too much attention to sexy buzzwords and little focus on substance and practicality. In particular, many new tools sound and look exciting, but then fail to meet the day-to-day needs and demands of the average patients and caregivers. Comes to mind the first generation of telehealth applications (just ten years ago...but it seems like a century!) that were burdened with operational issues and connectivity hiccups, workflows not supported by traditional EHR modules, and lack of user-friendliness both for providers and patients. Even more importantly, services were not reimbursed despite the substantial time commitment of physicians and nurses involved. Today's telehealth has improved on many of these fronts, and its adoption will rapidly increase with the new CMS PFS driving a shift to a true virtual care model, but there is still ample margin – and need - for continuing improvement. Fundamentally, for innovation to be embraced meaningfully and on a large scale, customers and payers need to see the value in terms of usefulness, effectiveness and – last but not least – a return of investment. Moving forward, it is essential for healthcare to learn from the digital expectations set by other industries. More and more, our patients are becoming used to the almost flawless convenience and practicality of watching Netflix, searching on Google, buying from Amazon, or working with Apple.

Furthermore, these technology powerhouses are already extending their footprints in the healthcare space with "one-stop virtual platforms" that aim

at bringing healthcare industry up to speed with the rest of the "Internet of Things" world we live in. Patients will continue to demand a more consumer-driven experience on par with online shopping ("digital front door"). This process will accelerate rapidly with the gradual entry into the healthcare marketplace of more than 100 million customers comprising late Millennials (Gen Y.1, currently 31 million people in the U.S.) and Gen Z (nearly 74 million in the U.S.), who are partially or completely native to the digital revolution. Healthcare will experience a "Darwinian" evolution that will grant survival only to those who will be fit enough to match the technological advantages already provided by other industries. Like all revolutions throughout history, the digital healthcare revolution will not be easy and will have a substantial social cost, but it is inevitable and eventually will morph into much better healthcare delivery options for future generations.

Q: Tell us about the last meaningful interaction you had with a patient.

GP: For almost three decades, I have dedicated my clinical work to pediatric patients with respiratory conditions, from birth to adolescence and young adulthood. As they are usually accompanied by one or both parents, my clinical practice provides me with a unique vantage point to observe the "generational gap" when it comes to the adoption of new technologies. A few weeks ago, I introduced to one of my adolescent patients the option of using a new device for inhaling her daily medications while receiving real-time feedback about her inhalation technique and storing all relevant medical information in the "cloud." I saw a spark in her eyes, so I kept chatting about the rapid technological advances of digital medicine that will soon allow her to have all medical records at her fingertips using blockchain, interact with robotic doctors and nurses, and have therapies precisely targeted to her personal needs. Her mother kept looking at me with concern, and expressed her angst and distrust for the machines that threaten to "take over the world." The girl just shouted: "Cool!" The next generations give me hope and make me more optimistic about our "digital future," but it won't be easy for them. Our children will have to deal with new accelerations in a world where artificial intelligence moving at the exponential speed of the Moore's Law will increasingly outpace human intelligence, and learn to interface with unfathomable technological progress that it's just now entering the "second half of the chessboard." They will also have to deal with the social instability deriving from rapid spread of automation, which, according to Bain & Co., may eliminate by 2030 as many as 20-25% of current jobs (equivalent to 40 million displaced workers), hitting middle- to low-income workers the hardest and depressing wage growth for many more workers. Indeed, healthcare will be one of the areas most affected by machine learning, which will certainly optimize workflows and will make back-office functions (Human Resources, Revenue Cycle, Supply Chain, etc.) run more smoothly and inexpensively, but will also eliminate hundreds of thousands of jobs. Finally, they will have to find the way to pay for the increasingly exorbitant costs of highly precise therapies like CAR-T that promise to cure cancer, diabetes, and many other epidemic diseases, but currently cost more than $500K per patient. Notwithstanding all these challenges, I am among those optimists convinced our "cool" new generations would find the way to harness the infinite potential of "AI" (Artificial Intelligence) into becoming the "IA" (Intelligent Assistance) we all need to give humanity a better future.

94% of CIOs expect workforce to include robots by 2025, survey finds

By Jackie Drees, *Becker's Hospital Review*

The rapid evolution of technologies like artificial intelligence will continue to impact the future of the workforce, according to a new survey from OneLogin, a cloud identity and access management platform.

By 2025, AI is predicted to create more than 2 million jobs. The technology is expected to produce more jobs than it will displace, according to the report. Business leaders will be tasked with effectively integrating the power of AI and human resources.

OneLogin asked 100 CIOs from across the globe whether they agree that both robots and humans will make up the workforce by 2025. Survey results showed:

- 64.35 percent – agree
- 20.70 percent – strongly agree
- 5.94 percent – disagree

When asked whether businesses of the future will need to leverage machine learning and AI to predict and rapidly meet the needs of their customers, participants responded:

- 35.6 percent – strongly agree
- 54.4 percent – agree
- 10.9 percent – disagree

To view OneLogin's full report, click here.

Workday advances employee engagement initiatives

By Staff, *Becker's Hospital Review*

Workday, a leader in enterprise cloud applications for finance and human resources, on Aug. 2 announced a new initiative to empower its 8,600-plus employees to better focus on their professional growth goals.

The workforce empowerment initiative centers on five key factors: contribution, capabilities, career, connections, compensation and recognition. The effort leverage's Workday's human capital management solution to allow employees to actively measure their own performance and create their own development and growth opportunities.

"Organizations that do not innovate their HR practices to help their people develop and reskill will fail to attract and retain top talent in today's competitive market," said Greg Pryor, senior vice president, people and performance, Workday. "When people are enabled to grow, perform in their roles and evolve their careers, it positively affects overall performance and delivers collective results for our colleagues, customers and company."

To learn more about Workday's healthcare offerings, click here.

How AI can impact 7 areas of healthcare

By Mackenzie Garrity, *Becker's Hospital Review*

Spending on artificial intelligence-related tools is expected to exceed $8 billion annually across seven healthcare areas by 2022, according to the Boston Consulting Group.

Below are the seven areas AI will play a significant role in:

1. Remote prevention and care: Virtual physicians are among the AI tools being implemented to treat patients outside hospitals. Wearables and other trigger-alerting devices are being introduced to patients to track health data. These devices all use forms of AI.

2. Diagnostics support: Physicians can use AI to improve medical imaging and other clinical tests. The technology can help physicians identify conditions and diseases, such as breast cancer, brain injuries and heart disease. The consulting group estimates healthcare companies will spend around $1.2 billion annually by 2022 on AI-related diagnostic support to reduce costs.

3. Treatment pathways and support: Through AI tools, physicians can more easily create individual treatment plans, eliminating potential errors. By developing correct treatment plans, physicians can lower complication risks and improve outcomes while cutting costs.

4. Drug discovery and development: Total spending on AI-related drug discovery and development applications is predicted to reach $1.3 billion by 2022. Currently, biopharma companies are spending big portions of their budgets on research and development. With AI, these companies can better identify and develop promising drugs.

5. Operations: Between natural language processing and automated writing, AI tools can reduce the time physicians spend on paperwork. These tools also can be used with biopharma and medtech companies to streamline operations, including global supply chain.

6. Marketing and sales: AI tools can allow healthcare companies to identify providers more likely to be receptive to their products.

7. Support functions: Other AI tools beginning to the merge include computer vision, voice recognition and neuro-linguistic programming. These functions are becoming automated. For example, chatbots are more commonly being used to answer patient questions about billing or passwords.

What does AI mean for care experiences – And for the providers who deliver them?

By Steve Jackson, President, NRC Health

Artificial intelligence looms large in consumer services, financial technology and manufacturing and now it's making inroads into medicine too.

AI, in fact, is already revolutionizing clinical work. Algorithms are proving to be about as accurate as radiologists in diagnosing lung cancer, according to Imaging Technology News. Even more remarkable, researchers predict by the year 2053, all surgical work could be conducted by machines, according to a study published in the Journal of Artificial Intelligence.

At first glance, trends like this might stir up some anxiety for those of us in healthcare. This reflects broader fears about AI in the economy. Leaders and frontline staff alike worry as AI grows more capable, the importance of human labor will shrink.

That is decisively not the case. More than perhaps any other industry, healthcare hinges on a human touch. The unique demands of the work put a premium on intimacy, connection and compassion – traits no machine could ever replace.

Quite the contrary, as AI begins to revolutionize care experiences, it will usher in a new era in patient service, one that will require more human input than ever before: the era of mass personalization.

Predictive analytics and personalized engagement will empower organizations to deliver experiences custom-tailored to individual patient needs.

The power of predictive analytics

Predictive analytics is one of AI's most promising developments. The term is short-hand for any process that uses historical data to make predictions about the future. Its most prominently used in the finance industry: banks routinely use AI-enabled predictive analytics to assess a borrower's credit-worthiness.

With a little imagination, it's not hard to see why such tools would be useful in healthcare. Health systems can use predictive analytics to anticipate what their patients will need, instead of merely reacting as new health concerns arise.

Well-designed analytics engines will combine patient health information (EHR-derived data points like lab values, diagnoses and treatments administered) and patient behaviors (such as online engagement, appointment-setting, cancellations, satisfaction scores, compliance and follow-up contacts) to bring new clarity on what patients want from their providers.

Health systems will know, for example, not just when a new health concern is likely to arise, but also when and how the patient would prefer to make an appointment to address it, what kinds of services the patient will most likely desire, what kinds of interactions are likely to increase the patient's compliance with follow-up instructions and more.

While today's predictive-analytics products can't yet offer that level of sophistication, the technology's evolving fast, and there's little doubt of its strategic value to health systems.

Personalized engagement: The "Netflix-ification" of care experiences

As complicated as predictive analytics are, personalized engagement engines demand a much higher order of complexity; think of Netflix's recommendation system. The streaming service takes in what it knows about viewers, and then automatically offers suggestions for what they might like to see next.

On the surface, this might not seem so complicated. But what's remarkable about processes like this is the technology that underlies them. Cluster behavior prediction systems absorb trillions of raw data points from consumers and independently identify patterns that can be used to group consumers by their preferences. This is how Netflix's algorithms work.

While personalized media recommendations like these are complex, personalized healthcare engagement is on another plane entirely.

For these systems to work, they will require exponentially more data and these data points won't be limited to just clinical information, or to patient interactions with health systems. They'll include socioeconomic status, demographic data, ZIP codes, fitness-center attendance rates, family status, biofeedback data from wearable tech like the FitBit and Apple Watch, grocery and restaurant food consumption data and more. With healthcare engagement, the array of conceivably useful data points is truly staggering.

But imagine the potential. With a refined personalized engagement engine, it's possible health systems will have a newfound ability to tailor their services individually for patients.

The engines won't just know what patients will need – they'll also know where and to whom to send it to in order to maximize a given patient's happiness with a given encounter. This will give health systems a way to construct a concierge care experience, customized for every patient who comes in the door. It would truly begin the era of mass personalization.

While such an idea sounds like science fiction now, researchers are already at work making such technologies a reality. "Cognitive aide" technologies, for instance, are already making an impact on clinical care, according to a Yearbook of Medical Informatics article. It's only a matter of time before they augment service decisions as well.

But note carefully – that's augment. Not replace.

AI technologies can offer direction, but it's providers who will need to assess and execute on what AI-driven solutions uncover. Healthcare's very human heroes need not worry about obsolescence. If anything, the era of mass personalization will demand more of us than ever.