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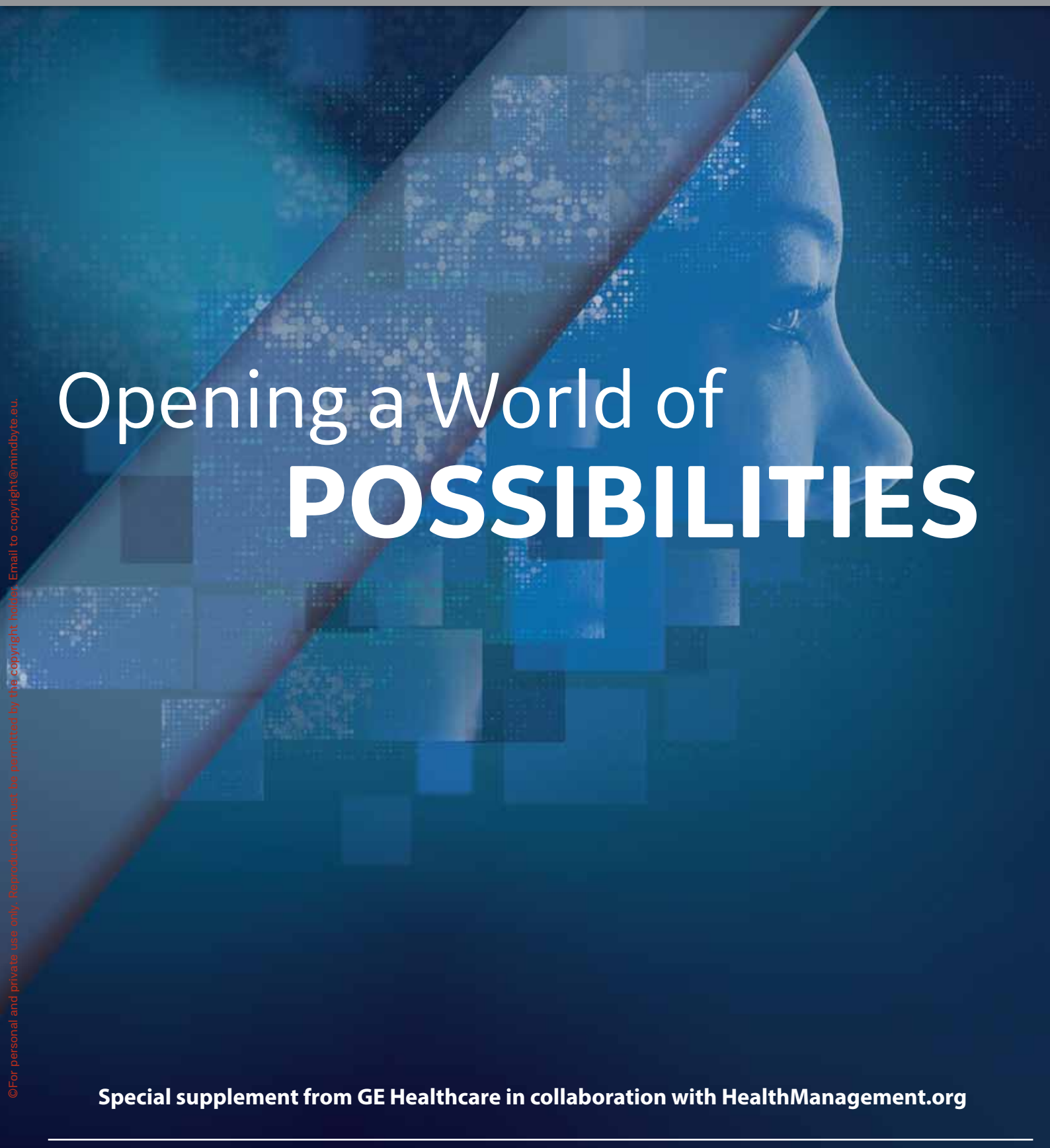


Opening a World of POSSIBILITIES

Special supplement from GE Healthcare in collaboration with HealthManagement.org

Contents

Improving Efficiency While Providing the Best Care

Catherine Estrampes
President & CEO
GE Healthcare Europe

The growth and aging of global populations, the rising levels of chronic disease coupled with escalating costs, growing complexity and inadequate infrastructure is forcing a fundamental re-think of every aspect of healthcare.

Swedish doctors spend on average one working day a week on administrative tasks. The British National Health System estimates that an extra 291,327 operations could be completed every year by improving operating room management. The proportion of inefficient or wasteful public spending in Italy was estimated to be around 19% in 2017.

Finding smarter ways to reduce waste and increase efficiency across healthcare is today's challenge. The good news is that there is tremendous opportunity to ease the burden of administrative tasks, improve processes and support faster decision-making across Europe.

Take for example X-Ray - the most common method of imaging and the first way of detecting a collapsed lung. It can take radiologists anywhere between two to eight hours to review the scans. But with Critical Care Suite™, a new algorithm built into the X-Ray device, clinicians can be alerted of a potential collapsed lung at the point of care, telling them to urgently review and prioritize the patient.

In MR, the MR Excellence program combines applied intelligence and data-fueled analytics with MR technology to increase productivity and quality in imaging. As a result, a practice in Germany saw up to 30% increase in productivity and increased MR scans from about 120 per week to about 170 per week. Patient wait times for an exam dropped from 6-8 weeks to just 1-2 weeks.

At the hospital level, traffic-control-style Command Centers help address capacity, safety, quality, and wait-time. By constantly pulling in streams of data from multiple hospital systems and using simulation and AI, the Command Center generates predictive analytics to help staff recognize patterns in real-time and predict what will happen in the next 24-48 hours. The first of its kind in Europe was launched in September 2019 in Bradford, UK.

Too often though, important patient data is siloed in different departments, devices, medical records or even hospitals. Storage, access, and use of data are key to unlock the potential in healthcare. National governments are showing the way with encouraging examples: in Germany, the new Digital Supply Act foresees that doctors will soon be able to prescribe digital health apps to patients. In Finland, the Findata initiative is already considered an exemplar for health data governance in Europe with anonymized data and a dedicated clearing authority handling access requests in a GDPR-compliant manner.

I am excited to see the impact that this digital transformation will have. The increased use of advanced data analytics, connected devices, genomics and AI is ushering in a new era with the potential for real breakthroughs in patient outcomes and operational efficiencies across every facet of care. Never before has innovation in healthcare been more digital. ■

Artificial Intelligence – Putting Patients First

A recent MIT Technology Review Insights survey looked at the current and potential future applications of artificial intelligence (AI) in the healthcare environment. This article discusses the survey's findings, and looks at how these technologies are 're-humanizing' healthcare, by aiding the transition from target- to value-based care models.

Not long ago, no one would have dreamed that a machine could be a partner in guiding a medical procedure, but recent advancements have transformed AI technologies into powerful tools for enhancing clinical and operational efficiency.

Today, AI is allowing everyone involved in the healthcare ecosystem—doctors, nurses, administrators, and patients—to benefit from enhanced efficiency and better diagnoses. It extends and augments professional capabilities and provides the foundation for better, more cost-effective outcomes. Crucially, it is an enabling technology for a more personalized approach to patient care, focusing on patient outcomes rather than just system efficiency.

During the next 10 years, AI is expected to radically streamline healthcare delivery by providing immensely powerful insights to enhance the patient management pathway, yet there are hurdles to overcome before AI transforms healthcare provision. For example, at present, too much patient consultation time is spent entering data, rather than drawing inferences from it. However, these transitional issues should quickly be resolved as AI is more broadly adopted across the sector, and the outlook among

healthcare professionals is positive; almost half of medical staff expect AI will enable more robust diagnoses, and 57% believe its improved predictive capabilities will allow them to focus more on preventive medicine. Rather than eliminating the human element from the system, AI allows those individuals to make smarter decisions, with fewer errors.

AI is already here

Numerous technologies are in play today to allow healthcare professionals to deliver the best care, increasingly customized to patients, and at lower costs. For instance, in medical imaging analysis applications, the combination of AI-based imaging technologies and radiologists has been shown to outperform either AI or the radiologist in isolation. So, far from replacing radiologists, the technology supports decisions and amplifies the performance of existing staff.

Radiologists don't just look at images. That would be a complete misunderstanding of what radiologists do. In my view, AI will enhance the value radiologists provide to patients, not replace them. While AI has been shown to augment the care radiologists provide, AI does not yet have the capacity to do what radiologists accomplish every day. It does, however, offer the tremendous opportunity to bring radiologists back into daylight by empowering them to become more 'doctor' than ever before. AI will help to re-establish the human connection between the radiologist and the patient. As such, I'm not the least worried that radiology as a medical specialty might eventually be at risk if we responsibly embrace AI.

To give just one example—GE Healthcare recently gained FDA clearance for first AI algorithms embedded on-device to prioritize critical chest X-ray review. These help radiologists prioritize critical cases with a suspected pneumothorax—a type of collapsed lung—by immediately flagging critical cases to radiologists for triage, which could drastically cut the average review time from up to eight hours[1]. They offer the first-of-its-kind automated AI quality check features that detect acquisition errors, flagging images for technologist review and allowing them to make corrections before they go to radiologists for review, and were built in collaboration with UC San Francisco (UCSF), using GE Healthcare's Edison platform. It's just one example of how an AI algorithm can help busy practitioners—reducing the turnaround time it can take for radiologists to review a suspected pneumothorax.

The industry is slowly realizing that AI is an enabling tool that represents the extension, not extinction, of professional capabilities. The survey found that seven out of 10 healthcare institutions have either adopted or are considering AI, with 10% using it for one or more applications, 17% conducting pilot projects, 11% in the process of acquiring at least one AI application, and more than a third planning to increase their spending on AI in the next two years. For those institutions that have already adopted AI, 86% of respondents believe that it has helped them analyse and make better use of data, while 79% indicate that it has helped avert healthcare worker burnout. Healthcare administrators and leaders also see AI as an agent for positive change, with 80% of business-facing and administrative healthcare workers expecting it to help them improve revenue opportunities, and 81% believing it will make them more competitive healthcare providers. In addition, more than 82% of healthcare business leaders report that adoption of AI has led to workflow improvements in both their operational and administrative activities, with nearly three out of four institutions planning to develop their own AI algorithms in the next two years.

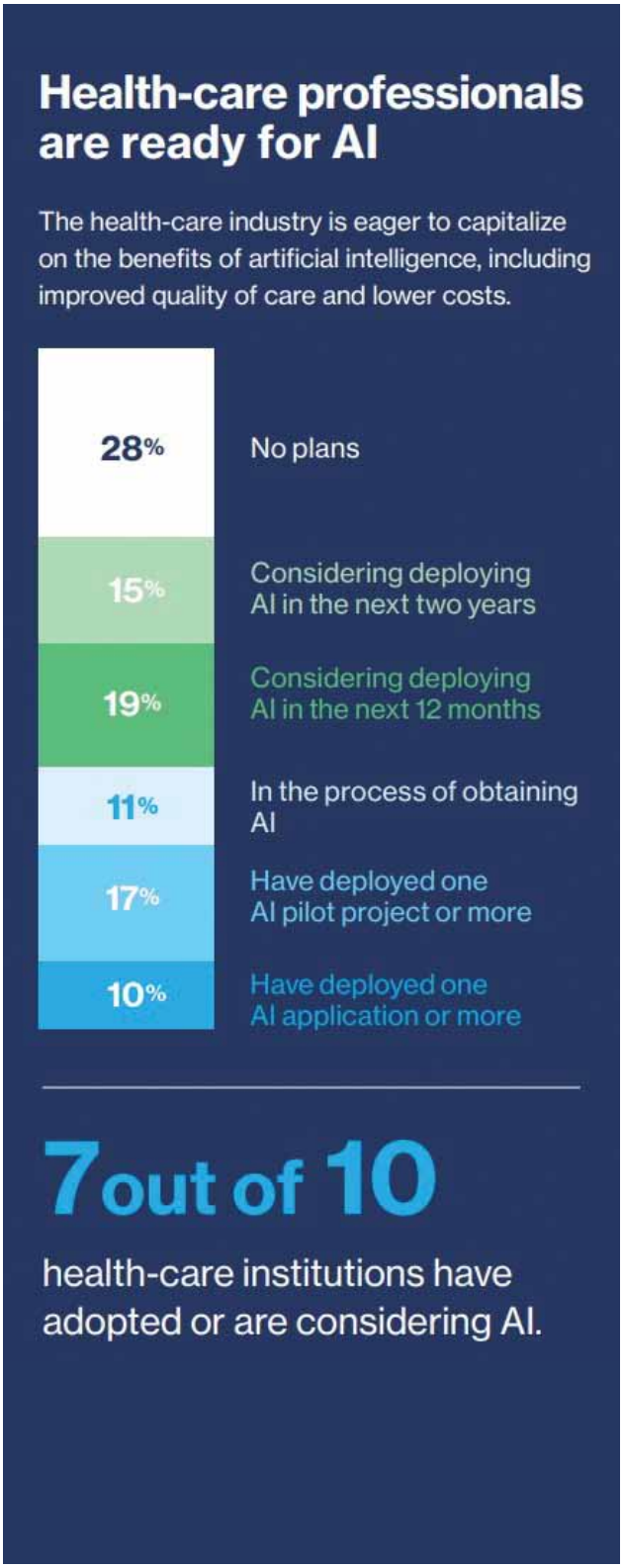
Untangling complexity

Across the entire healthcare ecosystem—from patient management, operations and administration to diagnosis and treatment—medical professionals are confronted with growing complexity. Regulatory concerns, expanding treatment alternatives, and the onslaught of data and information are all exceedingly challenging to navigate.

The true value of AI is in reducing this complexity, automating and streamlining workflows to allow healthcare professionals to harness the insights available, without being overwhelmed by the sheer volume of data. Handling growing workload volumes—and managing the backlog and staff fatigue that accompanies it—was cited as the top challenge that they were looking to mitigate through the use of AI. These technologies can be used to assume many of a physician's more mundane administrative responsibilities, such as taking notes or updating electronic health records, which can take up to 10% of a typical medical professional's working week. Almost 80% of AI adopters surveyed indicate that AI has already automated many of these time-consuming tasks, and 45% believe this frees up additional time for patient consultations, procedures and other higher value tasks.

Expect the unexpected

Integrating AI applications into existing systems is obviously a major challenge for any healthcare system, with 60% of respondents concerned about



Infographic from the MIT Technology Review Insights report: The AI effect: How artificial intelligence is making health care more human

the disruptive impact on established processes. Interestingly, there are four issues that less than half of current AI adopters consider obstacles to more widespread adoption: cybersecurity; lack of compelling adoption rationale; reluctance of staff to adopt the new technology; and lack of senior leadership support. Despite this, overcoming these 'traditional' adoption difficulties isn't easily done for most institutions, as a willingness to change and adopt AI is a perpetual challenge for even the most tech-forward organizations. The key to success is for medical professionals to see these technologies as something positive, rather than a threat, and evolve their practices to embrace these developments. AI can extend the resources and capabilities of overworked healthcare professionals and vastly improve processes, leading to better patient outcomes.

Conclusion

AI needs to work for healthcare professionals as part of a robust, integrated ecosystem, and success relies on more than simply deploying a new technology. The more 'humanized' the application of AI is, the faster and more widely it will be adopted, and the better the return on the initial investment. Ultimately, this will improve results and patient care and, in healthcare, the priority should always be the patient.

About the survey

In October 2019, MIT Technology Review Insights surveyed 908 healthcare professionals involved in the purchase or selection of AI, big data analytics, or medical technologies. With respondents from both sides of the Atlantic - 70% USA and 30% UK - this mixed cohort included:

- 17% medical doctors and specialists
- 5% nurses or nurse practitioners
- 26% senior managers
- 16% information technology professionals
- 16% research and development staff
- 9% legal or regulatory professionals
- 9% finance or accounting personnel
- 2% other healthcare workers ■

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Chief Medical Officer, Europe, GE Healthcare

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Leveraging the Power of AI on Smart Devices

The results of the MIT Technology Review survey, in partnership with GE Healthcare, emphasize AI's potential and ensure that the technology is here to stay, but its ability to overcome potential disruption must be addressed.

GE Healthcare believes the solution is in packaging. By unlocking data, breaking it out of silos, and deploying it on the right platform, AI can seamlessly integrate into existing workflow, thereby making it easier for providers to adopt these algorithms.

To do this, GE Healthcare recently introduced the Edison Developer Program to help healthcare providers gain easier access to market-ready AI algorithms and applications by directly integrating these technologies into existing workflows.

"Edison works to meet clinicians where they are and provide the intelligent solutions they need, when they need them," explains Karley Yoder, Vice President, Artificial Intelligence, at GE Healthcare. "It combines diverse data sets from across modalities, vendors, healthcare networks and life sciences settings to enable quick development of advanced intelligent applications and reduce barriers for developers to create intelligent solutions."

These solutions can be deployed on medical devices, via the cloud or on the edge, a computing technology that sits close to the physical device.

"The platform selected for the deployment of each application is a strategic one, since each offering provides unique benefits to radiologists and technologists," continues Yoder. "That said, many of our product launches this year are on-device AI solutions, which offer unique opportunities to increase clinical and workflow efficiency at the point of care."

"It also offers a lower barrier to entry for hospital systems that are interested in adopting and testing AI but are hesitant to make additional IT investments," adds Katelyn Nye, General Manager, Mobile Radiography and Artificial Intelligence, GE Healthcare. "On-device AI does not require infrastructure investments, security assessments, or IT configurations – offering a faster and more accessible way for hospital systems to test algorithms quickly and benefit from several unique on-device AI benefits."

After consulting customers throughout the world and evaluating their healthcare needs, GE Healthcare announced several unique on-device solutions across its portfolio, each offering a different benefit to customers:

On-device AI can improve efficiency by automating steps in the workflow and expediting exams

"Automation and smart technologies are not only the future of medical imaging but are essential as departments look to transform workflows and the patient experience," said Dr. Vincent Lombard, the first clinical adopter of Revolution™ Maxima with AI-based Auto Positioning, and a radiologist at Centre Imagery Jacques Callot. "By integrating artificial intelligence into existing workflows we've been able to not only improve scan quality and reduce steps, but we've also been able to spend more time caring for patients."

Revolution™ Maxima with AI-Based Auto Positioning uses real-time depth sensing technology to generate a 3D model of a patient's body to pinpoint the center of the scan range and automatically align it to the isocenter of the bore. Altogether, it is designed to simplify, streamline and automate the entire CT experience for one click, hands-free patient positioning.

Automatic quality checks catch errors at point of care, enabling technologists to retake images and fix protocol labels before uploading the exam results to PACs

"Automatically running quality AI algorithms – like Intelligent Field of View and Intelligent Protocol Check – on-device increases efficiency and integrates them into the technologist's standard workflow, enabling technologist actions – such as rejections or reprocessing – to occur at the patient's bedside and before the images are sent to PACS," explains Katelyn Nye, General Manager, Mobile Radiography and Artificial Intelligence, at GE Healthcare.

Intelligent Field of View and Intelligent Protocol Check help detect acquisition errors on GE Healthcare's Optima™ XR240amx mobile x-ray system, flagging images on-device for technologist review and allowing them to make corrections before the images are sent to the radiologist.

Embedding AI into the image processing chain enables the use of raw data to help improve image quality and presentation consistency

"I do not have to choose between improving the quality of the exam and shortening the exam time," says Dr. Pascal Roux, a radiologist at Centre Cardiologique du Nord (CCN), one of the first global clinical sites to evaluate a prototype version of AIR™ Recon DL. "I can have the best of both worlds. [We] can demonstrate high-resolution images with no truncation artifact, imperceptible noise and depiction of sharp structure."

AIR™ Recon DL*, an Edison application providing True-Fidelity™, is a GE-first, deep-learning MRI reconstruction technology application designed to simplify this choice by improving signal-to-noise and image sharpness and enable shorter scan times. Clinicians and technologists would no longer have to compromise between image quality and scan time with AIR™ Recon DL. This application was developed using a neural network trained on tens of thousands of images using GE's Edison AI Platform.

Embedding AI onto the device can help provide clinical information at the point of care and to the radiologist to assist with diagnosis and enable triage

"This project validates the focus of the industry in pushing research & development in deep learning algorithms," claims Dr. Bharat Aggarwal, Director of Radiology and Principal Investigator at MAX Hospital, one of the first global clinical sites to evaluate Critical Care Suite™. "We clearly saw advantages of the system in the sensitivity of detecting small pneumothorax in some patients, enhancing the speed of alerting the treating teams regarding development of PTX in their patients."

Critical Care Suite™ is an industry-first collection of AI algorithms embedded on the company's Optima™ XR240amx mobile x-ray device for triage. Recently cleared by the FDA, the embedded AI automatically analyzes images on-device and immediately flags cases with suspected pneumothoraxes to ensure a fast and reliable way of delivering AI results that are generated within seconds of image acquisition. All this is done without any dependency on connectivity or transfer speeds to produce the AI results, which are sent to the radiologist while the device simultaneously shares the original diagnostic image, ensuring no additional processing delay.

To further assist technologists and radiologists, three additional features are also available in Europe, including:

- **AI Score**** from 0 to 100 is presented in which the higher the score, the more confident the algorithm is that a pneumothorax is detected;
- **Image Overlay**** can be seen on-device (as well as on the Secondary Capture image sent to PACS) and accurately localized 96% of positive pneumothorax findings; and
- **Customization of preferences**** allows users to set an AI operating point (5 setting options) in order to tune the performance of the system to preferred sensitivity or specificity.

"At the end of the day, we believe widespread AI adoption will be determined by its integration into existing workflows and accessibility to hospital systems," concludes Yoder. "All our Edison platforms – on-device, cloud and edge – are designed to deploy the latest AI solutions to healthcare professionals where they need them most." ■

*Not available in the United States and Europe.
**Not available in the United States.

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For more information on Edison, visit gehealthcare.com.

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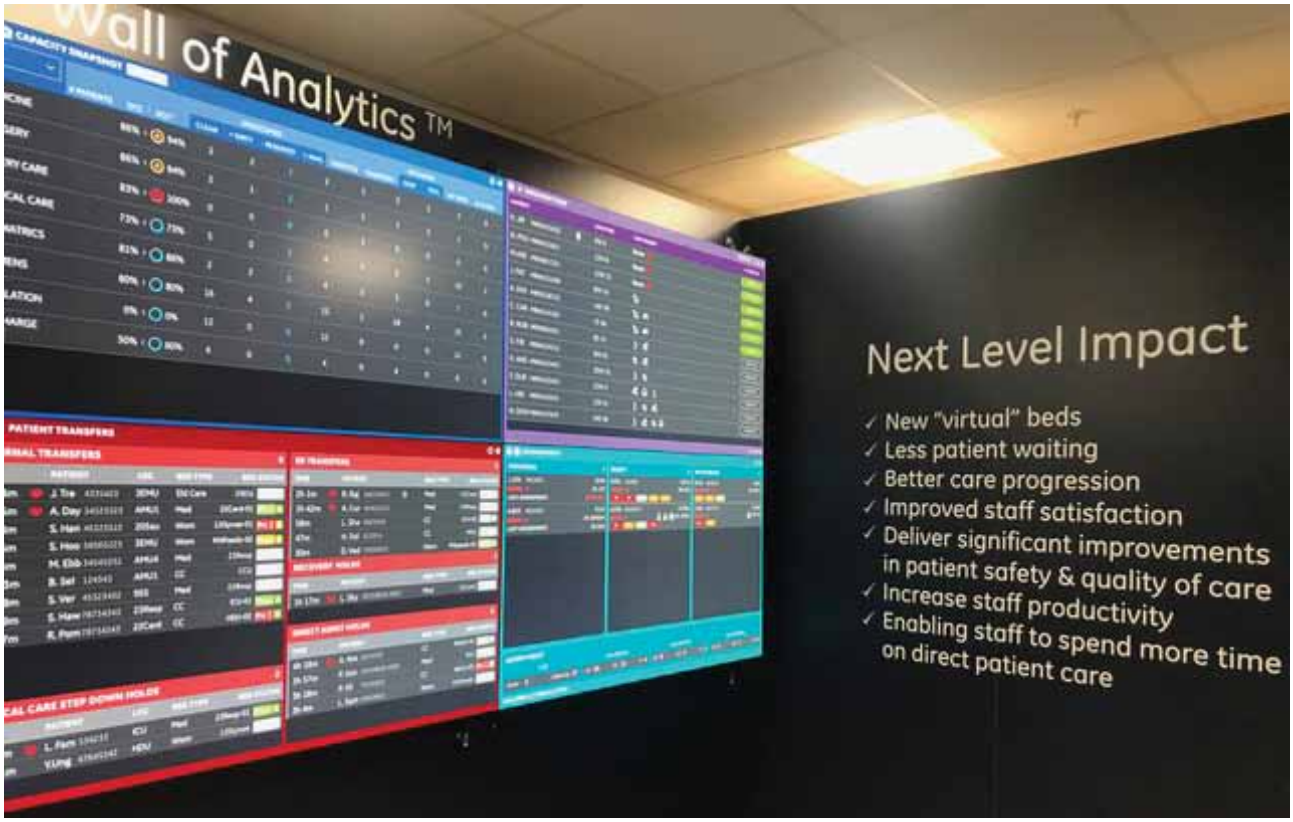
The English Patients: This UK Hospital Is Harnessing AI To Deliver Slicker Service



At Bradford Royal Infirmary, about 20 staff members work out of a centrally located room called the command center, monitoring a "wall of analytics" that helps them manage patient flow and make decisions quickly.

If you watched the opening ceremony of the London Olympic Games in 2012, you will know that British people love their National Health Service (NHS) as much as they cherish Peter Pan, The Beatles and James Bond. The ceremony's climax was an eccentric and poignant dance routine that celebrated the NHS's special place in the nation's heart. At one point, dancers bounced on trampolines made up to look like hospital beds.

Artificial intelligence (AI) is now helping ensure that the NHS gets the best out of those world-famous hospital beds. Hospital staff in the fast-growing northern city of Bradford are using cutting-edge software that generates real-time, 24/7 insights about the hundreds of beds and patients on their wards. Those insights allow them to help prioritize the city's hospital beds for the neediest patients, make faster decisions about care, identify and prioritize the sickest patients, and allocate resources more efficiently. Managing patient flow and care is a vital mission, because 96% of bed capacity at Bradford Royal Infirmary (BRI), the city's main hospital, is used regularly.

Patients at BRI may well catch a glimpse of the system in action. Around 20 staff members work from a new, centrally located room in the hospital called a command center, which officially opened Nov. 12. They monitor a 'wall of analytics:' Eight high-definition TV screens which constantly update with real-time data about the 800 beds across the hospitals that are part of the Bradford Teaching Hospitals NHS Foundation Trust. BRI alone sees around 125,000 emergency department (A&E) attendances per year, but the trust

serves approximately 1.1 million people in the West Yorkshire region.

If you think a command center sounds like those banks of desks that manage moon missions and airport runways, you are on the right track. "It's the same concept of mission control at NASA or air traffic control, but applied to hospitals," says Gerald Dunstan, partner, GE Healthcare Partners, which designs, builds and activates the command centers. "Bradford is getting real-time insight on patient flow and can make better decisions over what actions need to be taken."

Dunstan explains what is going on behind the scenes. Like any large healthcare operation, there are multiple streams of real-time data from the various departments and wards within the Bradford trust. At any one time, this might include paramedics alerting the site team from inbound ambulances, a general practitioner referring a patient to BRI's nephrology department, or the hospital's hematology ward relaying updates about the availability of en suite rooms.

These data streams used to live in not-so-splendid isolation from each other, making it difficult for hospital staff to get an overview of their patient population together with a snapshot of bed availability. It prevented them from allocating beds efficiently and identifying which patients need extra attention based on clinical need. In the past, staff would phone around wards to find out about patient comings and goings, and then produce a rough estimate of bed availability. "It was a manual effort that needed lots of calls," says Dunstan. Very often, bed allocation was a case of first come, first served, says Dr. Brad Wilson, the command center's medical director. "We didn't have the visibility to improve overall patient flow."

Those days of hanging on the telephone are over, because command centers consolidate those disparate data streams, offering staff an overview of bed supply and demand just by glimpsing at the screens. "The command center gives us cross-system visibility to make smarter decisions," says Wilson. The system, which can also be displayed on staff's tablets and mobile phones, allow users to quickly drill down to obtain more information about bed supply and demand. For example, the bed might be set up for a male patient in a negative pressure room, which lowers the risk of cross-contamination. Staff could quickly earmark that bed for an incoming cardiac patient, who is at high risk of infection.

The software is not just a hyper-efficient ward organizer and bed allocator. It also avoids potential bottlenecks, helps caregivers prioritize and focus on the sickest patients in the Trust right now, and preserves scarce hospital resources by using predictive analytics to generate insights from the mountains of data, or as Dunstan puts it, "add actionable intelligence." For example, it could predict that special handling is required for incoming patients based on an analysis of their symptoms, which would allow nurses on the ward to make up an appropriate bed. The software could also alert staff to patients who haven't filled out a consent form for surgery, thus averting the wasted time of a cancelled operation. Whatever the case, staff can get ahead of the game in terms of patient flow and resource allocation. Dunstan says greater situational awareness and slicker patient flow are boons for the hospital's A&E ward, which sees up to 400 patients per day.

The NASA-style command center is one small step on NHS's digital journey, but one giant leap for Bradford. It is the first hospital outside North America to receive such a nerve center. In 2016, the Johns Hopkins Hospital in Baltimore, Maryland, launched GE Healthcare's first center, and over the next 18 months it improved access for very sick patients by 78% and reduced emergency department patient waiting by 35%, even as inpatient occupancy grew by 8%. Humber River Hospital in Toronto, Canada and OHSU Health in Portland, Oregon, have also opened command centers and seen similar results.

It is early days for Bradford's own command center, but BRI is already seeing faster ambulance transfer times, fewer delays to patient consultations, patients returning home quicker, and fewer cancelled operations. Dunstan and Wilson are hoping to see an especially steep reduction in the time that medically fit patients spend in hospital. This would be good news, since this time is a huge strain on any hospital's administrative capacity and resources, says Wilson. "It's actually bad to have people in hospital who don't need to be there — they are at greater risk of all kinds of things: infection, delirium or malnutrition."

Wilson, an American who moved to northern England 22 years ago, is proud of reducing the number of patients that stay 21 days or longer at Bradford's hospitals by 40% in recent years. "It used to be in the hundreds," he says. "But right now [early November], we've only got 54 such patients." He is looking forward to Bradford's AI-enhanced future. "We had been on this digital journey for years and not understanding our own data," he explains. "Now it's finally pulled together in a meaningful and actionable way." ■

*Article previously published on GE reports by Chris Noon

Children in the Spotlight: When Every Second Counts

The University Hospital of the Free University of Brussels (UZ Brussel) in Belgium is pioneering the use of real-time deep learning-based image reconstruction (DLIR) on CT scan, exploring the benefits it offers for rapid pediatric evaluation, including lower dose and enhanced efficiency.

In healthcare, it is acknowledged that the sooner a patient receives the right diagnosis and the right care in the right place with the right resources, the better the chance of a positive outcome. Time is of the essence. Every second counts, and reacting in a timely manner can make all the difference, especially when the patient is as vulnerable and delicate as a newborn baby. It's all about caring for tomorrow, today.

In Belgium, doctors were working against the clock when a critically ill 18-day-old baby was admitted

to the UZ Brussel emergency ward, having already collapsed twice. A correct diagnosis was needed immediately, and the medical team reacted swiftly after a positive thransthoracic ultrasound exam, by performing a CT scan. Using a system incorporating a DLIR application, they were able to obtain high quality images with a reduced radiation dose.

This combination of rapid action and advanced technology was the key to saving the newborn's life. In a few minutes, the high quality images enabled the medical staff to identify a rare congenital cardiac condition and arrange transfer to a specialist facility. UZ Brussel's rapid diagnosis and decision-making were acclaimed by the receiving hospital, highlighting the importance of having access to such high quality imaging, allowing the team to find an answer in record time.

Dr. Koenraad Nieboer, a specialist in emergency radiology at UZ Brussel, led the team behind the newborn's case. He said: "We were able to perform a very, very low dose CT scan and generate excellent quality 3D images with realistic texture to diagnose an extremely rare cardiac condition. The images were straightforward to interpret, giving us confidence in our diagnosis, and the child was transferred to a specialist cardiac hospital for surgery."

> "We were able to perform a very, very low dose CT scan and generate excellent quality 3D images with realistic texture to diagnose an extremely rare cardiac condition"

After the CT scan, the patient's cardiovascular system was reformatted, creating nearly noiseless 3D volume rendered images in a time-efficient manner. This data was sent to the specialist cardiac surgeons prior to the child's admission to their hospital, allowing them to visualise the pathology, plan their approach to surgery and prepare in advance. Dr. Koenraad Nieboer added: "The technology allowed us to diagnose the condition accurately and with the minimum of tests, using procedures that asked less of the patient. The surgeons really appreciated the quality of the images we generated; they had never received such good 3D images of a baby before. Consequently, they were able to do what they do best, care for their patient."

Achieving a balance between efficiency and lower dose

A couple of decades ago, the emphasis for radiology exams was purely on image quality, with little concern about the radiation dose. With the realization that the dose levels used with filtered back-projection (FBP) were very high, the focus switched to developing alternative iterative reconstruction methods. The difficulty was that noise increased as the dose was reduced. A balance had to be struck, using the lowest radiation dose possible without compromising image quality.

Attention turned to model-based iterative reconstruction, where parameters are manually designed and optimized by human experts, which proved an effective means of reducing both the dose and noise while continuing to generate good quality images. However, the process takes around 30 minutes and image texture can be compromised. Several generations of iterative reconstruction later, users began to request a faster solution that delivered a more natural looking texture. By then, artificial intelligence (AI) had come to the fore, enabling the development of an algorithm – TrueFidelity™ – capable of generating the same image quality as FBP at a low dose, with minimal noise and in real time. This DLIR technique contributes to increase the speed and efficiency of imaging, producing intelligent image noise reduction and restoring the preferred noise texture. This leads to improved objective and subjective image quality compared to FBP and iterative reconstruction.

Dr. Koenraad Nieboer said: "We are in an era of deep learning, where artificial intelligence has made it possible to train an engine to recognise and adjust for noise, and to produce the same high quality images as FBP, but at a much lower dose and in real time."

The need to lower the radiation dose without compromising on image quality and, at the same time, improve efficiency, has been an ongoing challenge for radiologists everywhere. DLIR is the future, allowing the dose to be further reduced compared to previous techniques, and enabling high quality, real-time imaging to help increase the speed of patient assessment and streamline the treatment pathway. ■

From Breast Cancer Diagnosis to Treatment Plan in the Same Place, Same Team, Same Day

The time between a suspicious screening mammogram and a diagnosis and treatment plan can be weeks, leading to stress and anxiety for women. A hospital in France developed a unique one-stop breast cancer clinic that can confirm a positive finding, including biopsy, and provide a treatment plan, in one day, in one place, for most women with suspicious scans. The concept is now being exported to other countries.

Gustave Roussy is a cancer-research institute and European Cancer Centre. It is the first dedicated One-Stop Clinic for Breast Cancer in France

Approximately half of all women receiving screening mammograms over 10 years will have a false positive result, which can cause considerable anxiety.[1] Understandably, then, women want to confirm the diagnosis (or negative findings) and obtain a treatment plan as soon as possible. But this requires meeting with a variety of clinicians for tests and consultations, a process that could take four weeks,

up to seven if a biopsy or other exams are required.[2] Such delays lead to considerable stress and anxiety and may even affect prognosis.[3]

In a world in which a click of the button can bring a package to your door within a few hours, in which nearly everything we need to know resides in a device smaller than a purse, such delays may seem archaic. However, it is possible to offer a much faster option to the traditional pathway.

The proof lies in one of Europe's top cancer center, which decided to tackle this challenge more than a decade ago after realizing its patients had to wait up to two months to confirm a questionable scan. "Sometimes there are images that are hard to read, and these women do not know whether they have cancer or not," said Dr. Corinne Balleyguier, radiologist and head of the imaging department at Gustave Roussy Cancer Center in Villejuif, France. "This is too long. The clock is ticking, and we have to move as quickly as possible and start treatment early." Otherwise, she said, "the uncertainty can be nerve-wracking, and we want to reduce it as much as possible."

"We started seeing younger patients with dense breasts and more complex lesions," Dr. Balleyguier said. "We wanted to develop a multidisciplinary approach that would deliver high-quality care and reduce the time between screenings, primary evaluations deemed positive, and diagnosis." The concept was revolutionary at the time, said Dr. Suzette Delaloge, associate professor of medical oncology, founder of the One-Stop Clinic and head of the breast cancer department at Gustave Roussy, "at least on a scale as large as we were planning."

> "The clock is ticking, and we have to move as quickly as possible and start treatment early"

From Screening to Treatment Plan in 1 Day

Today, the One-Stop Clinic Delaloge developed enables women with abnormal or unclear findings to go from screening to confirmed diagnosis and treatment plan or confirmed negative result in just one day. The clinic operates with a multidisciplinary team including surgeons, radiologists, oncologists, pathologists, nurses, patient navigators, and social workers; a comprehensive suite of mammography equipment and applications; and clinical pathways designed to speed diagnosis and treatment planning.

The team is a critical component, with evidence that such a multidisciplinary approach may improve outcomes in patients with breast cancer.[4] Communication between the team members, and the ability for a patient to interact with the team in a single day or two rather than having to return for multiple appointments, speeds diagnosis and treatment planning and, overall, may result in a better outcome.

The women start arriving at Gustave Roussy around 8 am every Monday. A coordinating nurse divides them into three groups based on their referrals and schedules them to see one of three specialists for examination and screening. Women with unclear scans see a radiologist for consultation; those with suspicious lesions smaller than 10 mm visit a surgeon for a biopsy; and those with confirmed cancers see an oncologist to discuss a treatment plan. "The majority of patients who come to our facility don't have to worry about false positives or callbacks which, as you know, are an issue in breast cancer diagnostics," Delaloge said.

At the end of the day, patients have a final consultation to discuss the diagnosis and plan their treatment. "The results are remarkable and truly unlike anything we've seen happening anywhere else in the world," said Dr. Delaloge.

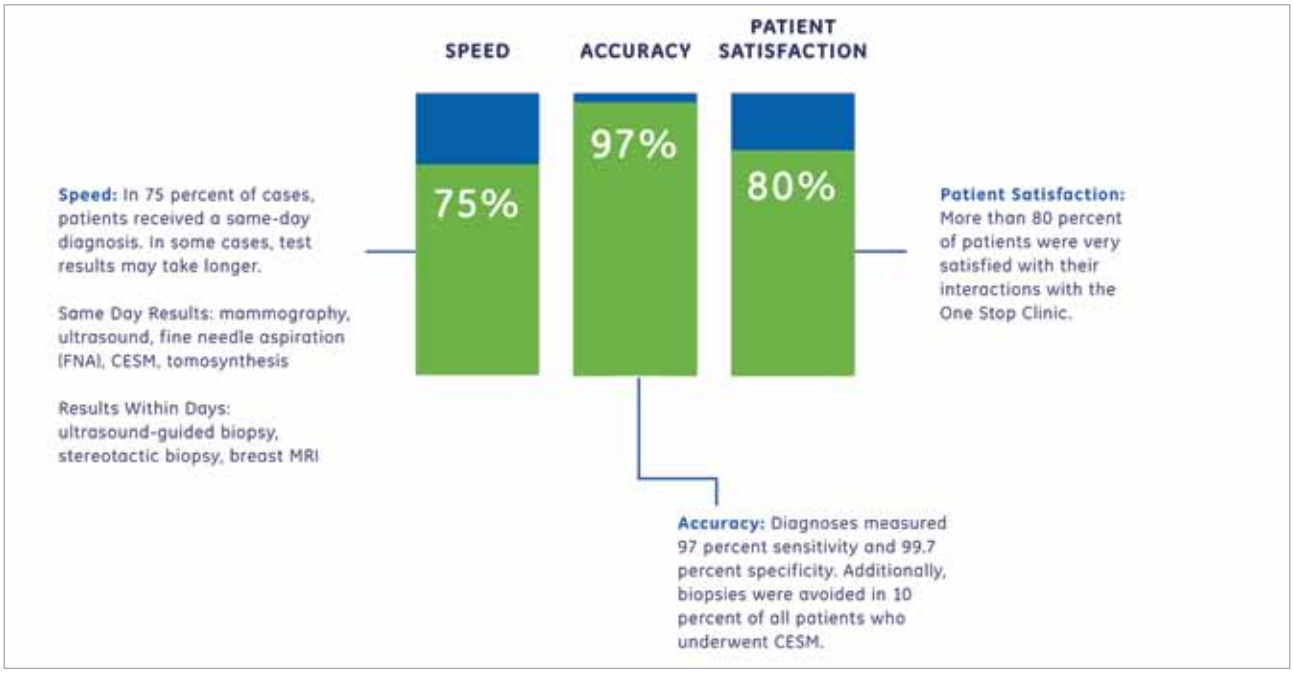
To date, more than 20,000 women have passed through the clinic.

Study Results Demonstrate Success

An independent analysis of 11,000 patients seen at Gustave Roussy over eight-and-a-half years found that that 75 percent with suspicious breast findings received an exact diagnosis (97 percent sensitivity and 99.7 percent specificity) and treatment plan the same day. Overall, 80 percent said they were "highly satisfied" with the process and the care they received. Ten percent evaluated with GE Healthcare's Contrast-Enhanced Spectral Mammography (CESM) were able to avoid biopsies.

Replicating the One-Stop Clinic Around the World

The One-Stop Clinic model is easily replicable, said



With Gustave Roussy Cancer Campus, a study was per formed with ~11,000 women over 8 years and proved One Stop Clinic provides unprecedented patient benefits.

Delaloge. "When you combine the right people, process, and technology, you can deliver excellent clinical, operational, and financial outcomes with increased value."

Thus, Gustave Roussy and GE Healthcare are now internationalizing the concept with the first One-Stop Clinic open in Medellin, Colombia. Representatives from Dynamica Medellin spent two years working with the team at Gustave Roussy to develop its clinic. Today, the Colombian clinic sees about 17 women a day, five days a week.

In the United States, Premier Inc. is working with GE Healthcare to develop the model for the One-Stop breast cancer diagnostic centers to give US women the same-day results. To support the effort, Premier conducted a Rapid Evidence Review, one of the first comprehensive evaluations of expedited diagnosis for patients with breast cancer. Based on the results of the first phase of the collaboration, GE Healthcare and Premier will next evaluate the potential and merits associated with adopting the One-Stop Clinic model in the US.

The companies have also convened an advisory board to provide insight on the One-Stop Clinic model, as well as guidance and counsel on best approaches to redesign it for the U.S. market. Such clinics, said Annemijn Eschauzier, Chief Marketing Officer, Women's Health at GE Healthcare "would set a facility apart from other clinics in the region by enabling the clinical team to provide a higher, more cost-effective, less stressful level of care for patients." ■

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