Primary Healthcare Technology Trends in the Next Decade

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Medical data doubles every 73 days. Each person will generate enough health data in their lifetime to fill 300 million books[1].

In the next decade, clinicians will have the ability to use blockchain, machine learning (ML), and artificial intelligence (AI) seamlessly to provide specialized care to patients. Data collected from multiple events, settings and sources can be great enablers of personalized medicine. The ability of healthcare technology to collate a plethora of data on the patient, much faster than any human physician or clinician could, would increase adherence to care, with a potential to increase positive outcome. This includes collecting all clinical and administrative data; matching them with the patient's genomic profile; looking up the patient's social determinants of health; then combining that information in a trusted way will drive personalized treatments, especially for chronic conditions.

Emerging technology trends are expected to permeate the ecosystem of health in the years to come. The advent of personalized care and the increased access to care will improve patient engagement. Practitioners will enjoy the advancement of technology assisted evidence based medicine and researchers will be able to expand the effectiveness of their explorations using emerging technology.

Personalized Care

As analytics platforms become more mainstream, social determinants of health (SDOH) including demographics, environment and socioeconomic factors become data sources for making risk assessments, patient outreach, and business decisions. This means that healthcare ecosystems (researchers, providers, payers and health management institutions) could proactively engage the right patients based on their SDOH to improve health outcomes, help optimize individual care costs and improve the quality of care provided by hospitals and health systems. Cognitive analytic platforms capable of leveraging genomic, clinical and lifestyle data will become more available.
The ability to deliver actionable clinical insights will bridge the last mile for precision medicine into clinical practice. The goal of tracking behavioral data is to add to the landscape of behavioral insights that can help enhance patient care. However, as AI tools enter this sphere, the medical practice will face more ethical challenges – Privacy, bias and safety will be front and center.

Patient Engagement

Chatbots (or virtual assistants) are already revolutionizing the business world, and they can be expected to be a big part of the digital transformation in healthcare, too.

In healthcare, the capacity to address easily diagnosed problems allows professionals to focus on matters that might require the full attention of a physician. Patients also benefit from feeling that their questions and concerns have been addressed.
Chatbots may be beneficial for practices dealing with older patients where a character (avatar) can be created who will serve as an assistant to provide friendly reminders. By connecting with other technologies, such as analytics and AI, chatbots can warn about potential drug interactions. A project at UCLA has combined chatbot technologies with AI systems to create a Virtual Interventional Radiologist (VIR). It made evidence-based responses to FAQs (frequently asked questions) quickly available to physicians by implementing IBM Watson cognitive technologies and Natural Language processing (NLP) methods. This allowed the questions to be read and answered in an intuitive manner, making the whole process simpler, faster and more useful for doctors[2].

Access to Virtual Care

Telehealth will gain mainstream adoption in the overall mix of healthcare services and will expand beyond the current focus on chronic conditions[3]. In The current digital healthcare trend, by 2024, the market for telemedicine will reach $100 Billion[4].
Mobile apps continue to contribute to better treatment making healthcare more accessible[5]. Over half of all people who use telemedicine say that using their healthcare mobile APPs is more effective compared to visiting clinics in person. Supported by regulatory approvals and technology maturity, progressive health systems will start to view telehealth as a standard of care option for primary care virtual consultation, allowing access to cost-effective care.
In the next decade, technology such as 5G wireless will increase the potential for telehealth by adding more capabilities beyond the home. The implementation of 5G technology improves the throughput of mobile cellular networks. 5G can better support healthcare organizations by enabling the transmission of large imaging files so specialists can review and advise on care; allow for the use of AI and Internet of Things technology; enhance a doctor's ability to deliver treatments through augmented reality, virtual reality and mixed reality (AR, VR); and allow for remote and reliable monitoring of patients.
Telepresence physicians will use robots to help them examine and treat patients in rural or remote locations.

These robotic devices include navigation capability within the ER, and sophisticated cameras for the physical examination[6].

Reducing Riskthrough Machine Learning

Augmented Reality (AR) systems in healthcare offer one of the most intuitive options to traditionally invasive explorative surgery. By rendering 3D information on real-world scenes, AR permits surgeons and doctors to stay grounded in actual procedures while having ready access to all the data available through other emerging technologies[7].
Data models are used to train machines and applications to detect neurological and cardiovascular illnesses and spot tumors in X-ray images. Aside from the benefits of early detection, these machine learning (ML) algorithms help reduce the risk of "Satisfaction of Search" (SOS) error when the reporting radiologist fails to continue to search for subsequent abnormalities after identifying an initial one[8]. A more complete pathological diagnosis is made possible by the help of trained "machines that can see".[8,9]

Digital Twins improving Healthcare outcome

A digital twin is a near real-time replica of something in the physical world—in healthcare, that replica is the life-long health related data record of an individual. Digital twins can assist a doctor in determining the possibilities for a successful outcome of a procedure, help make therapy decisions, and manage chronic diseases. To visualize what is at stake, a project by Siemens developed a digital twin of the human heart. Based on magnetic resonance (MR) images and ECG measurements, the project simulated the physiological processes of a patient's heart. Then, virtual planning was used to visualize responses to treatment before intervention. This twin can enable a surgeon to see the impact on a patient's condition and the placement of electrodes in the heart before the surgery even begins. While providing a safe practice environment, digital twins can help anticipate the success of a procedure, albeit, with so many variables at play in simulating a human heart, a few errors in data processing could result in a catastrophic failure costing the life of a patient. Ultimately, digital twins technology can help improve patient experience through effective, patient-centric care. The use of digital twins in healthcare is still in its early stages, but its potential is extraordinary[10].

\AI for More Effective Pharmacology and Research

Analysts anticipate that the first molecule discovered using AI will enter early phase clinical trials in the next 12 to 18 months[11]. The pharma sector may reap the first benefits[12]. In pharmacology, oncology, infectious diseases, and more, AI powered genomic medicine is making an impact. Computers make the analysis of genes and gene mutations that cause medical conditions much quicker[13]. This helps the medical community better understand how diseases occur, but also how to treat the condition or even eradicate it – Not to mention the advantages in epidemic monitoring that require accurate and fast simulations using AI powered algorithms.

Increased Consumerism in Healthcare

The next decade will also see an increase in consumerism in Healthcare.
The digitization of products, services, and commerce models is democratizing current healthcare systems, manifesting the concept of the "Comparison Shopping" consumer mindset. Consumer-driven care delivery models such as telehealth, e-pharmacy, retail care, price transparency, push care closer to the point of the person, among others. Examples are wearable devices such as heart monitors that can detect atrial fibrillation, blood pressure monitors, self-adhesive biosensor patches that track your temperature, heart rate, will help consumers proactively get health support.
In the next decade, drug delivery devices such as insulin pens, biologic auto injectors, inhalers, and smart packaging for pills will be commonplace to enhance both clinical and business operations in healthcare[14].

Other Issues

Ensuring robust cybersecurity protection is essential for sensitive medical data. The increased reliance on medical communication via mobile devices, coupled with the massive amount of patient health information, financial data, and protected information (e.g., Social Security numbers), requires healthcare organizations to provide the most secure and HIPAA-compliant[15] direct messaging and health information exchange (HIE) available[16]. Health information exchange is the mobilization of health care information electronically across organizations within a region, community or hospital system.

The next decade will see supportive information technology initiatives grow into the mainstream of the health ecosystems. This will include the implementation of needed infrastructure upgrades that make healthcare more accessible, better cloud integration with existing technologies and a transformation of the care workflow to focus on the "care seeker journey" and adapt to technology that people are used to in other areas of their lives. As younger people continue to enter the workforce, many hospitals will be "forced to modernize."[17]

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معاً لمكافحة وباء الـ «COVID-19»

في إطار مكافحة وباء الـ "COVID-19"، جدّدت مستشفى هيكل إلتزامها الكامل برسالتها المبنيّة على حماية مجتمعها وحماية المرضى على حدّ سواء. لذلك وضعت خطة طوارئ مفصّلة. على إثره، تم تشكيل لجان إدارية وطبية تعنى بـ :

1) متابعة الـ "Epidemiology" المحلية والعالمية
2) وضع الخطط المسارية في المستشفى تماشياً مع الـ "Epidemiology"
3) وضع البروتوكولات العلاجية، بحسب آخر المعطيات العلمية
4) تدريب الفريق الطبّي والتمريضي على كيفية التعامل مع مرض الـ "COVID-19"
5) تأمين وسائل الحماية الشخصية، الأدوية والمستلزمات الضرورية.

وقد تمّ تحديد مسارين مختلفين لفصل مرضى الـ "COVID-19" عن باقي المرضى والأقسام في حال الإستشفاء.
وابتداءً من 18 آذار 2020، تمّ إنشاء وحدة طوارئ خاصة خارج المستشفى، مجهزة بضغط سلبي و"HEPA filter" بحسب التوصيات. تضمّ هذه الوحدة ثلاث غرف: الأولى، تسمح بفرز ومعاينة مرضى الطوارئ (الأطفال والبالغون) المشتبه بهم، وبإجراء فحص الـ "PCR" الخاص بالـ "COVID-19" والمرخص من وزارة الصحة العامة، كما باستشفاء وإنعاش مريضين إن لزم الأمر في الغرفتين الباقيتين. يتمّ في هذه الوحدة، فرز المرضى ومعالجتهم بحسب حاجتهم للإستشفاء وفق بروتوكولات خاصة، مع إعطاء المرضى التعليمات اللازمة بانتظار نتائج فحص الـ "PCR" سلبية كانت أم إيجابية. تمّ معالجة أكثر من 250 مريضاً في هذه الوحدة.

بالإضافة لما ذكر أعلاه، تمّ تجهيز طابق خاص منعزل كلياً عن باقي الأقسام، مع مسار خاص للمرضى مؤلف من 7 غرف (ضغط سلبي) لإستشفاء 10 - 11 مريض مثبتين أو محتملين. كما تمّ تجهيز 6 غرف إضافية للعناية الفائقة.

تقرير فحص الكورونا خلال أشهر
آذار، نيسان وأيار 2020
يُظهر العدد الإجمالي للفحوصات المخبرية في مختبرنا

الفحوصات	العدد الإجمالي	النتائج الإيجابية
فحوصات فردية	١٨٦٢	٥٤
الشركات	٥٩	صفر
المطار - الوافدون	٣٨٨	٢
ضمن حملة وزارة الصحة	٥٩٤	١٥

العدد الإجمالي للفحوصات: ٣٤٣٤
النتائج الإيجابية: ٧١

لم يتم استشفاء أي حالة إيجابية في مستشفى هيكل

بطريقة متوازية، تمّ إتخاذ تدابير إحترازية داخل المستشفى:
- منع زيارات المريض والإكتفاء بمرافق واحد ثابت لدى الحاجة
- ملء إستمارات وأخذ الحرارة عند دخول المستشفى
- إلتزام جميع الموظفين، الأطباء والزوار بوضع الكمامة
- أما بالنسبة لفحوصات الكورونا المتوفرة في مختبرنا
(Walk-thru, Drive-thru, Home testing)
- RT-PCR   - Serology IgG   - Rapid test

كما يتمّ التواصل يومياً مع وزارة الصحة، للإبلاغ عن جميع الحالات إيجابية كانت أم سلبية. وتشارك المستشفى بشكل مكثّف في التعليم، من خلال توفير معلومات ونصائح مفيدة عن فيروس الكورونا والوقاية منه على وسائل التواصل الإجتماعي، كما قمنا بتنظيم ندوة عبر الويب مع 130 NGOs لتعليمهم كيفية استخدام معدات الوقاية الشخصية في العمل التطوعي، وبالتالي لحماية أنفسهم وأسرهم من الإصابة بـ COVID-19. وقد تمّ بث هذه الورشة على الهواء مباشرة على قناة LBCI.

رسالتنا مقدسة ولن نتنازل عنها رغم كل الصعوبات بشرية كانت أم مادية. نحن كطاقم معالج قمنا بواجبنا... وأنت، هل أنت مستعد للمخاطرة وعدم القيام بواجبك الإنساني؟؟

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