The FutureS of healthcare

Francesco Schiavone [a,b,*], Marco Ferretti [a]

[a] Parthenope University of Naples, Department of Management Studies & Quantitative Methods, Italy
[b] Paris School of Business, France

ARTICLE INFO

ABSTRACT

This editorial for the special issue of FutureS is not intended to provide a comprehensive, analytical overview of the future of health care; rather, it collects the perspectives on which scholars have focused most. There is a danger that what we report will quickly become obsolete for numerous reasons; think of the speed of current technological progress or the fact that the Covid-19 pandemic could further stress health care systems around the world. However, we would like to outline some of the current topics explored in the literature and focus on the scenarios envisioned by practitioners. We write this piece being interested in the innovative impulses of all the actors belonging to the "renewed" health care ecosystem, aware of the fact that there are significant differences between the countries of the North and South of the world and, consequently, between their health care systems. What we can say with certainty is that the healthcare and life sciences are the protagonists of an unparalleled revolution. The aging population and changing needs, the increasingly common occurrence of chronic disorders, and digitization are some of the challenges facing the sector. The technological change of the fourth industrial revolution is disruptive and changes the logic of the market, not only that of healthcare but also that of adjacent markets. Because of the intensity with which insiders have to face these new trends, the topic has been the focus of interest of scholars and practitioners in recent years. The big players in consulting, as well as the scholars, have deepened the issues of healthcare of the future, focusing on what will be the major challenges in 10 years and imagining potential scenarios that will reconfigure the way health care is delivered and used.

In the next 10 years, there will be profound demographic changes and the healthcare system will necessarily have to reconfigure the supply of the necessary services and the methods of delivery (KPMG, 2018). Due to the aging of the population, there has already been a dramatic increase in chronic and degenerative diseases requiring complex treatment in recent years.

In addition, the Covid-19 pandemic that has been sweeping the world since 2019 has strained global health systems, revealed already existing weaknesses, even in the most advanced countries, and is representing an important moment of reflection for all policymakers. The whole world is questioning what will need to be done to foster greater effectiveness of national systems as well as better capacity to cope with shocks of such magnitude.

In this document we explore what practitioners and scholars consider the main future challenges and the major changes that need to be made in the healthcare sector in order to embrace a new paradigm of care, based on the centrality of the patient, on prevention and not on cure, on technologies at the side of humans.

---

* Corresponding author at: Via Generale Parisi, 12, 80133, Naples - Italy.
E-mail addresses: francesco.schiavone@uniparthenope.it (F. Schiavone), marco.ferretti@unicampania.it (M. Ferretti).

Healthcare systems around the world have undergone profound changes, reforms, developments and improvements in recent years. There are numerous opportunities for the healthcare industry to seize while multiple challenges remain, especially in developing countries.

In general, people are healthier, financially better off, and living longer today than they did 30 years ago. Over the past 30 years, the challenges faced by the global health system have included increasing population and urbanization, the spread of chronic diseases, behavioral changes, infectious diseases, region-specific conflicts, and security in health care delivery. It is foreseeable that by 2045 (Durrani, 2016), most of the world's population growth will occur in urban areas of poor countries as the rapid, unplanned and unsustainable style of urban development will make cities in developing countries the nevralgic centers for emerging environmental and health risks. All of this will necessarily require changes in hospital design, culture, and practices to better meet the needs of patients, families, and all stakeholders.

Medical and scientific advances impose significant challenges on today's health care systems. Developments in genetics, information technology, and nanotechnology are changing the approach to health care as it tends toward personalization, and increasingly moves outside the hospital setting. A shift to patient-centered care and patient empowerment has already been underway for some time.

The traditional model of care is undergoing radical transformations and will need to change further to meet the many emerging challenges (Durrani, 2016).

So, what can we expect in the near future?

We explore this in the special issue of FutureS, which has collected 10 contributions on the future of healthcare. Such a call is linked to the RNI Forum on Innovation 2019 on "Innovation for Health. Innovation for Life", hold at University of Naples Parthenope (Italy) on 17–19 July 2019. This special issue is one of the actions of the project "Dipartimento di Eccellenza" (funded by The Ministry of Education, Universities and Research - MIUR) carried out by the Department of Management Studies and Quantitative Methods (DiSAQ) of the University of Naples Parthenope (Italy). In the next few pages we will explore these contributions by connecting to possible scenarios gathered from scholars and practitioners. What they expect could be summarized in a few main aspects: a new patient-centered healthcare system; a redesigned concept of the healthcare ecosystem and the resulting redesign of roles and stakeholders; and the predominant importance of technologies in shaping the future. In a report provided by Deloitte (2021) on the challenges of the global healthcare industry, the authors systematize the major global issues that healthcare providers, policymakers, and all stakeholders who gravitate to this particular ecosystem must focus on. These are: (1) digital transformation and interoperable data, (2) socioeconomic change, (3) labor and talent, (4) care model innovation, (5) consumers and the human experience, and (6) collaboration. Further, we assert that these six issues are the ones that actually reflect problems around the world, although some countries, as we know, are running at different speeds. Surely, the healthcare system will have to balance the needs of the older population for which an "acute" type of care is foreseeable and those of the young people who will require increasingly "out of hospital" care and who have different needs and requirements in terms of a better experience for the patient, convenience and coordination between health and wellness programs. The today's and the near future's patient are increasingly taking on the guise of a consumer who has changed his or her needs and whose needs must be met quickly, on demand and 24/7, like all the other services he enjoys.

Moreover, consumer needs are variable and often difficult to understand. For this reason, large volumes of free data would be needed. According to recent studies, individuals would be willing to share their medical information if this would improve the effectiveness of the treatment, achieve better services, greater value, better experiences and greater personalisation (KPMG, 2018).

In such a context the new paradigm of healthcare delivery will be supported by technological disruptors, possessing large amounts of data and a deep knowledge of the behaviour of patients - now consumers - who will play a fundamental role in the consumerization of healthcare. The patient, in fact, is increasingly assimilated to a consumer and the powerful technological tools of the industrial revolution will support this process of transition towards a consumer-centred model (Balint, 1969; Castro, Van Regenmortel, Vanhaecht, Sermeus, & Van Hecke, 2016) in which the relationship with the patient is strengthened and, although it may seem an oxymoron, humanized. Humanisation linked to the well-being of the patient, the environment, spaces, specialist and collaborative interventions, integration with the community, the individual and the community, taking into account that each person is unique and unrepeatable and reacts differently to problems. In this sense it would be necessary to include social sciences in the training of future health workers (De la Fuente-Martos et al., 2018). With these assumptions, it becomes imperative to move from a cure regime to one of care (De Valck, Bensing, Bruynooghe, & Batenburg, 2001; Ciasullo, Troisi, Cosimato, & Douglas, 2018; Font & Sato, 2012).

Infact, evidence suggests that there is a close relationship between living and working conditions and health, in fact variables such as income, education, working conditions, social support can positively or negatively affect the health of individuals and communities.

Individuals are taking proactive attitudes towards a healthy lifestyle that includes diet, exercise, sleep patterns, energy levels and stress management (KPMG, 2018), as such a regimen has been shown to delay the onset of the disease (Gopal, Suter-Crazzolara, Toldo, & Eberhardt, 2019).

New patients are no longer understood as recipients of treatments and no longer behave that way but are themselves co-producers of health services and co-creators of value (Palumbo, 2017).

The patient-medical relationship will change - from a reactive approach related to diagnosis and treatment in response to signs and symptoms, to a proactive type of health (Waldman & Terzic, 2019) focused on personalized patient care based on early warning signals, predictive models related to gene analysis and continuous monitoring of a multitude of data from different sources (Hamburg & Collins, 2010). Chronic diseases must be treated with the active participation of the patient and his family, in order to find the most congenial tailor-made solutions (Accenture, 2019a, 2019b; Deloitte, 2019a, 2019b, 2019c; Auffray, Charron, & Hood, 2010; McKinsey, 2019a, 2019b, 2019c, 2019d; Sagner et al., 2017). This active participation results in a co-creation process in which patients

and professionals cooperate to solve problems (Dalal et al., 2016; Osei-Frimpong, Wilson, & Lemke, 2018; Tartaglione, Cavacece, Cassia, & Russo, 2018).

Therefore, the healthcare system of the future will be patient-centered.

All the transformations we are witnessing, a consequence of environmental and lifestyle changes, which see health care changing from reactive to preventive and proactive, person-centered and focused on wellness and not disease, are driven and accompanied by a series of innovations in technology and business models that will change health care as we are used to understanding it within thirty years (Aceto, Persico, & Pescapé, 2018).

Most of the existing contributions on healthcare and on the possible scenarios of this sector, combine the word future with the word technology. In fact, such obvious strides in technology suggest a future in which the patient journey is highly embedded and dependent on technology. A quick search on Scopus or Web of Science suggests how important technology is in this transition from the traditional model of the health care system to a new model of care delivery, whether in a developed or developing country.

The patient of today is different than the patient of 30 years ago, their needs have changed, the way they think about the hospital, the site of care, and even how they approach diseases. In addition, the tools he uses or could use are also extremely different.

The reconfiguration of the entire system also involves a reduction in traditional settings and the consequent expansion of alternative care sites. Patients will be able to receive care where and when they prefer through a variety of flexible formats, as is the case for many retail brands that leverage a variety of sales channels. In this new landscape, there will be specific care facilities depending on the target group of patients that can provide different levels of acuity, different diagnostic features and different levels of convenience. It will also be possible for each facility to be informed about the patient's medical record regardless of where the patient has requested treatment.

And if patients can receive the care they need when and where they want, why necessarily in a physical space? The disruptive technology that has emerged in recent years will allow for an increase in virtual care. We have already experienced this because of Covid-19, which required alternative and timely solutions and other forms of virtual care, regardless of geography and used strategically, enable providers to meet the needs of patients at a distance or at home, and can also provide guidance to physicians in other locations facing complicated cases.

Telemedicine is considered a solution to the current challenges of the health sector, even more so in a period of crisis such as the one following the Covid that forced us indoors for a long time; thanks to information technologies, in fact, it has been possible to bridge geographical distances, albeit minimal (Jnr, 2020; Wosik et al., 2020). Gjellebæk, Svensson, Bjørkquist, Fladeby, and Grundén (2020 this issue) discuss its importance in their article, submitted to this special issue; they look at the difficulty in the diffusion of such technologies and study it in relation to the management strategies implemented by managers. The article suggests conditions for organizational and knowledge-based innovation in the face of future health and care needs in society. Management strategies that focus on middle managers and their use of strategies to be used in the work of facilitating learning in the workplace in relation to the introduction of technology and new ways of working are examined. The central position of middle managers in the organizational hierarchy as well as their contribution to learning and communication across organizational levels is highlighted in the article.

Another contribution of this special issue analyzes, in relation to telemedicine, its role in decreasing inequalities in access to health care. The objective of the article "The Future of Telemedicine Cabin: The Case of French Student Acceptability" by Patricia Baudier, Kondrateva, and Ammi (2020 this issue) is to determine the variables that influence student adoption of telemedicine cabins implemented within Universities, Business Schools… This targeted population, are more reluctant to consult in the event of minor health issues. Telemedicine booths could make it easier for them to access health care. The future of such solutions, in fact, must be seriously studied as Telemedicine Cabin or Teleconsultation could be a solution in case of pandemic period such as Covid-19 where all contact between doctors and patients must be avoided and reserved for critical situations. In fact, in case of severe infection, hospitals cannot treat all patients and must focus on vital emergencies. Therefore, the accessibility, availability, and ease of use of the telemedicine booth or teleconsultation can be part of the national governments' plan to reduce the level of contamination by performing remote consultations even from home.

In addition to eliminating distance and inequity a focal goal is to eliminate fragmentation of health care systems; instead, the objective should be to enjoy an integrated system that knows no physical boundaries and allows for all-round patient-centered care.

In this regard, Ciasullo, Manna, Cavallone, and Palumbo (2020 this issue) in an article of this special issue, analyzing data collected from the Eurofound database, not only shed light on the existence of five different types of systems, but also pointed out that the healthcare systems of the future should be based on a hybridization of healthcare systems: in fact, the future of healthcare will benefit from a contamination of the different types of existing healthcare systems; this will make it possible to achieve greater equity of treatment and higher financial sustainability.

In the systems of the future, as suggested by many scholars, the patient will be actively involved which will allow that they will be able to manage themselves (Ascione, 2018; Bürklea, Deneckea, Lehmanna, Zetzb, & Holma, 2018). This is true for countries such as the United States and other economically advanced nations but also for low-income countries as they will face the same issues that will require more hospital care in comorbidities but will move some treatment pathways out of hospitals.

The leaders of the future will certainly be those organizations that will prepare the necessary measures to put the consumer at the center of the ecosystem. Practitioners all agree that those who will not be part of the change in this revolution risk playing a less central role in the future (Accenture, 2018, 2019a, 2019b; KPMG, 2018; McKinsey, 2019a, 2019b, 2019c, 2019d). Many of the ICT technologies we know have evolved exponentially in line with Moore's law (Moore, 1965) and there have already been a significant number of disruptive innovations in the healthcare sector, but since the 1920s the pace at which these innovations have followed one another has been overwhelming.

As suggested by the disruptive changes we are witnessing in recent years, the protagonists of the change will not be

biopharmaceutical companies, but technology giants such as Amazon, Apple, Google, Microsoft, Alibaba, etc. For some time, these Giants have entered the world of health care launching mainly products in the field of prevention and diagnostics; many patents have been filed in recent years and the partnerships concluded with biopharmaceutical companies are equally high. Traditional companies are aware that a revolution is underway and that a new sector, that of "health tech" (Pwc, 2019), is coming to life. Such a regime of change must necessarily correspond to a cultural transformation. For digital health to enter our lives and operate in the right way it is necessary to build knowledge and attitude (Meskó, Drobni, Bényei, Gergely, & Győrffy, 2017).

The fourth industrial revolution and the so-called smart technologies are revolutionizing healthcare. Ćwiklicki, Klich, and Chen (2020 this issue), by addressing this special issue, study the adaptive capacity of the world's healthcare systems to the fourth industrial revolution. They identify key determinants of adaptive capacity, which are: 1) human capital, 2) information and communication technology, 3) social capital, 4) financial resources, 5) governance, and 6) legal norms. Their results show that among the most important determinants for smart technologies to become an integral part of the systems of the future are human capital, financial resources and legal regulations. Also among the most difficult barriers to overcome is the absence of a long-term vision. Understanding the factors that enable the acceptance of 4.0 health and those that hinder it is certainly a good starting point for improving service delivery.

Overcome reluctance, healthcare providers would then be able to predict the needs, behaviors, and attitudes of the new "patient-consumer" and with them the risks, and be able to provide timely interventions when needed, avoiding, for example, the use of the emergency room, or providing context-related solutions (an app that warns a lung patient that it's time to sit down given the temperature of the environment and other variables).

The already mentioned telemedicine, wearable devices, home monitoring devices, electronic pills, and all implantable sensors will replace, as argued by practitioners and scholars, traditional modes of care and allow greater flexibility (Accenture, 2019a, 2019b; Aceto et al., 2018).

And this flexibility goes hand in hand with effectiveness and efficiency, for example in the use of electronic medical records, which can be consulted anywhere and in real-time. The most powerful technologies are certainly the big data& analytics, quantum computing that allows to drastically improve protein folding and drug discovery through probabilistic modeling of the human body's reaction to stimuli. Through augmented reality and virtual reality, exploited for training, patient education, and treatment, it will be possible to simulate realistic scenarios able to eliminate almost all risks.

In addition, an ever-closer man-machine reality is expected. This is what results from numerous studies of major consulting firms (Accenture, 2019a, 2019b; Deloitte, 2019a, 2019b, 2019c; KPMG, 2018). Artificial intelligence (AI) already has numerous applications ranging from decision support for physicians, drug discovery by matching biological patient information with the existing scientific literature on that specific case, to complex genomic processing to provide highly personalized care. AI is already used for the disinfection of operating rooms, to offer companionship, to assist physicians in surgeries. Robots won't take work away from human beings, but on the contrary, the value that the man-machine combination can generate is much higher than what one of the two alone could achieve. Machine learning allows the system to continuously learn from all the data it absorbs that no human being could ever store, but humans can validate the results of the technology and spend more time and effort on tasks that require problem-solving and critical thinking (Accenture, 2019a, 2019b; Deloitte, 2019a, 2019b, 2019c). Workers, therefore, will not carry decades of institutional knowledge within an organization in the performance of a role. Instead, they will move between one environment and another, whether physical or virtual, working alongside technologies that can fill any gaps. Knowledge will remain within the organization itself; it will not travel together with people.

AI will help in the reconfiguration of the work environment and in the improvement of doctors' conditions - avoiding the increasing cases of burn-out (Meskó, Hetényi, & Győrffy, 2018). Also, technology will assist humans thanks to drones delivering medicines, blood and organs, and autonomous vehicles such as ambulances that will improve the efficiency of the intervention, for example by optimizing the route and reducing human error.

While AI applications are attracting considerable attention in healthcare and numerous tools are already in use especially in the United States and China, multiple reticence and obstacles remain, especially in terms of regulation as well as problems with the associated costs (Jiang et al., 2017).

The radical innovations brought by the aforementioned technologies, the demographic changes, the changes in lifestyles and the onset of chronic diseases converge in an approach that in the literature is defined by 4 Ps: predictive, preventive, participatory, personalized medicine (Hood & Friend, 2011).

The adoption of a new approach based on these four Ps promises to reduce the burden of chronic diseases through the effective exploitation of technology and a better understanding of human-environmental interactions and of the determinants of chronic diseases. Fortunately, most chronic diseases can be prevented or delayed. The deeper we look at the issues of genomics, and thus its interaction with lifestyle, social and physical environment, and personal experiences, the more we will be able to predict the risk and prevent these diseases.

The pharmaceutical industry is also investing heavily in R&D to provide more personalized and patient-specific medicines. One of the contributions of this special issue is that by Aldieri, Bruno, Senatore, and Vinci (2020 this issue) who argue that the profound changes and transformations we are witnessing make it necessary to imagine a future in which healthcare services are more efficient. The paper combines two interesting themes in innovation research: on the one hand, the role of knowledge spillovers in the innovation process and, on the other hand, the use of contrasting scenarios to highlight the uncertainty and dynamic behavior of the pharmaceutical industry in future developments. The effects on R&D innovation productivity are a crucial point to investigate future scenarios of the pharmaceutical industry in the European Union, Japan and the United States.

As this last contribution highlights, in order to achieve a service provision as efficient and close to the patient as possible, many

different actors will necessarily come into the field and work together.

Both scholars and practitioners affirm that in the future, the health care systems will be redesigned in terms of stakeholders and their roles: strong collaboration between stakeholders is needed.

Infact, healthcare systems are expected to enter into alliances with innovative biotech companies, technologists, insurance companies and other nationally important health care systems that do not compete in the same geographical areas. A deeper and deeper convergence (Bröring & Leker, 2007) of sectors that are distorting the competitive logic is desirable.

It would be also desirable to form multi-stakeholder groups that, trained within communities, should create effective and innovative planning applicable at the local level. The approach will need to be systemic and interdisciplinary and will need a common language to help researchers, health professionals, and stakeholders to collaborate as efficiently as possible.

In their article, under the umbrella of the futures of healthcare's special issue, Sophie Boutillier, Fourmentin, and Laperche (2020 this issue) show how stakeholders' positions are shaped and transformed over time, by their interactions with others. Indeed, the scholars, in their work entitled "Food additives and the future of health, an ongoing controversy on titanium dioxide" bring out the transformations of organizational routines and the consequent changes in the roles of stakeholders, highlighting the "signal role" played by scientists, transmitted by NGOs who raised the "precautionary principle". This study confirms the transition we are witnessing, highlighting another important aspect, namely that different disciplinary fields are strongly interconnected. It will also be necessary to identify opportunities for sustainable partnerships to implement change such as incubators, research centers, universities, private sector, and global health networks to make innovative project ideas concrete. Hospitals and healthcare facilities in general could also generate value through collaboration with the start-up ecosystem that could help address current business problems, rejuvenate culture, or expand into future markets. And clearly among all the figures mentioned, at the center of the ecosystem will be the patient, a new proactive player in value co-creation.

Regarding multidisciplinarity, another interesting article submitted by Pau and Hall (2021 this issue) highlights the possibility of numerous possible futures and investigate these scenarios through a participatory method involving non-experts. They have built the Collective Imagination Framework (CIF), developed through an 18-month practice-based design research project entitled "Designing for Healthcare in Space" at the Royal College of Art. The framework is designed to facilitate open and accessible contributions to the future of healthcare and broader participation beyond experts and the modern-day community of interest to address the unknowns of the future.

Non-expert images of the future can move from being used as a source of data for experts to filter, to a more equal voice in a feedback loop with experts. Healthcare, in this new perspective, leaves behind the top-down approach traditionally used and effective with infectious diseases or acute injuries.

Since many changes are contemplated in the delivery of care, it is expected that hospitals, so traditionally conceived, will also mutate in structure and design. In fact, a number of studies have demonstrated the relationship between physical environment and healing (Huisman, Morales, van Hoof, & Kort, 2012).

In this sense, the environment must be designed in a way that favors the best permanence of patients, with architectures based on empathy with them, or structures that incorporate art, gardens, and landscapes to reduce the stress of patients and families (KPMG, 2018); acoustics and lighting will also play an important role. Furthermore, the reformulation of the hospital concept is also observed in efforts to optimize care and efficiency in healthcare facilities. Indeed, many providers are making some strategic and structural changes to hospitals. This facilitates the coordination of the whole range of care and allows patients to access care closer to home.

Besides the defragmentation of healthcare systems, the shift of care from the hospital to the home, and the reduction of costs associated with patient services, another important goal is that of sustainability, intended in all its meanings. The current pandemic has further highlighted the urgency of transitioning our healthcare systems to make them more environmentally, economically, and socially sustainable. The issue of sustainability is a hot topic on which many are wondering. And this aspect of sustainability, critical today, as well as one of the focal points of the trends that will characterize the new paradigm of care, is addressed by the paper of the special issue of Pereno and Eriksson (2020 this issue). The authors in their work investigate the possible futures of sustainable health care from a multistakeholder perspective. The results highlighted three main horizons and drivers for improving the socio-technical transition to a desirable scenario based on collaboration among dynamic distributed networks. In addition, this study identifies specific innovation, information, and collaboration strategies for transition at local and international levels. Jackson Williams (2021 this issue) also addresses this special issue by investigating several scenarios starting from the analysis of the potential factors of a reduction in the growth of health expenditure in the United States. In fact, the author denounces the inordinate growth of health care costs in America and provides a series of plausible scenarios in which financial sustainability is an imperative.

In such a complex context, affected by variety and variability, it is crucial to reconfigure the resources and skills of the multiple actors involved in the health care of the future. Despite the overwhelming weight of technology, we refer again to the concept of humanization that will have to be taken into account when designing roles.

Another of the characteristics of the care paradigm of the future is definitely the re-design of the skills and capabilities of healthcare professionals. In this regard, there is a high interest from scholars regarding the integration of new skills and technological capabilities by health workers. With respect to this issue, an article of great interest is the one by Kalisz, Khelladi, Castellano, and Sorio (2021 this issue) that explores the perception of healthcare professionals about the adoption and diffusion of social robots. The main objective of the article is to treat social robots as hybrid products. The study explores practitioners' perceptions of the adoption and diffusion of social robots, including features of categorical ambiguity. The analysis of this perception is crucial because it is related to the creation of a robotics solution as an alternative for future customer needs. And in addition to meeting the needs of new patient-consumers, the authors explain, their adoption would significantly reduce healthcare costs (Kalisz et al., 2021).

Furthermore, it will be necessary to develop new skills in terms of alliances and collaborations with partners and suppliers, of Big

Data, Artificial Intelligence, and Quantum Computing. New roles will arise such as nanomedical engineers, planners of AR/VR devices operation, as well as physical spaces design. As the patient is the heart of the system, skills in terms of consumer satisfaction regarding the patient's experience will also be required.

In conclusion, many of the most advanced economies such as the United States, China, Australia, New Zealand, Japan are already taking big steps into the future.

What we expect in the near future is definitely an integrated and patient-centric healthcare system. Technologies such as big data, AI, IoT, augmented & virtual reality will increasingly make their way into this field; this and other environmental variables will pave for the reconfiguration of ecosystems that will see new stakeholders involved. Hospitals will be rethought as a function of an increasingly tangible switch from a treatment regime to one that will allow people to cope with certain pathologies (mostly chronic) directly in their own homes. All of this necessarily requires that new knowledge and skills be acquired by healthcare professionals and that healthcare systems around the world make a collaborative effort-as suggested by the Covid crisis-in such a way that geographical distances are shortened and inequities in the use of healthcare services are reduced.

Acknowledgement

References

Accenture. (2018). *Future agenda; Future of patient data, insights from multiple expert, discussion around the world*.

Accenture. (2019a). *DIGITAL HEALTH TECH VISION are you ready for what's next in healthcare?*.

Accenture. (2019b). *Today's consumers reveal the future of healthcare*. Accenture 2019 Digital Health consumer Survey.

Aceto, G., Persico, V., & Pescapé, A. (2018). The role of Information and Communication Technologies in healthcare: Taxonomies, perspectives, and challenges. *Journal of Network and Computer Applications, 107*, 125–154.

Aldieri, L., Bruno, B., Senatore, L., & Vinci, C. P. (2020). The future of pharmaceuticals industry within the triad: The role of knowledge spillovers in innovation process. this issue *Futures, 122*, Article 102600.

Ascione, A. (2018). *Hoepli Il futuro della salute: Come la tecnologia digitale sta rivoluzionando la medicina (e la nostra vita)*.

Auffray, C., Charron, D., & Hood, L. (2010). *Predictive, preventive, personalized and participatory medicine: Back to the future*.

Balint, E. (1969). The possibilities of patient-centered medicine. *The Journal of the Royal College of General Practitioners, 17*(82), 269.

Baudier, P., Kondrateva, G., & Ammi, C. (2020). The future of Telemedicine Cabin? The case of the French students' acceptability. this issue *Futures, 122*, Article 102595.

Boutillier, S., Fourmentin, S., & Laperche, B. (2020). Food additives and the future of health: An analysis of the ongoing controversy on titanium dioxide. this issue *Futures, 122*, Article 102598.

Bröring, S., & Leker, J. (2007). Industry convergence and its implications for the front end of innovation: A problem of absorptive capacity. *Creativity and Innovation Management, 16*(2), 165–175.

Bürklea, T., Deneckea, K., Lehmanna, M., Zetzb, E., & Holma, J. (2018). Integrated care processes designed for the future healthcare system. January. In *MEDINFO 2017: Precision Healthcare Through Informatics: Proceedings of the 16th World Congress on Medical and Health Informatics, 245* p. 20).

Castro, E. M., Van Regenmortel, T., Vanhaecht, K., Sermeus, W., & Van Hecke, A. (2016). Patient empowerment, patient participation and patient-centeredness in hospital care: A concept analysis based on a literature review. *Patient Education and Counseling, 99*(12), 1923–1939.

Ciasullo, M. V., Manna, R., Cavallone, M., & Palumbo, R. (2020). Envisioning the future of health systems: Exploratory insights from European countries. this issue *Futures, 121*, Article 102585.

Ciasullo, M. V., Troisi, O., Cosimato, S., & Douglas, A. (2018). Defining health service eco-system "infection": A critical analysis of patient surveys. *Int. J. Bus. Manag, 13*, 118–138.

Ćwiklicki, M., Klich, J., & Chen, J. (2020). The adaptiveness of the healthcare system to the fourth industrial revolution: A preliminary analysis. *Futures, 122*, Article 102602.

Dalal, A. K., Dykes, P. C., Collins, S., Lehmann, L. S., Ohashi, K., Rozenblum, R., … Mlaver, E. (2016). A web-based, patient-centered toolkit to engage patients and caregivers in the acute care setting: A preliminary evaluation. *Journal of the American Medical Informatics Association, 23*(1), 80–87.

De la Fuente-Martos, C., Rojas-Amezcua, M., Gómez-Espejo, M. R., Lara-Aguayo, P., Morán-Fernandez, E., & Aguilar-Alonso, E. (2018). Humanization in healthcare arises from the need for a holistic approach to illness. *Medicina Intensiva (English Edition), 42*(2), 99–109.

De Valck, C., Bensing, J., Bruynooghe, R., & Batenburg, V. (2001). Cure-oriented versus care-oriented attitudes in medicine. *Patient Education and Counseling, 45*(2), 119–126.

Deloitte. (2021). *2021 global healthcare outlook. Accelerating industry change*.

Deloitte. (2019a). *2020 global health care outlook. Laying a foundation for the future*.

Deloitte. (2019b). *Healthcare and life sciences predictions 2020. A bold future?*.

Deloitte. (2019c). *Prospettive, potenzialità, impatti e modelli dell'Artificial Intelligence in ambito sanitario*.

Durrani, H. (2016). Healthcare and healthcare systems: Inspiring progress and future prospects. *Mhealth, 2*.

Font, J. C., & Sato, A. (2012). Health systems futures: The challenges of technology, prevention and insurance. *Futures, 44*(7), 696–703.

Gjellebæk, C., Svensson, A., Bjørkquist, C., Fladeby, N., & Grundén, K. (2020). Management challenges for future digitalization of healthcare services. this issue *Futures, 124*, Article 102636.

Gopal, G., Suter-Crazzolara, C., Toldo, L., & Eberhardt, W. (2019). Digital transformation in healthcare–architectures of present and future information technologies. *Clinical Chemistry and Laboratory Medicine (CCLM), 57*(3), 328–335.

Hamburg, M. A., & Collins, F. S. (2010). The path to personalized medicine. *The New England Journal of Medicine, 363*(4), 301–304.

Hood, L., & Friend, S. H. (2011). Predictive, personalized, preventive, participatory (P4) cancer medicine. *Nature Reviews Clinical Oncology, 8*(3), 184–187.

Huisman, E. R., Morales, E., van Hoof, J., & Kort, H. S. (2012). Healing environment: A review of the impact of physical environmental factors on users. *Building and Environment, 58*, 70–80.

Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., … Wang, Y. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology, 2*(4).

Jnr, B. A. (2020). Use of telemedicine and virtual care for remote treatment in response to COVID-19 pandemic. *Journal of Medical Systems, 44*(7), 1–9.

Kalisz, D. E., Khelladi, I., Castellano, S., & Sorio, R. (2021). The adoption, diffusion & categorical ambiguity trifecta of social robots in e-health–Insights from healthcare professionals. this issue *Futures, 129*, Article 102743.

KPMG. (2018). *Healthcare reimagined; Innovation trends, predictions and actions for healthcare leaders*.

Mckinsey. (2019). *Digital health ecosystems: A payer perspective*.

McKinsey. (2019a). *McKinsey on healthcare, best of 2019*.

McKinsey. (2019b). *Next-generation member engagement during the care journey*.

McKinsey. (2019c). *The hospital is dead, is dead, long live the hospital*.

Meskó, B., Drobni, Z., Bényei, É., Gergely, B., & Győrffy, Z. (2017). Digital health is a cultural transformation of traditional healthcare. *Mhealth, 3*.

Meskó, B., Hetényi, G., & Győrffy, Z. (2018). Will artificial intelligence solve the human resource crisis in healthcare? *BMC Health Services Research, 18*(1), 545.

Moore, G. (1965). Moore's law. *Electronics Magazine, 38*(8), 114.

Osei-Frimpong, K., Wilson, A., & Lemke, F. (2018). Patient co-creation activities in healthcare service delivery at the micro level: The influence of online access to healthcare information. *Technological Forecasting and Social Change, 126*, 14–27.

Palumbo, R. (2017). *The bright side and the dark side of patient empowerment: Co-creation and co-destruction of value in the healthcare environment*. Springer.

Pau, S. S. T., & Hall, A. (2021). New spaces for healthcare futures studies: Connecting existing theory to deeper participatory practice. this issue *Futures, 126*, Article 102689.

Pereno, A., & Eriksson, D. (2020). A multi-stakeholder perspective on sustainable healthcare: From 2030 onwards. this issue *Futures, 122*, Article 102605.

Pwc. (2019). *Driving the future of health. How biopharma can defend and grow its business in an era of digitally enabled healthcare*.

Sagner, M., McNeil, A., Puska, P., Auffray, C., Price, N. D., Hood, L., … McEwen, B. S. (2017). The P4 health spectrum–a predictive, preventive, personalized and participatory continuum for promoting healthspan. *Progress in Cardiovascular Diseases, 59*(5), 506–521.

Tartaglione, A. M., Cavacece, Y., Cassia, F., & Russo, G. (2018). The excellence of patient-centered healthcare. *The TQM Journal*.

Waldman, S. A., & Terzic, A. (2019). Healthcare evolves from reactive to proactive. *Clinical Pharmacology and Therapeutics, 105*(1), 10.

Williams, J. (2021). Unsustainable health care spending in the USA: How will it end? *Futures, 126*, Article 102674.

Wosik, J., Fudim, M., Cameron, B., Gellad, Z. F., Cho, A., Phinney, D., … Tcheng, J. (2020). Telehealth transformation: COVID-19 and the rise of virtual care. *Journal of the American Medical Informatics Association, 27*(6), 957–962.