New Work in Health Sector

The future depends on what you do today.  
Mahatma Gandhi

16.1 Global Healthcare Expenditure

Healthcare in a country comprises the sum of activities performed either by institutions or individuals pursuing, through the application of medical, paramedical and nursing knowledge and technology, the purposes/core functions of:

- Promotion of health and preventing disease
- Curing illness and reducing premature mortality
- Caring for persons affected by chronic illness who require nursing care
- Caring for persons with health-related impairment, disability and handicaps who require nursing care
- Assisting patients to die with dignity
- Providing and administering public health
- Providing and administering health programs, health insurance and other funding arrangements
- Health-related functions such as the education and training of the health workforce, research and development in health, and environmental health should be distinguished from the core functions; as far as possible they should be excluded when measuring activities belonging to core healthcare functions

The global Healthcare industry is a large business with still some inequalities between developed, developing and underdeveloped countries in the world. In 2016, the world spent more than US$ 8.5 trillion on health, representing close to 10% of the global GDP. The average per capita health expenditure was US$ 1000, but half of the world’s countries spent less than US$ 350 per person. The patterns and trends identified in last year’s report are confirmed by the 2016 data published in WHO’s
Global Health (WHO, 2020). With global health care spending expected to rise at an average of 5% annually until 2023, the healthcare sector will present many opportunities for drug makers, equipment producers, consultants and other stakeholders in this industry. While there will be uncertainties, stakeholders can navigate them by factoring in historic and current drivers of change when strategizing for 2020 and beyond. Among these drivers are a growing and aging population, rising prevalence of chronic diseases, infrastructure investments, technological advancements, evolving care models, higher labour costs amidst workforce shortages, and the expansion of health care systems in developing markets. Health care systems need to work towards a future in which the collective focus shifts away from treatment, to prevention and early intervention (WHO, 2020). Compared to industries with fierce competition, demand pricing elasticity is not that high as competition is smaller and as the governments have to pay cost in this sector. Figure 16.1 shows the spend on healthcare on a global basis.

### 16.2 Healthcare Sector in Europe

The healthcare industry in Europe is an extremely large market as outlined in Fig. 16.2. The level of current healthcare expenditure in Germany was EUR 352 billion in 2016. This is the highest value among all EU member states, compared to an average of 9.1%. France recorded the second highest level of current healthcare expenditure (EUR 257 billion), followed by the United Kingdom (EUR
France, Germany and Sweden had the highest current healthcare expenditure relative to GDP in 2016 among the EU Member States (European Commission, 2018). Current healthcare expenditure in France was equivalent to 11.5% of gross domestic product (GDP), more than in any other EU Member State. The next highest ratios were in Germany with 11.1% and Sweden with 11.0%. The benchmark, however, is Switzerland as Non-EU country with 12.3% of the GDP. By contrast, current healthcare expenditure accounted for less than 7.5% of GDP in 12 Member States, with Romania recording the lowest ratio (5.0%). Relative to population size and in euro terms, current healthcare expenditure was highest among the EU Member States in Luxembourg (EUR 5600 per inhabitant), Sweden (EUR 5100 per inhabitant) and Denmark (EUR 5000 per inhabitant) in 2016. It is interesting to note that Luxembourg had the highest ratio per inhabitant given that it had the second lowest ratio of healthcare expenditure to GDP, reflecting the high level of GDP in Luxembourg.

A significant proportion of workers in Luxembourg are cross-border workers and live outside the country; as nonresidents, the expenditure on their healthcare is not included in Luxembourg’s health accounts while their economic activity does contribute to Luxembourg’s GDP. Three of the EFTA countries Liechtenstein, Switzerland and Norway, each reported higher levels of healthcare expenditure per inhabitant than in any of the Member States. Following on from Luxembourg, Sweden and Denmark, a group of four Member States, the Netherlands, Germany, Austria and Ireland, recorded current healthcare expenditure between EUR 4200 and 4300 per inhabitant. In turn, these were followed at some distance by another...
group of the countries France, Belgium, Finland and the United Kingdom with ratios in the range of EUR 3600–3800 per inhabitant. There was then a relatively large gap to Italy (EUR 2500 per inhabitant), Spain (EUR 2200) and Malta (EUR 2000). All of the remaining Member States recorded average expenditure below EUR 1700 per inhabitant in 2016, with seven of these 14 recording an average spend on healthcare below EUR 1000 per inhabitant. The lowest levels of average expenditure per inhabitant were in Bulgaria (EUR 556) and Romania (EUR 432). As such, the ratio between the highest (Luxembourg) and lowest (Romania) levels of expenditure per inhabitant was 13.0% (European Commission, 2020).

### 16.3 Healthcare Care Continuum

The continuum of care is a concept involving an integrated system of care that guides and tracks patient over time through a comprehensive array of health services spanning all levels of intensity of care. The aim of the continuum is to establish a proactive and cost-effective healthcare system. In healthcare, the continuum of care is now being used to describe how healthcare providers follow a patient from preventive care or prevention, diagnosis, treatment and home care as shown in Fig. 16.3. Depending on the patient, this might involve the use of acute care hospitals, ambulatory care, or long-term care facilities. The coordinated effort to medical care means better outcomes for the patient. Effective treatment over the continuum of care requires attention to many moving parts. Not only does the medical care need to be coordinated between a variety of providers, the financing and record-keeping must also be efficient and accessible. The advent of electronic health

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**Fig. 16.3** Healthcare continuum. (Source: Author’s Source)
records, managed care (quality of care), and payer networks have helped the logistics involved in supporting the continuum of care.

The health continuum can also be displayed as the healthcare services from birth to death (end of life care) as outlined in Fig. 16.4. The combination of treatments and the holistic measures over the life span will benefit to the patients and the overall cost situation (Porter & Guth, 2012). For ethical reasons, it is important that healthcare is provided in the highest quality throughout the healthcare continuum in a patient-centred way (Keating, McDermott, & Montgomery, 2013). The health care industry has changed dramatically over the past few decades (European Commission, 2020). Research and development have given us astonishing new treatments, powerful diagnostics, and a rapidly growing wealth of knowledge. Medical specializations and providers have proliferated. Governments and insurers have become powerful players. Patients have become vocal and proactive consumers, ready to search for better options, even if that means going abroad. But, even as health care

Fig. 16.4 Healthcare continuum process from birth to end-of-life care. (Source: Author’s Source)
has become more effective, it has also become more complex and costly. Growing and aging populations are putting increased pressure on health care systems that are already buckling under the burden of chronic diseases like cancer and diabetes.

### 16.4 New Work in the Healthcare Care Sector

An important point among others for New Work in the Health Care sector are flexible working hours and work–life blending (integration of private life and work). Working hours are often a problem in the healthcare industry. Long shifts, inflexible working hours or night work are common because patients need care around the clock. The approaches for mobile working cannot be implemented in the health sector to the same extent as in IT professions. Caregivers can hardly care for their patients via video chat from a café. (But there is also new potential here, for example through robotics in nursing.). In order to relieve the employees here, solutions in the sense of New Work must be discussed and sought in the team that fit the individual life situations. The examples of hospitals that have already established successful models show that this does not have to remain a dream. But there is still plenty of room for improvement in the health sector in the area of self-determination. In order for employees to be able to make decisions, flat hierarchies and agile procedures are necessary that prevent long decision-making paths. And digitization also helps to relieve people and free up more time for meaningful tasks, such as personal exchange with patients. Routine tasks such as medication planning and security can be handled by computer systems. A study by the management consultancy McKinsey addresses the as yet untapped potential of the digitization of the health care system in Germany: A consistent introduction of paperless data exchange via electronic health records and electronic transfers and prescriptions alone would save enormous amounts of time. Likewise, collaboration and exchange among colleagues and other interested parties with new technologies are much more efficient and have fewer hurdles.

### 16.5 Trends of New Work and Virtual Reality in Healthcare Care Sector

#### 16.5.1 New Professions in Health Care

The digital transformation of the health system has the potential to improve patient care, lay off the people working in the health system and make the system more efficient so that it remains affordable, the commission stressed. The COVID-19 pandemic has shown, the importance of digitization has been clear to everyone. The pandemic is becoming a catalyst for the digital transformation in all areas including the health sector. The pandemic has shown, that at least three new job profiles in the healthcare system are necessary in order to implement digitization in the healthcare system and thus to improve healthcare in the long
term: a specialist for digital health, a process manager and a system architect for digital health. Based on new demands, the digital health specialist is a patient-related profession. The person in question should look after individual patients immediately and look for individual ways to provide the best possible care. The specialist should provide classic analog help and routine care and, if necessary, fall back on digital technologies, which they introduce the patients to. A relevant part of the work will be the maintenance of health data and the electronic patient record. The specialist needs basic medical and nursing general knowledge and technical know-how. As a link between patients, specialist staff and technological applications, it increases the quality of care on site. According to Ärzteblatt, the process manager for digital health is responsible for the implementation and maintenance of innovative care processes. It is intended to develop medical and nursing processes through the introduction of digital health technologies that are based on a patient collective and their treatment requirements (Ärzteblatt, 2020).

16.5.2 Health by App and Smart Phones

Health by Smart Phone and Apps, are considered as a future market that is already showing a very dynamic development in view of the intensive mobile phone use of the German resident population. There are currently over 400,000 health-related smartphone apps available that have been specially developed for smartphones and tablets. Such mobile phone apps can be used, for example, to record health data, monitor body functions and symptoms of illness, remind them to take medication or support personal health and fitness programs. The newly defined use of cell phones by smartphones and tablets forms the basis for the success of such health-related smartphone apps. Such mobile phone apps or a fitness tracker are already preinstalled on many devices and are gladly accepted by smartphone users.

16.5.3 Smart Hospital

In the course of digitization, many hospitals want to catch up on their backlog in terms of networking and new technologies. So-called “Smart Hospitals” use, for example, artificial intelligence (AI), 3D printers for implants, networked and remote-controlled robots or digital patient file. But where are the limits? In the end, of course, the focus should be on the person, i.e. the patient. At the same time, however, security in “smart hospitals” must also be guaranteed and systems must always function reliably. After all, it’s about human life. The aim is to use digitized processes and new technologies in wards to better care for patients and to relieve the nursing staff of nonspecialist activities, for example by delegating these activities to the service staff. With this, hospitals hope to save millions and a more efficient way of working within their grown infrastructure. In the following we dare to take a look into the future and explain the possibilities and solutions that should advance your smart hospital through new technologies.
16.5.4 Cyber Security Health Care

In the course of the digital transformation of the healthcare system, the risk of cyber attacks is growing. The increased use of IT systems and the processing and storage of sensitive data pose new challenges for those responsible. The number of cyber attacks has been increasing rapidly for years, making healthcare one of the most popular targets for cyber criminals. The highly professionalized attackers often encounter insufficiently protected systems, networks and untrained users. The attacks range from the theft of sensitive data to the manipulation of infrastructure and medical devices. In the healthcare sector in particular, such attacks can have devastating consequences and even endanger human life, while hospital management is often unaware of its responsibility and liability in this context. In order to recognize the dangers and successfully avert them, a holistic view of the risks is necessary, as is the involvement of all relevant employees—from management to the user.

16.5.5 Process-Driven Health Care

Processes will lead health care activities instead of departments in the hospital of the future. A process value chain shows the processes in the hospital of the future from the patient’s perspective. The previous focus on departments, disciplines and hierarchies is no longer applicable. It is noticeable that the processes up to the therapy can take place at any location outside of the Smart Hospital. Telemedicine and online consultation hours make it possible. The Smart Hospital thus saves expensive space that has to be invested in and operated. The employees can concentrate on the essentials. The doctor is increasingly becoming a technology and app consultant and acts on an equal footing with the patient. Patients are valued and taken seriously. Modern clinical decision systems secure critical diagnoses and therapy decisions. The operation is supported by imaging processes that are evaluated in real time. Robots support everything from simple logistical, communicative processes on the wards to complex operations.

16.5.6 Online Video Diagnosis and Consultation

Online video consultation is the process of consulting patients regardless of location and state of health. The patient is treated online through telemedical offers. The patient and doctor can access a platform regardless of location and meet for a video consultation in a virtual treatment room. They can communicate with each other via webcam and microphone. This type of communication takes place primarily in the context of pre-inpatient services, in home follow-up treatment or for outpatients for second opinions. The long-term care of patients across sector boundaries also increases the quality of treatment and patient satisfaction, thereby increasing patient loyalty. Health care is best delivered face-to-face, doctor-to-patient. However, many
patients in rural areas cannot receive personal medical care due to their individual requirements. Even in areas where doctors are geographically easily accessible, a specialist visit or special treatment can be challenging. For patients with chronic illnesses that impede mobility, regular travel to a doctor can be a physical, emotional, and financial burden. The video consultation can help here. Online video consultation hours also enable patients and doctors to meet for consultations wherever they are without having to travel. Doctors can virtually connect with patients via video to get a first impression of their physical and mental state, to jointly view the results of imaging tests and even to make a diagnosis in real time from a computer, tablet or mobile device. Video communication gives general practitioners the ability to connect patients with specialists in areas such as neonatology, psychiatry, nephrology, oncology, and more.

16.5.7 Online Rehabilitation

Virtual rehabilitation describes the use of virtual reality for the therapy of psychological, neurological, physiological or cognitive diseases. The therapy is partially or fully supported by the use of virtual technology. Virtual Reality Therapy (VRT) uses specially programmed computers, visual immersion devices and artificially created environments to give the patient a simulated experience that can be used to diagnose and treat psychological conditions that cause difficulties for patients.

16.5.8 Electronic Patient Record (EPR)

The development of an electronic and digital patient record (EPR) is a component of digitization in medicine. The digital patient record is a common goal of the federal government and health insurance companies. The EPR was launched in France in 2004. The EPR is voluntary for patients.

With the introduction of the EPR, the patient files will be available anytime and anywhere. To this end, a uniform platform is to be set up for the digital files. In addition, the patient should have access to his files himself and possibly add personal data. In addition, if the doctor changes, the file can be automatically and quickly evaluated by the new doctor and the file is not lost.

In addition, the patient files are completed by several areas. Thus, the visit to the clinic is entered in the patient file and can be viewed. Not to be forgotten, however, is the security of the files. The EPR should be protected against misuse so that any misappropriation of the data is impossible. The digital file will probably serve as the basis for telemedicine in the future.

In the future, technical possibilities such as digital patient files, robots and artificial intelligence in hospitals will facilitate the transition to digitalization and transform our hospitals into smart hospitals.
16.5.9 Robotics in Health Care

Robots are ahead of humans in some things. They never get tired, they do any job, and they never get sick. Applicable in hospitals, they can take over certain activities from doctors and nurses and thus relieve them. A substitute for caring for the patient is never intended, it is purely about relief and taking over activities that ensure that less time remains with the patient! Even today, so-called surgical robots for surgeons are in use during long operations in some facilities and make some operations easier. The strenuous standing around for hours during time-consuming operations is replaced by robots controlled by the surgeon. In this way, a constant concentration of the surgeon is maintained during the operation. This makes them less prone to mistakes, which in turn is good for the patient.

Robots can take on various service tasks for nurses and caretakers. They could bring drinks, coolants or magazines to the patient in a fully automated manner and in return dispose of dirty laundry—of course, several compartments are necessary for this in order to meet the hygiene requirements. Even today, robots are mainly involved in hospital logistics and usually bring unseen samples or food from central supply stations to laboratories or wards.

With the use of robots in the healthcare sector, hospital managers hope to find solutions for staff bottlenecks and improved handling of patients. By relieving the staff and having more time for the patient. No study has yet been able to sufficiently prove whether the robots have shortened patient stays (Fig. 16.5).

16.6 Case Study: Robots in Japanese Health Care System

Japan is a pioneer in robotics. There has long been relying on robotics, primarily because of the demographic change in nursing and healthcare. When using robots on wards, however, many legal and ethical questions still have to be answered in Germany. For example, a robot can never replace a caregiver’s affection and warmth for the patient.

Japan’s healthcare robotics market is anticipated to reach a market valuation of US$3077.0 million by 2025 expanding significantly in the course of forecast period (2019–2025). The expected growth of the healthcare robotic technology in Japan can be attributed to the combined pressure of skyrocketing costs, aging population, and a shortage of qualified healthcare workers. Medical robots can prove to be a solution to these problems of healthcare industry. Further, numerous initiatives from government and private sector have made Japan one of the leading markets for Artificial Intelligence (AI), robotics, big data and other technology, this would further boost the market for healthcare robotics in Japan. Robots in healthcare help the medical personnel to spend more time with patients, as it can perform the routine
tasks. This would further make the medical procedures safer and less costly for patients. Medical robotics is a fast growing and rapidly innovating space, majorly fueled by enhancement of automation technologies, rising incidence of disabilities in human beings and increased incidence of age-related physical ailments in the baby boomer population in Japan.

There are different kinds of medical robots available in Japan such as Surgical Robot, Rehabilitation Robot, Diagnostic Robot, Hospital & Pharmacy Robot and other robotic systems. With advancement in robotic technology, future surgical robots will be smaller, less expensive, and easier to operate, which may ultimately facilitate their acceptance in surgery and help to improve their clinical use. Demand for rehabilitation robots could be particularly strong in Japan given the nation’s rapidly greying and shrinking population. As per the Institute of Medicine at the
National Academies of Science, Engineering and Medicine, diagnostic errors cause around 10% of patient deaths and contribute for 6–17% of hospital complications. For such reason, demand for diagnostic robotics has increased in Japan. For hospital and pharmacy Japan uses nursing robots as supplemental healthcare workers in elderly homes. Figure 16.6 shows the help of a robot in the Japanese health care system.

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