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Anticipating the Future in Healthcare

New Technologies as key drivers for change

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On one hand the outlook for the healthcare industry is broadly positive: revenues and profits will increase around the world. But the current model is not sustainable, meaning that healthcare providers have to change if they are to overcome significant future challenges. Innovation is the only way forward. In this article the authors examine the trends driving the healthcare ecosystem, the role of technological innovation and how it will change the way healthcare is delivered, along with the business models of market participants.

The key players in the global healthcare ecosystem all have high expectations for the future: the industry believes that revenues and profits will increase, governments and funders expect more job opportunities and higher standards of welfare delivered at a lower cost, while patients are looking for improved care and treatment methods. However, there are massive challenges to overcome in order to meet these growing demands whilst maintaining affordability. Today's healthcare model is simply not sustainable and the pressure to find new ways of tackling challenges will only increase. Innovation seems to be the only way forward, and this provides significant opportunities for market participants.

In this article we examine the trends driving the healthcare ecosystem, the role of technological innovation and how it will change the way healthcare is delivered, along with the business models of market participants. Three case studies demonstrate how players from three different geographies have introduced innovations that fundamentally change the way healthcare is organized. All these examples have one thing in common – they show that technology-driven innovations have the potential to enable positive change in the healthcare ecosystem.

Challenges ahead

Healthcare systems are fundamentally challenged by:

- Demographics: According to the United Nations, the number of people aged 60 and above tripled between 1950 and 2000. By 2050 it will have tripled again. Although the elderly today live in an era of better health conditions, demographic change will provide a challenge to many healthcare systems.

- Societal demand: Healthcare suppliers are rapidly introducing new, but costly, technological advances. Patients are increasingly demanding access to these, irrespective of cost.

- Chronic disease: There is an increasing burden from chronic diseases that require life-long treatment and regular follow-up. According to the World Health Organization (WHO), chronic diseases account for about 45% of global diseases, and are expected to increase to 57% by 2020. Cardiovascular diseases account for nearly half of this total.

The resulting budget pressure on the healthcare system is huge. Healthcare expenditure as a share of GDP has increased over the last couple of decades, today reaching 10% of global GDP. There is much variance – with extremes such as the USA at 18% of national GDP and Indonesia at 3%. Divided into three groups using macroeconomic dynamics, countries show the following characteristics:

Growth segment (g):

Despite economic development, growing countries tend to spend below 6% of GDP on healthcare, significantly below the level of mature countries.

Mature segment (m):

Most markets in this segment target a spend of 9-10% of GDP. Consequently, it is evident that healthcare in the USA is far more expensive than in comparable rich countries.

Decline/ slight recovery segment (r):

All countries in this group had to cut healthcare expenditure in relative terms during the financial crisis. Levels are kept at a minimum of 8% of GDP.

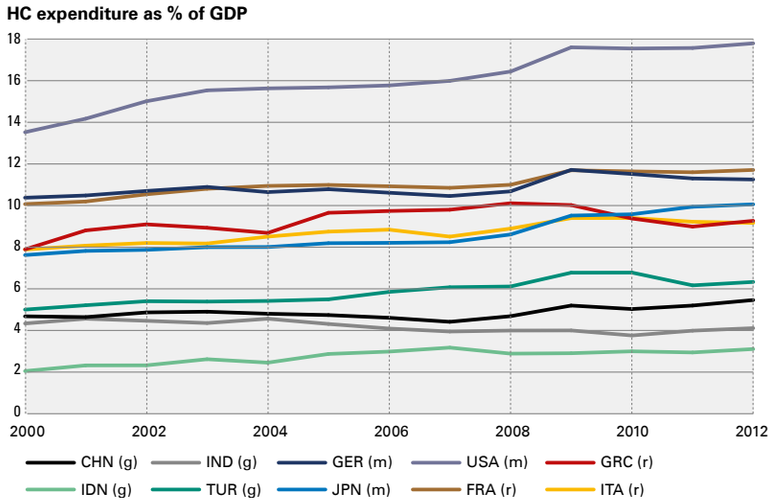

Table 1 **The rising cost of healthcare**

Source: The WorldBank "World Development Indicators" 09/2014; Arthur D. Little

In short this graph shows that governments tend to limit the natural growth of healthcare spending to a level they feel appropriate for economic conditions.

Key trends shaping the future healthcare ecosystem

Against this backdrop we have identified a number of key, interconnected trends that we see shaping the future of healthcare towards 2030, as shown in Table 2. We have further illustrated these trends with three current examples of innovation systems that have the potential to serve as role models for implementing smart solutions around integrated care, digital health and new treatment technologies.

Budget pressure and emerging markets: The slowing of GDP growth in established markets and the continued budget pressure have led international healthcare companies to search for oppor-

tunities in emerging markets. By adapting their portfolio to create lower priced, simple and easy-to-use versions of products originally developed for use in mature markets, as well as delivering identical products at lower price points, companies are addressing some of the needs of these emerging healthcare markets. Resources in public healthcare will always be limited, so providers of services and treatments will have to fight for market share in a modestly growing environment. Additionally, they can reach consumers directly through smart solutions that drive a willingness to pay for treatments and services privately.

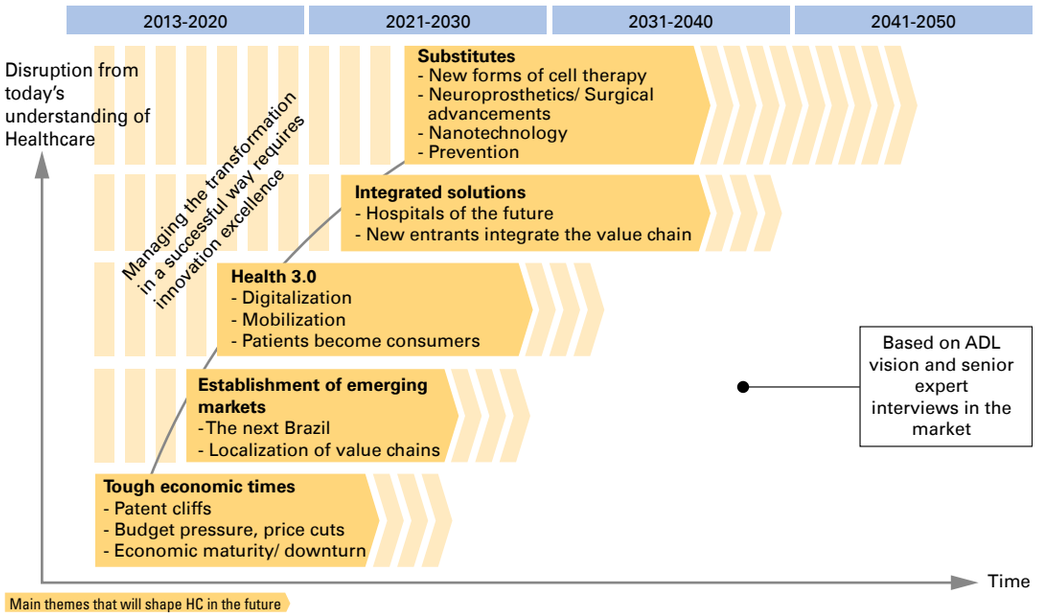

Table 2 **Five key trends shaping the future of healthcare ecosystems** *Source: Arthur D. Little*

Digital transformation: Digital health innovation has helped support growth in emerging markets while also supplementing existing medical infrastructure in markets such as India. Digital health technologies allow disruptive innovation. Whether it is instantly crossing distances and connecting medical doctors in urban centers to rural patients, or providing lifesaving health information through simple techniques such as short messaging service (SMS) or digital patient visits, the use of digital health technologies is growing rapidly. Case study 1 illustrates a good example of this.

Case Study 1: How digital health helps to address budget needs in India

The Indian healthcare sector is one of the largest markets in Asia, as well as being the fastest growing. It is expected to grow at a CAGR of almost 15% to $158bn by 2017. Rising income levels, an aging population, increasing health awareness and changing attitudes towards preventive healthcare are expected to continue to boost growth. Lower medical service costs, infrastructure development, and a burgeoning private sector with high quality standards have fuelled the growth of medical tourism in the country. Moreover, India has emerged as a R&D hub for many international healthcare and life-sciences players due to its lower costs for technical research. All of this has been supported by government policies which have encouraged foreign direct investment and provided tax benefits, both for consumers and providers.

In the wake of this growth, a number of new service providers and players have emerged, offering innovative solutions targeting both the consumer and corporate sector. Hyjyia, an ICT platform provider for Electronic Medical Records (EMR) has been working with the Indian Health Organization (IHO) to create the Digital Wellness Program – an eco-system of providers, payers and corporate consumers to build a new generation of corporate wellness programs on a subscription-based model.

The platform creates a one-stop-shop that brings together basic services around health content and reminders for personal wellness. A number of primary healthcare provider networks have joined the platform to offer first level consultation services including appointments, tele-consultations and second opinions, all underpinned by electronic medical record sharing. The platform also provides options for chronic healthcare monitoring with the ability to buy popular gadgets, including sensors and trackers that can be used to measure progress in fitness activities. More importantly, over time, it creates an online platform for storing digital health records, enabling the development of an online and mobile hub for wellness and personal health access.

With a business model built on corporate wellness programs, it allows corporate buyers to tap into an ecosystem of smart and relevant digital health services, including access to doctors, risk assessments, online health content, wearable gadgets, remote monitoring and health apps. Through its integrated model, the platform allows corporates to use primary healthcare providers, executive health screening, online health assessments and awareness programs, corporate health audits and reports, group counselling ser-

vices, lifestyle management talks, and personalized health and wellness advice. Overall, the model allows corporate buyers to reduce medical costs for staff, enhance ROI by formulating more precise health benefit programs, and improve their overall image as an employer. It also creates a unique opportunity to amass personal health records on an online platform, sharing not only through corporate wellness programs, but also across the network of providers and payers, thereby creating efficiencies in the provisioning and delivery of health services through corporate health benefit schemes.

In the past, where electronic health portals were focused on integrated providers, payers and patients, the model adopted by IHO and Hyjyia in India is bringing together corporate employers to reduce the costs within the system.

Integrated solutions: Providers will always have to navigate between the willingness to offer the best services and technologies and meeting budget constraints. An innovative way forward is to connect to those developing cutting edge technologies in order to find smart solutions that integrate their innovations into clinical practice in a commercially viable way. This case study outlines how the county of Stockholm has managed to connect integrated care and supplier concepts to a smart innovation sourcing model.

Case Study 2: How integrated care and supplier concepts help Stockholm council to keep up with innovation, regardless of budget pressure

The county council of Stockholm in Sweden is facing substantial challenges, with a growing remit for care, increasing costs, an aging population and the need for considerable investments in new medical technology. Additionally, its population is expected to increase significantly in the coming years, reaching almost 2.5 million in 2020, according the most recent forecasts. Karolinska University Hospital, one of the world's leading academic hospitals, plays a central role in meeting these challenges, providing highly specialized care, conducting basic research, and delivering patient-focused clinical research and education.

With the aim of creating a more efficient and safe healthcare structure in Stockholm, a ten-year investment and transformation plan has been developed. An important part of the plan is the creation of the state-of-the-art New Karolinska Solna (NKS) hospital facility, which will open its doors to its first patients at the beginning of 2017.

To ensure that the new hospital is state-of-the art not only when it is commissioned but also in the coming decades, innovative ways of working are required. A high pace of innovation is necessary to drive these new ways of working, meaning that Karolinska University Hospital has decided to invite healthcare industry players to collaborate to develop cost efficient care production that provides the highest possible benefits for patients.

A means of achieving this is through the current procurement of medical equipment, and information and communications technology for the new facility. Arthur D. Little has supported Stockholm County Council and Karolinska University Hospital since late 2011 in the procurement of medical technology for NKS. Identifying innovative ways of integrating the competence of future equipment suppliers and developing new business models have been key to procurement.

Karolinska's clearly stated ambition of taking a truly patient-centric approach to healthcare by developing new and improved care pathways in close collaboration with industry and academia, has attracted lots of attention from global medtech suppliers. They have strong incentives to partner with Karolinska, as it will provide daily interactions with clinicians along the various care pathways. This will enable them to achieve a true understanding of unmet needs, and how their own solutions need to be integrated to enable both increased efficiency and greater patient benefits.

In the procurement of most of the medical imaging equipment to NKS, the three major global suppliers - GE Healthcare, Philips Healthcare and Siemens Healthcare – were all among the bidders. The contract is for a managed equipment partnership (MES) that provides continuous medical imaging functionality. It initially covers more than 170 different devices, of which almost 50 are heavy modalities such as CT, MR and angio equipment. The agreement also defines a framework and aims for an overarching innovation partnership that looks to improve healthcare solutions over time.

Following a public European tendering process, Philips Healthcare was recently awarded the contract, signing a 14-year partnership agreement with the hospital. As part of the agreement, Philips will establish a research and innovation hub at the new hospital with the aim of bringing together clinicians and researchers from industry and academia to facilitate idea generation and exchange. By developing innovations in partnership with clinicians, Philips hopes to generate substantial value to transform healthcare in Stockholm. When announcing the agreement, Karen Sørensen, CEO Philips Nordic, said: "For Philips, this agreement fits perfectly in our strategy to become a solutions company in healthcare, where we partner with our customers to transform healthcare in multi-year engagements, with performance-based revenue models."

New technologies: New technologies are entering the market, for example, smart neuroprosthetics enable patients with spinal cord injuries to walk again. Gene therapies have been shown to heal genetic disorders through a single series of interventions, while cell therapies that can replace destroyed functional tissue are having a significant impact on how we treat diabetes or vascular diseases. Sector limits will merge and value creation will change. For example, homologous stem cell treatments require cell material to be collected from the patient in order to produce the medicine which will then be given to them. This will change the whole supply chain for the manufacturing and delivery of such treatments, leading to a much closer integration of healthcare provision and medicine creation and delivery. Case study 3 provides a good illustration of this.

Case Study 3: An unexpected pioneer in new technologies provides access to gene and stem cell therapies

In November 2012, the European Medical Agency granted approval for Glybera, the first gene therapy for patients with exceptional cases of lipoprotein lipase deficiency (LPLD). The technology was licensed from the Dutch bio company uniQure BV by Chiesi, a mid-sized, family-owned, pharma company based in Parma Italy.

In addition to Glybera, uniQure is developing another gene therapy agent targeting Hemophilia B (severe orphan blood clotting disorder). This is currently in Phase I/II development.

Through its agreement, signed in April 2013, Chiesi has exclusive rights to commercialize both products in Europe and selected other countries such as Brazil, Mexico, Pakistan, Turkey, Russia, and the CIS, as well as Glybera in China.

As a gene therapy, Glybera is injected through a one-time course of up to 60 consecutive intramuscular injections. Several follow-up appointments with specialists are necessary to control the efficacy and safety of the healing process. However, compared to the life-long substitution therapy which is the current method of care, which also has significant dietary restrictions, this therapy delivers a paradigm shift in medical benefits, quality of life and potentially lower cost per patient.

Chiesi is also investing in another break-through innovation: stem cell technologies. The company is involved with Holostem, a spin-off company from the University of Modena. Paolo Chiesi, chairman of the board of directors, and Andrea Chiesi, CEO of of Chiesi Farmaceutici are part of Holostem's management team.

The JV is currently developing a stem cell treatment for corneal regeneration and the restoration of visual acuity in patients with severe corneal chemical and thermal burns associated to total unilateral or severe bilateral limbal stem cells deficiency. The cell therapy is based on the use of autologous cultures of limbal stem cells. This means that cell samples are collected from the patients in order to be cultivated and then applied in line with medical procedures.

The introduction of therapies such as Glybera and Holostem will have significant implications on the healthcare ecosystem. Pharma companies will change their revenue model from repetitive treatment cycles of chronic disease to one-time interventions, and consequently need to build a new type of agreement with budget holders. Providers

need to interact more closely or even enter new partnerships with pharma companies to ensure the proper application and monitoring of treatments. Routine diagnostics around treatments also need to be established.

For payers and healthcare systems these new technologies represent the opportunity to offer patients therapies that have the potential to cure diseases outright rather than facing lifelong, ongoing treatments.

Tomorrow's healthcare ecosystem

To fuel the continuous growth of new technologies, governments around the world are making strong, concerted efforts to promote research and entrepreneurship in healthcare, life sciences and ICT through significant investments in academic research and the creation of life sciences and technology clusters. These catalyze the work required to translate good science into innovative solutions through the skills of entrepreneurs who understand how to create value for the overall system. Today we are also seeing a continued progression in the quality of science that is produced, along with an enormous growth in the volume of scientific know-how. This flow of new, advanced science into the upstream parts of the innovation funnel indicates a bright future for new technology innovation.

Tomorrow's healthcare ecosystem will be driven by a combination of breakthrough technologies, forward-looking regulatory frameworks, astute entrepreneurship and the availability of risk capital for bold innovations, all linked to a willingness to pay for innovation that will drive progress within the overall ecosystem. The willingness-to-pay dimension will need to be strengthened by progress within the system itself in order to appreciate, quantify and measure the value of innovation. An enhanced ability to appreciate the value of innovation will therefore be a key success factor in ensuring a strong flow of innovation.

Implications for players in the healthcare ecosystem

The impact on the different stakeholders will be significant. Pharma and medical technology companies will need to review their value chain and business model and transform themselves, to thrive in this new world of healthcare. Providers and payers will seek new partnerships with suppliers. In some cases, segments will merge and we will see the rise of more integrated healthcare companies that serve several lines of business, including healthcare provision, creation of medical treatments and the application of digital care models. Each individual player needs to redefine its position within the ecosystem and CEOs will need to initiate journeys of transformation if their companies are to succeed in this changed ecosystem. Based on these trends, the case studies and our view of the future of healthcare, every stakeholder has to take action. Since each player in the healthcare ecosystem has a different position in terms of strengths and weaknesses, how they transform has to be assessed individually. However, some overarching directions can already be observed across each group:

Budget holders should start to capitalize on their deep access to patient data and use prospective data models to better structure patient pathways. They could use the data and the direct interactions with those they insure to customize these pathways in order to give adequate care to each person during his or her insurance life cycle. In collaboration with providers and suppliers, with their data access and contracting power, payers can take a leading role in establishing structured, integrated care programs. Additionally, it is already clear that budget holders are looking into the next level of evidence-based medicine, with outcome-related reimbursement of treatments. Through digital health and Big Data, they will be able to turn this idea into reality, and increasingly connect payments to outcomes that have been measured by real-life data generated at the point of care. For budget holders to accomplish this, however, they need to take responsibility and ensure funding for the development of the necessary technology infrastructure.

Providers need to rethink the way they structure care pathways and their approach to innovation sourcing. A cost-cutting approach

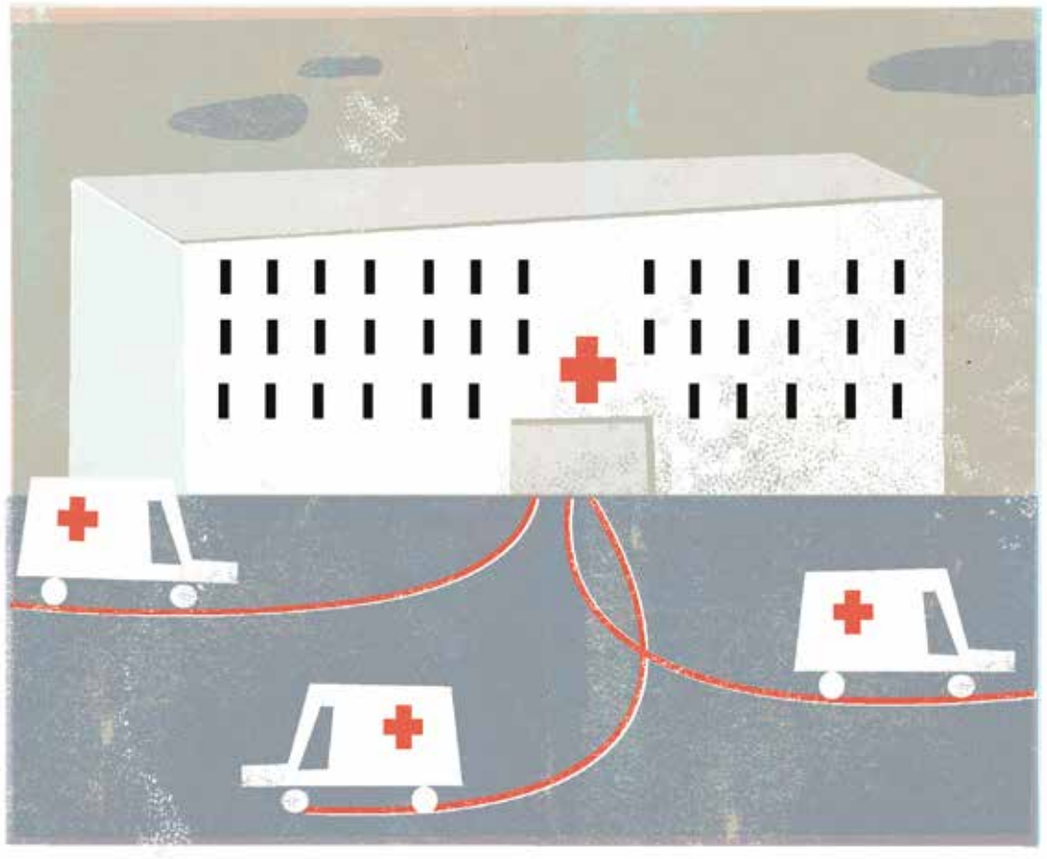

Illustration by Sylvia Neuner

may work in commodity segments, but those aiming to provide state-of-the-art healthcare services must strive to offer a premium product. For this segment at least, the power of digital health can be used to provide transparency and guidance on the patient journey, structuring pathways to avoid duplication and the under- or over-supply of healthcare, thus achieving the best outcomes at an affordable price. Innovation sourcing approaches based on integration will unleash the energy and competence of suppliers and allow them to play an important role in these systems, following the same, rather than differing, objectives compared to their contractual partners.

Medical technology suppliers will have to identify where they want to position themselves within these integrated systems in order to determine the gap and the transformation needed from where they are today. The core competence of many of these companies is a thorough understanding of the detailed needs of healthcare professionals. Enabled by digital health technologies, they could consequently integrate themselves into care processes and build a role supporting budget holders in structuring, and providers in executing, future patient pathways. A particular opportunity for medtech is to support healthcare professionals in improving their services through smart technologies such as navigation guided instruments for surgery that connect to the operating room environment or through workflow management systems.

Pharmaceutical companies can build on their strong knowledge of current and future standards of care, the attached disease and patient pathways and their understanding of the physician's point of view on a particular disease. Within the last decade they have developed a strong competence in health economics to cope with the new requirements of market access authorities. Based on this knowledge they can support each of their customers with targeted information and services. Again, with the use of digital technologies, many companies have already developed smart solutions for health insurance products, patient compliance models, health professional diagnostics and treatment decision support.

As the trend analysis and case studies show, transformation in healthcare has already begun, driven by technology innovation and changes in healthcare organization. Understanding this vision of the future healthcare ecosystem should form the basis for the operating models of the future, making it critical for future success.

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