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Stakeholder-Analysis of the effects on the health care system in terms of digitization and introduction of the e-prescription in Germany

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Abstract

The Digitalization influences all areas of life and is more important than ever. A change in the health sector is also becoming overdue since years. The Federal Ministry of Health in Germany has recognized this and as a result, the health sector is currently experiencing new horizons into an even more digitalized future through progressive developments in e-health, e.g. by abolishing the paper prescription and introducing the e-prescription in Germany. The presented methodological SWOT analysis of such an e-health application, using the example of the e-prescription, is intended to illuminate the effects on key stakeholders in the healthcare system within the framework of a 360-degree evaluation from a technical and organizational perspective.

Keywords: digitalization, e-health, e-prescription app, SWOT analysis,
Analysis of Health Care Markets, Information and Internet Services, Computer Software

JEL codes: I110, L860

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1. Introduction

Digitization in the German healthcare system is a mammoth task. Although it offers many opportunities for the involved persons, there are often reservations or fears due to the changes in thinking and working methods it requires. The federal government states:

> *"Digital technologies can help us to better solve the challenges facing almost all health systems in the western world - treating more and more elderly and chronically ill people, paying for expensive medical innovations, providing medical care to structurally weak rural areas."*
> *(Quote from the Federal Ministry of Health from Germany, BMG, 2022)*

According to a BITKOM study from 2019 on the topic of digital health (Berg, 2019), half of the German population sees the advancing digitalization in the healthcare market as a necessity, especially to counteract rising healthcare costs. The German population is thus open to digital applications in the healthcare sector, for example as almost 60 percent would use e-prescription. 65 percent of Germans also see high usage potential in the use of the electronic patient file. However, the German healthcare market is still far behind in international comparison.

The draft law "Law for More Security in the Provision of Medicines" passed in August 2019 was the starting signal for the electronic patient file and the e-prescription in Germany. Digitization in the health care system is now to be advanced in Germany as well and a faster and more secure exchange of data between all involved actors is to be ensured. E-prescription apps are necessary for this purpose, which are to serve patients as a management tool for their data and prescriptions, if they are affine to smartphones.

Various factors require a need for action with regard to the digitalization of processes in the healthcare system. Due to increasing life expectancy and thus a shift in the composition of the population (“demographic change”) a multimorbidity and a high need for treatment can be assumed (Veit, Wessels, Deiters, 2019), which results in rising costs for the health care system. Furthermore, the confidence in the German healthcare system has declined continuously in recent years, according to a study by Pricewaterhouse Coopers (PwC, 2020). The lack of time of the doctors or the opening hours are mentioned as examples. These points of criticism can be offset by digitalization, among other things. The current Corona pandemic is also prompting calls for contactless medicine in order to be able to detect an infection or carry out treatment in such a way that the infected person comes into contact with as few people as possible. In contrast, other European countries are already further ahead than Germany in terms of the digitalization of the healthcare system. The e-prescription is already available in 18 European countries (HCP, 2020).

The Federal Ministry of Health is one of the main drivers in the progress of digitalization. According to the SHI Modernization Act of 2004, the legal prerequisites for the electronic prescription should already be in place in 2006 (Krüger, 2020). However, it was only with the ambitious approach former of the Federal Minister of Health (Jens Spahn was Head of BMG until the handover to Dr. Karl Lauterbach in 2021), that the legal requirements for the digitization of the healthcare system were pushed far ahead. In 2019, for example, the "Act for Greater Security in the Provision of Medicines," which describes the introduction of e-prescribing, came into force. (BMG, 2019). Since 01.04.2020, a draft law of the "Patient Data Protection Act" was available, which requires the mandatory

introduction of the e-prescription from 2022 and enables the introduction of the electronic patient file from 2021 (BMG, 2020).

The telematics infrastructure (TI) serves to network all players in the healthcare system (such as physicians and pharmacies as well as patients) in a manner that complies with data protection requirements. These players depend on and significantly participate in a cross-sector and cross-system exchange of information with the statutory health insurers. The term telematics is composed of the terms "telecommunications" and "information technology" and describes the networking and linking of various IT systems and information from different sources (Gematik, 2020). The TI was founded by the *"Gesellschaft für Telematik-Anwendungen der Gesundheitskarte mit beschränkter Haftung"* (called "Gematik"). Gematik is a service company of the umbrella organizations of the health care system. The tasks of this organization are the establishment, operation and further development of the TI (Zahorsky, 2018).

Gematik consists of the following shareholders: the "Federal Ministry of Health, the Federal Chamber of Physicians, the Federal Chamber of Dentists, the German Pharmacists' Association, the German Hospital Association, the Central Association of Statutory Health Insurance Funds, the National Association of Statutory Health Insurance Physicians, the National Association of Statutory Health Insurance Dentists and the Association of Private Health Insurance Funds" (Gematik, 2020). The BMG has a 51 per cent share in the company. The introduction of the TI was stipulated in the E-Health Act (Gematik, 2020). According to §291a SGB V, the electronic transmission of prescriptions for pharmacy-only medicines is to be established by Gematik by 30 June 2020. A further deadline is the connection of all pharmacies to the TI by 30 September 2020 and all hospitals by 31 December 2020 (Schlippenbach, 2020).

The TI is thus building the technical foundation for new digitalized applications in the healthcare market (Gematik, 2020). such as the e-prescription, an online-based comparison of the master data of the insured, the reading of emergency data on the health card and ensuring communication between the service providers. Other important fields of application are the e-medication plan and the e-patient file (Gematik, 2020).

2. Theoretical Background

The following chapter is about the identification of stakeholders in the health sector. Figure 1 shows the nine most important stakeholders (BMG, 2020).

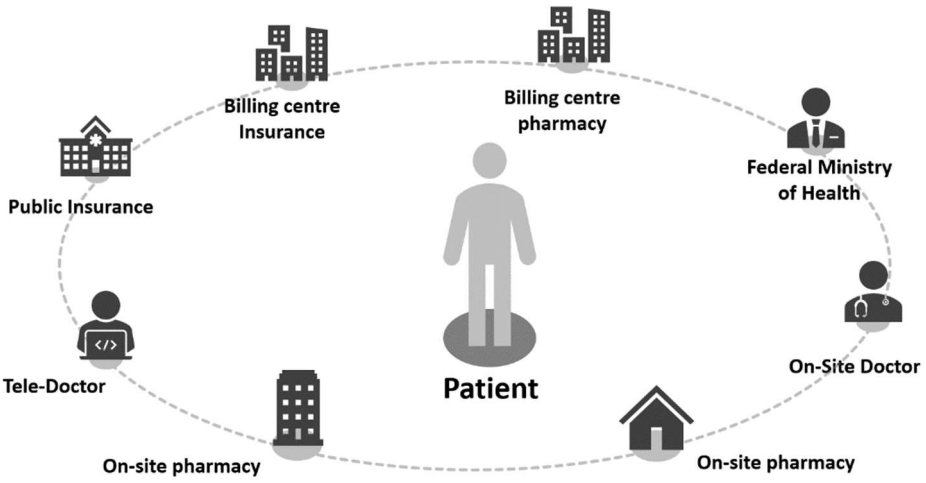

Figure 1: The approach of patient-centricity (own presentation)

2.1. Definition of Stakeholders in Healthcare

The patient is at the center of attraction in general and especially in digital healthcare. Some of the stakeholders act in the foreground and are clearly recognizable to the patient, such as pharmacies, doctors and health insurance companies. The billing agencies and the Federal Ministry of Health tend to operate in the background, as patients are often only indirectly affected by their processes/procedures. Focus will be on the main stakeholders.

2.2. Definition of Strategic-Management-Tool

A common strategic management tool is an analysis by using "SWOT" (acronym for Strengths, Weaknesses, Opportunities and Threats). The management-tool of the SWOT was developed in the 1960s at Harvard Business School for use in companies (Kotler, Berger, Rickhoff, 2010).

In the following it is applied in order to clarify the positioning of the selected five stakeholders with regard to digitalization on the health market and in particular with regard to the introduction of the e-prescription. For simplification matters, only the four fields of strengths and weaknesses ("internal") and opportunities and threats ("external") are considered. The combinations of the four fields and their strategic objectives are thus disregarded. The focus of the present SWOT analysis was placed on the five essential actors in the health care system. In addition, the status quo of the digitalization of the health care system and new digital fields of application are examined in more detail.

This useful technique derives the appropriate strategic and decision-making even for complex issues. It is a strategic planning tool for teams and organizations of all sizes to decide on a certain course of action while clearly presenting or evaluating current and future potential. In combination with an external view of general trends and market developments, a SWOT analysis can help define initiatives and set priorities.

SWOT analysis was selected as a proven framework for the structured comparison and evaluation of an organization's competitive position. This method is also used to develop strategic planning and forecasting of current or future potential, as both internal and

external factors are evaluated. The SWOT matrix also helps to put oneself in the perspective of individual stakeholders in the case of complex structures or processes, thus creating a common understanding of the challenges.

2.3. Objective

The aim of this article is to identify and describe a potential recommendation of actions for the stakeholders of the increasingly digitalized healthcare sector.

Based on the findings of the theoretical background, made in chapter 2, the following research questions will be answered as output of the assessment with the SWOT-Analysis:

1) *What are the main changes in the healthcare-sector due to the digitization?*
2) *Who are the main winners and losers in this game of digital-healthcare?*
3) *For whom can be the e-prescription a "game-changer" to gain sustainable success?*

3. Method

To process the research questions, a broad literature search was first carried out. This was the basis for the following qualitative content analysis (Mayring, 2015). The current state of research and the theoretical foundations were determined through an extensive literature review and mainly online search sources (databases).

The literature search was carried out by using of the following databases:

a) Google Search
b) Google Scholar
c) Web of Science
d) ELSEVIER
e) Springer Link
f) SCOPUS
g) JSTOR

The following search keywords were used as part of a targeted literature search:
"E-Health" (> 81.000 results), "E-Prescription" (> 3.700 results), "Digitalization", (> 174.000 results), "Change Management" (more than 1,2 Million results).

Subsequently, the results were further limited by the search-filters "AND" and "DATE". The literature search identified 671 potential sources, 380 of which were identified as relevant sources. All sources that corresponded to the generally valid scientific requirement for the level of detail and quality of the elaboration were classified as relevant.
Finally, 52 sources were used for editing. These sources were published between 2015 and 2022 and are mainly from German-speaking areas. For the qualitative content analysis, only sources that meet scientific standards were used. The qualitative content analysis was carried out with the software MAXQDA. In the given literature 9 categories (codes) were identified and 42 subcodes were analyzed:

1) Digitalization (Paradigm shift, Challenges, Legal Bases, User opinions/Survey)
2) E-Health (Pharmacy, Patient, Health insurance, Surgery, gematik/TI)
3) E-prescription (prescription management, eMP, ePR, communication KIM)
4) Change Management (Mindset, Workflows, Cost-benefits, Personal requirements)
5) SWOT (Strength, Weaknesses, Opportunities, Threats)
6) Legal Regulation (E-Health-Law, GSAV, TSVG, DVG, PDSG, VOSG, KHZG, DVPMG)
7) Security (GDPR, security concerns, data security, digital signature, health data)
8) E-Commerce (Disruptive, Quick commerce, Medicine delivery, Amazon Pillpack)
9) Business Models (Tele-Medicine, Tele-Pharmacy, On-demand, Click & Collect)

The codes and subcodes have been developed deductively and are vitalized in Figure 2:

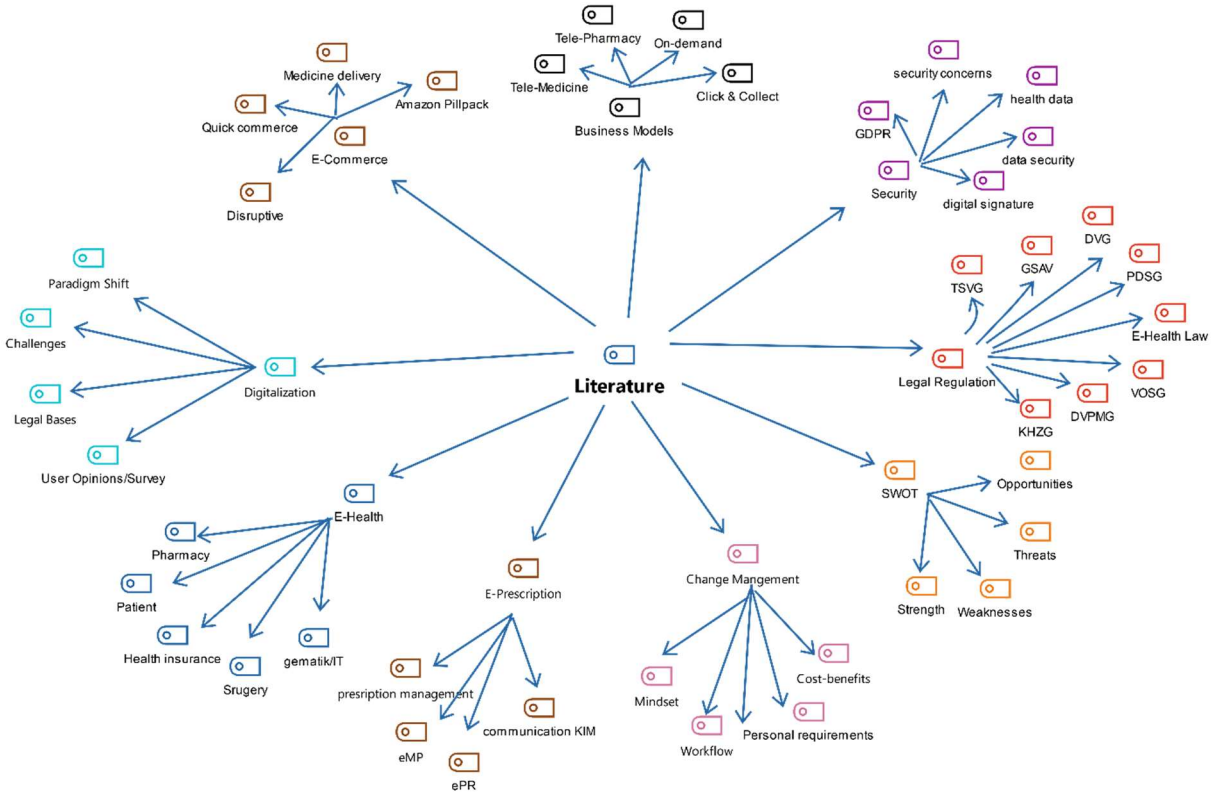

Figure 2: MAXQDA Code/ Subcode Overview (own presentation)

This literature review reveals the complexity of the topic, because the introduction of the e-prescription is a "Game-Changer" for the whole health market and all stakeholders. During the qualitative content analysis of the sources, the e-prescription itself is only the top of an iceberg. A rollout of such a complex technology to a heterogeny market with about 500 million of paper-prescriptions per year for the and more than 72 million public insured people in Germany is a big change and lots of regulation demands and security concerns has to be faced. Digital Healthcare is therefore more than simply digitizing of processes and it's not possible to use best practices from other branches due to regulation.

4. Results

In the following section, the results of the SWOT analysis are summarized for each stakeholder (except the Billing agencies cause not relevant) and compared in tabular form as a SWOT matrix. The result is a subjective assessment of the general advantages and disadvantages of the individual stakeholders, although there may well be deviations from this generalized representation in individual cases. The figure 3 shows a brief overview:

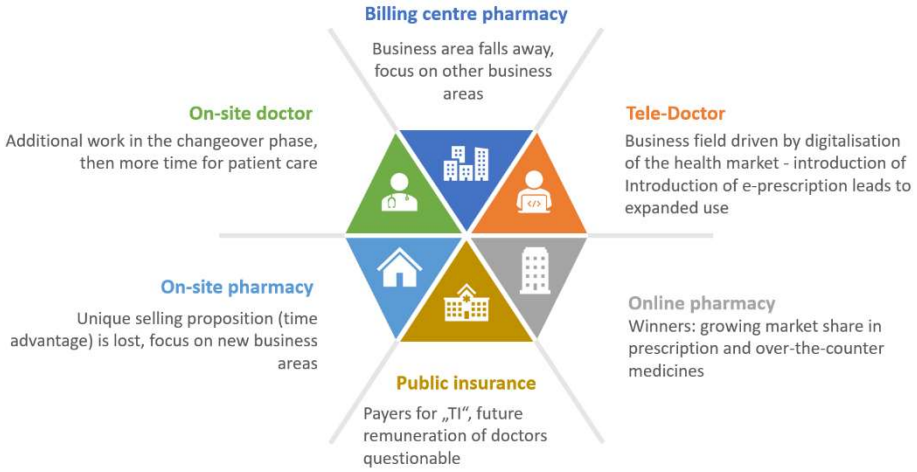

Figure 3: Overview of healthcare-stakeholders (own presentation)

4.1. Result for Patients

Patients represent a highly heterogeneous group that is rather weak in terms of representing their interests to higher authorities. Digitization in the healthcare market strengthens the role of the patient, as they now have access to their (health) data and medical knowledge is provided. The information from the medical prescription plays an important role and includes several stakeholders, because without electronic communication, the patient remains the most important data carrier for the exchange of medical information.

The stakeholder patient can be divided into different categories. In this project, a distinction is made between young patients who go to the doctor only once or twice per year, older patients who visit the doctor very often during the year and chronically ill patients, who make up about 48 percent of the German population (Berg, 2019).

Strengths ("S")

Young patients in Germany in particular are very open to digital tools and solutions and have a high affinity for technology and the internet. Widespread use of smartphones with internet connection is common. In addition, young patients in particular have a high level of trust in online pharmacies and minimal concerns about data protection and security to tele-doctors and artificial intelligence in general. The most important strength is the demand for digital solutions to reduce healthcare costs in Germany. Approximately half of the German population sees digital healthcare as a necessity.

Weaknesses (W)

The elderly and often sick patients often do not have a smartphone and not necessarily a good internet connection. They are therefore severely limited in their use of digital solutions and applications. In many cases, the limited use is reinforced by a dislike or even fear of digital media. The aforementioned limitations also make it difficult and almost impossible to compare the services provided by health insurance companies.

Opportunities ("O")

The patients' opportunities are seen in their desire for flexibility. It is predominantly the young and rarely ill patients who are often on the move and like to travel. They therefore want to be able to handle all processes independently of time and place. This also includes ordering medication or making doctor's appointments. The young generation is also well informed - also due to their extensive use of the internet - and they are more likely than other generations to question doctors' findings or diagnoses. This is where the e-patient record (called "ePA" in Germany) comes to the fore, which increases the transparency of one's own health data. With the introduction of the e-prescription, chronically ill patients do not have to come to the practice in person for a follow-up prescription and can redeem it directly online to a pharmacy. This minimizes and avoids the risk of infection, which is particularly important in the current situation of the SARS-CoV-2 coronavirus. The convenient handling of digitalization in the health market is a multifaceted opportunity. For the patient, online pharmacy means the chance to have medicines delivered around the clock and directly to their home. Compared to the paper prescription, the e-prescription has the advantage that it cannot be "lost" because it is stored on a virtual memory or on the smartphone in the app. Furthermore, illnesses and symptoms can be faked by some patients ("black sheeps") more easily with the tele-doctor than with a face-to-face doctor's appointment. Patients also see faster and optimized care as an opportunity for digital healthcare. Through the e-medication plan (called "eMP"), interactions become apparent more quickly and easily and the patient can consequently be informed and advised about them in detail. This applies predominantly to chronically ill patients who take an average of 6.3 medications on a long-term basis. Germany counts about 25,000 deaths due to side effects of medicines (ABDA, 2020). This number can be reduced by the introduction of the eMP and its extensive usage potential. There is the possibility of faster care for patients by a tele-doctor as opposed to long waiting times for an appointment or on the day of the appointment with a registered doctor. Tele-physicians also improve communication by sharing and adding expert knowledge. This leads to better and optimized treatment. Through the ePA and eMP, early detection and monitoring of symptoms and regular check-ups by doctors are possible and improve the monitoring of a patient. The e-prescription minimizes and avoids errors in manual processes, for example when reading the prescription at the pharmacy. Patients have a variety of different online pharmacies at their disposal. They can thus compare prices and purchase the medication at the lowest price (only in case of over-the-counter medicine).

Threats ("T")

A major risk is the lack of acceptance in the transition phase of digital applications in the healthcare system. Older patients in particular will prefer the use of paper prescriptions to the use of the electronic form, due to their limited affinity with media and technology. In connection with digitalization, patients see a particular risk in data protection, because patient data is sensitive data and requires special protection. Despite the TI and its Patient Data Protection Act (PDSG), many patients still have concerns about

the security of their health data (Knodt, 2019). Digitization in general, and thus also in the health sector, is often associated with the introduction of new techniques and technologies that are not yet fully developed. In the worst case, the new media can also fail. For example, the e-prescription is stored in an app on the smartphone, which has no battery or internet connection inside of a pharmacy. If a patient is diagnosed by a tele-doctor, erroneous symptoms can be transmitted by the patient due to the physical treatment not taking place, as well as the consequence of a distorted virtual transmission.

SWOT	***Patient („client“)***	**POSITIVE**	**NEGATIVE**
		STRENGTHS („Strengths“)	**WEAKNESSES („Weaknesses“)**
	INTERNAL ANALYSIS	▪ Affinity for technology ▪ Openness for online solutions ▪ Minimal data protection concerns ▪ Widespread use of smartphone and internet connection ▪ Demand for digital solutions to reduce rising health costs	▪ limited use of smartphone and internet connection ▪ dislike or fear of digital media ▪ difficult comparability of health insurance benefits
		CHANCES („Opportunities“)	**RISCS („Threats“)**
	EXTERNAL ANALYSIS	▪ Desire for flexibility ▪ Enlightenment ▪ Avoidance of risk of infection ▪ Convenient handling ▪ Fast and optimized care ▪ Error prevention of manual processes ▪ Comparability of prices ▪ Easy feigning of illness	▪ Lack of acceptance in transition phase ▪ Data protection ▪ Failure of technology ▪ Incorrect or distorted transmission of symptoms

Table 1: SWOT table from patients' point of view (own presentation)

4.2. Result for Onsite-Doctors

The general practitioner is a central stakeholder in the health care system and is very often the first point of contact for patients in particular. Many people have a familiar relationship with their local doctor or family doctor, not least because the doctor-patient relationship has existed for a long time.

SWOT	***On-Site Doctor („offline“)***	**POSITIVE**	**NEGATIVE**
		STRENGTHS („Strengths“)	**WEAKNESSES („Weaknesses“)**
	INTERNAL ANALYSIS	▪ Personal relationship and trust between doctor and patient ▪ Fully comprehensive range of services ▪ Undistorted perception of the patient	▪ Waiting room poses risk of infection Limited opening hours ▪ Time required for home visits ▪ Accessibility to doctor
		CHANCES („Opportunities“)	**RISCS („Threats“)**
	EXTERNAL ANALYSIS	▪ Time savings through digital processes ▪ Additional possibility to act as a tele-doctor ▪ fee/remuneration for use of digital solutions Optimized diagnostics	▪ Time expenditure due to digital processes Change in organizational structures ▪ Loss of fees due to use of digital solutions ▪ Migration of young patients

Table 2: SWOT table from onsite-doctors‘ point of view (own presentation)

Strengths (“S”)

The established doctor is consulted for many questions concerning health and illness and offers a full range of services. He can - in contrast to a tele-doctor - perform services such as ultrasound or smear tests immediately, which makes a quick diagnosis possible in the aforementioned case. Likewise, by seeing the patient in person, the registered doctor can get a realistic and full picture without the distortion that may occur through digital media.

Weaknesses (W)

The main weakness is the risk of infection in the doctor's waiting room. Especially due to the current spread of the coronavirus SARS-CoV-2, this risk is to be regarded as highly relevant, since viruses can be transmitted within a very short time through the many

contacts in the doctor's office. The opening hours of doctors in private practice do not always meet the needs of patients and therefore represent a weakness. Through digital consultation hours, on the one hand, patients can contact the doctor regardless of their location, but on the other hand, doctors can also provide care after regular opening hours and outside of the practice in exceptional cases. There is also always a controversial discussion about the shortage of doctors. However, there is consensus that there is not necessarily a shortage of doctors, but rather an uneven distribution of doctors. Urban and metropolitan regions are generally well supplied, but many rural regions experience supply bottlenecks (Veit, Wessels, Deiters, 2019). In addition to further journeys for patients, this also means long distances for doctors in private practice who have to make house calls. Due to these journeys, time is lost that could be spent on patient care. Some home visits could be avoided by acting as a tele-medicine provider to make the most efficient use of patient care. Accessibility to the practice by public transport cannot always be guaranteed either, especially in rural areas, which makes access difficult for certain groups of people (e.g. handicapped patients in not barrier-free Doctors' surgeries).

Opportunities ("O")

The changeover to digital solutions such as the e-prescription offers the opportunity to save time for the practicing physician. Although it can be assumed that additional time will be needed during the conversion phase, previous manual processes can be carried out more quickly and easily in the long term, which gives the doctor more time for patient care. In general, the practicing doctor has the opportunity to act as a tele-doctor in addition to his on-site activity. The two types of care can be carried out side by side and can thus combine the advantages of each model. Optimized diagnostics through the use of digital solutions offers a considerable opportunity for both the patient and the doctor. For example, information from the electronic patient file is available to the doctor, which means that health data can be retrieved quickly in an emergency and duplicate examinations can be avoided. Through the electronic patient file, the examining doctor has, for example, access to previous illnesses, blood values, medication intake or previous treatments (BMG, 2019).

Threats ("T")

Both the increasing time required and the susceptibility to errors during the conversion phase to digital processes can be seen as risks. Above all, the digital signature, to which the electronic prescriptions must be signed, currently leaves many questions unanswered (e.g. comfort-signature of stacks). According to the current state of the art, the signing process alone costs much more time than a manual signature. A PIN must be entered for each signature, which is difficult to implement given the large number of prescriptions.

In everyday practice, the organizational structures must be adapted in such a way that the PIN and doctor's identity card required for the creation of the e-prescription are also available to the staff in the practice. The conversion of medical practices to the telematics infrastructure is also associated with organizational effort even before the first use by obtaining offers or the installation (KBV, 202). In addition, a migration of young patients from the general practitioner to the tele-physician is possible. Above all, "digital natives", the people who have grown up with digital media, will be more positively disposed towards the offer of a digital consultation or treatment and accept it, whereby the local doctor loses these patients, at least in part. With regard to the change in doctors' fees, there can only speculate at present. Both a reduction, an increase and an unchanged level of the fee for medical services paid by the health insurance funds are possible.

4.3. Result of Onsite-Pharmacies

As of 2022, there were approximately 18,500 on-site pharmacies in Germany (ABDA, 2022), which is still significantly more than the approximately 14,500 gas stations in Germany (Statista, 2021).

SWOT	***On-Site pharmacy („offline“)***	**POSITIVE**	**NEGATIVE**
		STRENGTHS („Strengths“)	**WEAKNESSES („Weaknesses“)**
	INTERNAL ANALYSIS	▪ Time advantage ▪ Confidence in society ▪ Securing the cold chain ▪ Proximity to medical practices ▪ Provision of all types of medicines and aids	▪ Ban on the prescription bonus ▪ Messenger service by pharmacists ▪ Concentration in conurbations ▪ Lack of transparency of inventories ▪ Indiscretion at the counter ▪ Accessibility to pharmacy
		CHANCES („Opportunities“)	**RISCS („Threats“)**
	EXTERNAL ANALYSIS	▪ Increasing attractiveness due to assumption of medical services ▪ Rapid reimbursement by the health insurance fund ▪ Digital prescription path minimizes errors and saves time ▪ Competitiveness through the creation of an online platform of all on-site pharmacies ▪ Elimination of prescription storage	▪ Churn of customers ▪ Effort due to changeover of technology

Table 3: SWOT table from onsite-pharmacies' point of view (own presentation)

Strengths ("S")

On-site pharmacies have the particular strength of time advantage compared to any other of mail-order pharmacy. Ideally, medicines, drugs or aids can be collected directly

after the doctor's visit in the immediate vicinity of the practice without delay. In addition, the onsite pharmacy has the right and the possibility to dispense any prescribed medication. This is particularly important for narcotics, medical aids or emergency contraception, as these cannot be ordered from online pharmacies (Cicek-Görkem, 2018). The local pharmacy also enjoys a high level of trust within the society. The competence of the staff and the guarantee of the cold chain are assumed by the patients to be with the on-site pharmacies.

Weaknesses (W)

The prohibition on granting prescription bonuses at German pharmacies can be seen as the greatest weakness. According to the Pharmaceutical Price Ordinance, there are uniform pharmacy dispensing prices for prescription drugs. Patients should be able to obtain medicines from any pharmacy - whether on-site or online - at the same conditions (ABDA, 2020). A draft law for the price fixing of mail-order medicines by foreign pharmacies was passed in July 2019 and is before the EU Commission for a vote (BMG, 2019). As things stand, pharmacies can only deliver their medicinal products to patients without prior consultation by a messenger subject to the instructions of the pharmacy manager. On-site pharmacies without a valid mail order license, it is not allowed to use parcel services such as DHL or Hermes to deliver the medicines (in comparison to mail-order pharmacies), which means that no synergies of the existing networks can be used for delivery and the messenger service becomes correspondingly more costly for the onsite-pharmacies (Müller-Bohn, 2019). Online-pharmacies, on the other hand, use regular parcel services for delivery. Another weakness is the lack of transparency of stock levels, which means that patients do not know before entering the pharmacy whether the product they want is in stock. In the worst case, the patient is delayed in placing the order and has to make a second trip to the pharmacy. Another weakness of the onsite pharmacy in contrast to the online pharmacy is the lack of discretion (in case the pharmacy has no separated room for discrete conversations about medical problems). Some medical concerns are fraught with shame, which patients prefer to talk about discreetly and without contact with pharmaceutical staff or other waiting customers in the queue. Just as with general practitioners, the problem with some pharmacies is that they are not accessible to everyone due to a lack of accessibility, and that while they are concentrated in cities, they are often not optimally distributed in rural areas (ABDA, 2020).

Opportunities (“O”)

Probably the greatest opportunity is offered by the assumption of medical services by pharmacists on site. Instead of relying purely on the classic sale of medicines, the pharmaceutical staff can also offer additional services such as vaccinations or blood pressure and blood sugar measurement, thereby relieving the burden on the doctor's practice and the patient. In the adopted draft law of the "Law to strengthen on-site pharmacies" of July 2019, such powers are demanded, among other things, with regard to vaccinations, but also with regard to the right to repeatedly dispense medicines (BMG, 2019). The draft law is being submitted to the EU Commission for approval. With the introduction of the e-prescription, the local pharmacies can also forward the filled prescription effortless to the health insurance funds via direct billing (currently just for standard medicine and not all kind of prescriptions like Narcotic or Cytostatic drugs). This eliminates or reduces the postal route to a large extent. Due to the rapid arrival of the e-prescription at the health insurance fund, the latter must in turn reimburse the pharmacy more quickly, as the period for reimbursement begins from the arrival of the prescription

at the health insurance fund. As a result, the local pharmacy receives its liquid funds more quickly. Subsequently, the e-prescription eliminates the need to store paper prescriptions at local pharmacies until the next billing-period. Since paper prescriptions are only still in circulation during the transition phase to the e-prescription and in exceptional cases in the future, the pharmacy does not have to store the prescriptions until the bi-weekly collection by the billing center, thereby reducing storage costs and the risk of loss or damage to the paper prescriptions (DAV, 2015). Another opportunity for on-site pharmacies could be the merger of several local providers into one online pharmacy. In this way, the local pharmacies could use synergies and remain competitive compared to pure mail-order pharmacies. Ideally, the digital prescription channel should minimize or avoid errors caused by human error and speed up processes in the pharmacy.

Threats ("T")

A realistic threat is the additional effort caused by the conversion of the technology. Pharmacies need the appropriate hardware and software to use the telematics infrastructure. Although the costs for this are covered by the health insurance funds, the conversion to the new authentication requires a certain amount of time until the pharmaceutical staff has converted their processes (ABDA, 2020). The incomplete conversion to e-prescriptions may result in additional costs due to parallel management of e-prescription and paper prescription. By introducing the e-prescription, patients will be able to redeem prescriptions at online pharmacies with just a few clicks, instead of having the additional effort of sending them to the online pharmacy by post, as was previously the case. On-site pharmacies fear a decline in demand for both prescription and over-the-counter products.

4.4. Result of Tele-Doctors

The tele-doctor ("remote doctor") has a kind of special position in the medical profession in the German healthcare system, as there is a difference between purely private doctors and established doctors with a registered seat by the Statutory Health Insurance ("SHI"), which is the prerequisite for treating statutorily insured patients and prescribing drugs on cash register prescriptions. A pure tele-physician without a cash register seat can therefore only treat patients for a fee and is primarily relevant for patients with private insurance. At the same time, of course, a SHI-accredited physician with a registered office can also practice telemedicine at the same time, although the associations of SHI-accredited physicians contingent this.

Strengths ("S")

Many doctors assume that telemedicine will become more and more important as a part of digitalization in the health market. 47 percent expect a general increase and even 60 percent of the practicing physicians also see their own field of work growing (BÄK, 2020). In Germany, or at least in some federal states, telemedicine is already widespread and can be seen in the many different ways it can be used. This modern type of care encompasses almost all medical specialties (KVBW, 2020). The first telemedical model project called *"Docdirekt"* by the Association of Statutory Health Insurance Physicians of Baden-Württemberg (KVBW) contributes to positive and extended experience. "Via video telephony, patients in Baden-Württemberg receive competent medical advice from

established doctors" (Wallet, 2020). Since April 2016, the app has recorded around 4,000 users per call, and doctor contacts have been made in around 800 cases. The three-year project "ERIC", a telemedical platform for the improvement of intensive care treatment of the Fraunhofer Institute, offers further experience on the possible applications (Frauenhofer-Fokus, 2017). The so-called "tele-stroke units", certified stroke departments, also provide a remedy, so that rural regions can be connected to superregional hospitals or stroke units through a telemedical connection (Deutsche Schlaganfall Hilfe, 2017). The tele-physician also benefits from lower fixed costs due to the elimination of rent or purchase of premises for a practice. However, the tele-physician has to ensure a good internet connection for his daily and successful business and may have additional costs. Furthermore, patients are less reluctant to raise a particular or even sensitive issue with a tele-physician and thus opt more for telemedicine treatment, which expands the patient base. In addition, there is a high degree of discretion in treatment with a tele-doctor.

Weaknesses (W)

However, these strengths are countered, especially at present, by the weakness of the legal hurdle of telemedicine. The basic legal prerequisite has already been created, but the hurdle lies in information, documentation and the specifics of electronic data protection. Clarification includes information on the uncertainty of the communication channels as well as on uncertainties compared to a personal contact. Documentation is almost the same as for face-to-face treatments, but the recording must be clearly consented to by the patient for the sake of evidence (Redaktion Rechtsdepesche, 2019). Despite the wide range of applications of telemedicine, tele-doctors have a limited range of services compared to a general practitioner. For example, a telemedical gynecologist cannot take smears or perform an ultrasound during pregnancy. Through treatment via the screen and the internet, there is no physical examination, so that deceptions such as fever feigning on the part of the patient can take place due to a lack of verifiability.

Opportunities (“O”)

Telemedicine sees opportunities in preventing gaps and bottlenecks in care, especially in rural regions due to the demise of rural doctors. Due to the development of physician density and the advancing demographics in Germany, telemedicine has a high potential for use, because older patients can be treated in their home environment. The bridging of treatment breaks in the event of discharge from hospital is also seen as an opportunity (Deutscher Ärztetag, 2015). Intra-doctor communication is also improved. Easy access to a second opinion and another expert leads to an increase in the quality of treatment for patients (Kompetenzzentrum Telemedizin, 2019). The tele-physician is also contacted for minor or rather harmless clinical pictures and this increases their patient frequency with consequences for the fee. Regarding the change in the doctors' fees, can only speculated at the moment. A reduction, an increase or an unchanged level of the fee for medical services paid by the health insurance companies are all possible. With the e-prescription, physician have the possibility to check the collection of prescribed medications.

Threats (“T”)

A big risk is the failure of the technology due to a bad Internet connection, which can lead to a connection failure, or also technical problems of the computer or the smartphone. Through the treatments in the virtual space, there is the possibility of an incorrect and false diagnosis through a virtual conditioned distortion. In this case,

subtleties are lost that would be noticeable in a personal contact between patient and doctor. Violation of § 7 of the Model Professional Code and electronic data protection, as well as inadequate and incorrect information and documentation, also represent a risk factor (Redaktion Rechtsdepesche, 2019).

SWOT	***Tele-Doctor („online")***	**POSITIVE**	**NEGATIVE**
		STRENGTHS („Strengths")	**WEAKNESSES („Weaknesses")**
	INTERNAL ANALYSIS	▪ Experience values on possible applications ▪ Low fixed costs ▪ Low inhibition threshold ▪ higher Discretion	▪ Legal hurdle ▪ Limited range of services ▪ Easy deception due to lack of verifiability
		CHANCES („Opportunities")	**RISCS („Threats")**
	EXTERNAL ANALYSIS	▪ Prevention of gaps in health care provision ▪ Utilization potentials through development of doctor density ▪ Improved intra-doctor communication ▪ Verifiability of the collection of medicines ▪ Increase in the frequency of patient contact and consequently of the fee	▪ Data protection ▪ Violation of the law ▪ Faulty diagnoses due to distortion in virtual space ▪ Failure of technology

Table 4: SWOT table from tele-doctor's point of view (own presentation)

4.5. Result of Online-Pharmacies

Similar to tele-physicians, online pharmacies also have a special position in the healthcare sector. Only about 20% of German pharmacies have a mail-order license and most mail-order pharmacies are based in other EU countries. Mostly, for regulatory reasons, the Netherlands is a popular location for supplying patients primarily in Germany.

Strengths ("S")

In Germany, 42 per cent of the population already regularly buy their medicines from an online pharmacy and 66 per cent have already ordered once from an online pharmacy. Germans thus have great confidence in online pharmacies and are making increasing use of them. Another strength is that mail-order sales of medicines have been permitted in Germany since 2004, in contrast to other 21 EU member states such as France, Spain and

Italy (DAZ, 2019). The introduction of the e-prescription will eliminate the logistical effort of paper prescriptions for online pharmacies and thus optimize them. Another strength of the online pharmacy lies in the transparency of the verifiability and security of stocks. In contrast to the on-site pharmacy, patients can easily check online whether the corresponding drug is currently in stock and available.

SWOT	***Shipping pharmacy („online")***	**POSITIVE**	**NEGATIVE**
		STRENGTHS („Strengths")	**WEAKNESSES („Weaknesses")**
	INTERNAL ANALYSIS	▪ Existing trust ▪ Admissibility of mail order business ▪ Optimization of logistical processes ▪ Visibility of stock levels	▪ Patchy technologies regarding redemption E-prescription ▪ Restricted supply and dispatch Legal hurdle for narcotics ▪ High competition due to comparability of prices
		CHANCES („Opportunities")	**RISCS („Threats")**
	EXTERNAL ANALYSIS	▪ Elimination of the hurdle to submit the prescription ▪ Possibility of same-day delivery ▪ Rapid reimbursement by health insurance company	▪ Entry of competitors such as Amazon Pharmacy ▪ Delay or failure of delivery ▪ Interruption of the cold chain ▪ Legal mail order ban

Table 5: SWOT table from online-pharmacies's point of view (own presentation)

Weaknesses (W)

Germany has over 3000 online pharmacies in 2018 (BVDVA, 2019). Due to this large number, there is also a high level of competition, especially when it comes to comparing the prices of medicines. A major weakness of online pharmacies compared to on-site pharmacies is the limited range of products available, which is due to the e-prescription. The e-prescription will not yet be able to process all types of prescriptions. The limited offer is therefore individual prescriptions, aids, the T-prescription (special prescriptions) and the narcotic prescription, which can be processed without problems in the on-site pharmacy. The dispatch of medical narcotics, for example, is also not legally permissible (Cicek-Görkem, 2018).

Opportunities ("O")

For many Germans, the e-prescription has a factor and opportunity of convenience, because the hurdle of submitting the prescription, such as scanning the e-prescription and sending the e-mail to the online pharmacy, is eliminated. Thus, more and more patients will switch to mail order. Ordering medicines by e-prescription from an online pharmacy offers the possibility of receiving the delivery on the same day or within the shortest possible time (same-day delivery). The e-prescription triggers faster processing of the order and thus shorter delivery times. The e-prescription also speeds up the reimbursement of online pharmacies by the health insurance company, since the dispatch time of the paper prescription and its administrative time expenditure are eliminated.

Threats ("T")

Entry by competitors such as Amazon also poses a threat to online pharmacies. The e-commerce giant is also expanding its business to include the shipment of prescription drugs by registering the brand "Pillpack Amazon Pharmacy". Medication delivery is already taking place in the US and more countries are planned (DAZ, 2020). When it comes to delivering and shipping medicines, delay or even failure to deliver can be a risky factor. This also means that the interruption of the pharmaceutical cold chain can no longer be guaranteed (DAZ, 2020). Some medicines need to be stored in a cool place to guarantee full and successful efficacy and administration. Despite the permissibility of mail-order trade for 16 years, a possible ban on mail-order trade is a highly topical issue and is being strongly discussed by the German Federal Ministry. The current Health Minister is coming under increasing pressure, as the German Pharmacists' Association is calling for a ban on the mail order trade of prescription drugs (Waschinski, 2020).

4.6. Result of Health Insurance

In Germany, there are currently about 105 statutory health insurance funds for the approximately 73 million patients with statutory insurance, and the rest of the approximately 10 million people in Germany are insured with one of the approximately 50 private insurers (GKV-Spitzenverband, 2021). Again and again there are demands for a uniform citizen insurance for all, which would mean an end of the "two-class medicine" and at the same time this abolition of the private insurance would load the health system with several billion euro additionally. This discussion will certainly continue for many years until a final decision is made by the legislature.

Strengths ("S")

The greatest strength is seen in the high financial resources of the German health insurance funds. They have many times the legally required minimum reserve of financial reserves, which allows contributors to benefit from lower premiums and improved services in the long term (BMG, 2020).

Not least because of their interface between doctors, billing centers and insured persons and their proximity to the state, health insurance funds enjoy a high level of trust in society (PWC, 2020). It is assumed that they protect the sensitive data of the insured and handle the money of the insured in a trustworthy manner. Since many health insurance companies still have local offices, this institution is also characterized by its proximity to the insured, who can contact the employees personally, if necessary, not only by telephone or via the Internet. Since the health insurance funds are in a competitive

situation with each other, the loyalty and satisfaction of the insured play a major role (Rafferty, 2020).

SWOT	***Health insurance („public")***	**POSITIVE**	**NEGATIVE**
		STRENGTHS („Strengths")	**WEAKNESSES („Weaknesses")**
	INTERNAL ANALYSIS	▪ high financial resources ▪ service-oriented employees ▪ trustworthy institution ▪ proximity to customers through local offices	▪ Economic strength dependent on members' salaries or economic situation ▪ Outdated IT ▪ Lack of readiness for digital change ▪ Dependence on the state ▪ Oversupply (synergies not used) ▪ Price modality of private health insurance ▪ Difficulty in switching from PKV to GKV
		CHANCES („Opportunities")	**RISCS („Threats")**
	EXTERNAL ANALYSIS	▪ Cost savings due to: ▪ Elimination of prescription storage ▪ Reduction of the fee ▪ Reduction in staff ▪ Increasing efficiency ▪ Elimination of billing services	▪ Demographic change ▪ Loss of confidence in SHI system ▪ Increase in costs due to higher fees ▪ Cost units for connection to TI ▪ Obligation to reimburse pharmacies quickly

Table 6: SWOT table from public-insurances' point of view (own presentation)

Weaknesses (W)

Due to the contribution rate, which is calculated as a percentage of the insured's salary, the economic strength of the health insurance fund depends on the earnings of its members or, in a broader sense, on the economy. This can be an advantage in the case of an insured structure with above-average remunerated professions, but a weakness of a health insurance fund in the case of a downturn in the economy or an insured structure. The infrastructure of health insurance funds often consists of outdated IT solutions using legacy systems and in-house developments. This can pose a challenge to health insurance funds and their IT in the transformation to digital healthcare. The lack of digital competence among employees is another core problem in the transition to digital solutions (Frauenhofer-Zentrum IMW, 2020). As in many other companies and industries, health insurance companies have employees who are critical of the digital transformation and do not feel ready or are not willing to learn new skills. As health insurance funds are public corporations, they carry out tasks assigned by the state on their own responsibility. Although they are organizationally independent, they are nevertheless not completely free in their decisions and their efficiency. This is a weakness when novel solutions need to be implemented quickly. Despite a steadily decreasing number, 105 statutory health insurance funds will still be operating in 2020 (GKV-Spitzenverband, 2021). Due to the oversupply of health insurance funds, which often differ only marginally in their range of services, synergies cannot be fully utilized, which means that, among other things, the insured person co-finances these costs through his or her health insurance contribution. Having dealt with statutory health insurance in particular, since the majority of the population is insured there, a brief comment should now be made on private health insurance. The private health insurance model also shows weaknesses. On the one hand, the price modalities can be mentioned here, which depend on age and state of health. On the other hand, it is difficult for privately insured persons to switch back to statutory health insurance.

Opportunities ("O")

The opportunities on the part of the health insurance companies can all be combined under the aspect of cost savings. For example, the costs for the previous storage of paper prescriptions are reduced by switching to e-prescriptions. According to § 304 SGB V, health insurance companies are obliged to store paper prescriptions for at least four years. Often, these are stored even longer, which leads to high storage costs and can be significantly reduced by e-prescriptions. By switching to more efficient IT systems, there is also the opportunity to operate processes more efficiently and with fewer staff, which allows the health insurance funds to reduce staff and costs in the long term. Furthermore, the switch to e-prescriptions eliminates some of the costs for the pharmacy billing centers. The service of sorting and scanning with high-speed printers is not necessary with e-prescriptions and then also does not have to be remunerated, since all data are already scanned in and can be forwarded directly by the pharmacy to the health insurance company. The health data, which are increasingly collected and stored through digitalization, play an increasingly important role in negotiations between health insurance funds and outpatient and inpatient service providers (Veit, Wessels, Deiters, 2019). For health insurance companies as payers, there is also great potential in the improved possibility of case management of insured persons through the available data volumes. The large amounts of data make it easier to derive findings on the morbidity of individual cases, which can be relevant for the management of sickness benefit cases, for example (Rafferty, 2020).

Threats ("T")

Through digitalization, health insurance companies run the risk of losing contact and access to their insured persons. Decreasing customer contacts due to solutions at the push of a button lead to a decreasing perception of health insurance companies in society. The negative aspects, such as the refusal of services if they are not included in the respective catalogue of services of the health insurance company, remain present. The institution of health insurance therefore runs the risk of losing its trust and reputation within society. In general, demographic change poses a challenge to health insurance companies to cope with the rising costs in the health care system. Due to the ageing society and a low birth rate, it is questionable how long the solidarity-based pay-as-you-go financing can cover care (Veit, Wessels, Deiters, 2019). Since the health insurance funds are the cost bearers for the connection to the telematics infrastructure, they will be faced with considerable costs (KBV, 2020). Both the health insurance funds and the pharmacies must be equipped with the corresponding hardware and software. The statutory health insurance funds have undertaken to assume the costs for the acquisition and installation of the components. As already mentioned with regard to the opportunities for on-site pharmacies, a faster reimbursement of pharmacies by the health insurance funds results from the changeover to digital processes, especially the e-prescription. For the health insurance funds, this faster outflow of liquidity poses a threat. For the health insurance funds, digitalization can have both a cost-increasing and a cost-reducing effect and can therefore be seen as an opportunity and a risk in equal measure. Fewer costs are achieved by increasing the efficiency of the diagnostic processes, but additional costs may be incurred due to the additional digital services that have to be remunerated through the fee (Rafferty, 2020).

5. Discussion – Paradigm-Shift from analog to digital

Talking about digital health or digital healthcare, is more than digitizing of paper-based processes. It is more or less a multidimensional concept that provides services between technology and healthcare. with different stakeholders. The digital transformation in healthcare needs software, hardware and services. They have to be easy to use and less effort, but there is a lack between requirements and reality of the several market players.

Clients very often using wearable devices (like Smartwatches) to track their personal fitness and share their health-data with other providers to get some benefits in bonus programmes (e.g., 10.000 steps per day). On the other hand, is the electronic health records (EHRs), electronic medical records (EMRs), wearable devices for telehealth or telemedicine and personalized medicine still a future trend, but not daily business so far.

The Corona pandemic has revealed the necessity and gaps of increasing digitalization in healthcare, especially in Germany there is still a long way to go despite numerous changes in the law. In this country, the mindset is still very paper-based and a fax is often the fastest way to transport information, even if it is not the most secure and no longer compliant with data protection since 2018 with the introduction of the GDPR in Europe.

Telemedical solutions are already being used, which lead to better monitoring or improved logistical processes and thus also to improved patient care. The business field of the tele-physician is becoming increasingly well-known and also offers high potential for use in the future. The possibility of issuing an e-prescription is indispensable for

treatment by the tele-physician. The legal hurdles created by the Federal Ministry of Health will most likely be eliminated, but the technical implementation by the Gematik is still a hurdle. Whether this innovative form of treatment will catch on remains to be seen.

Under current conditions, the online pharmacy will be the winner among the stakeholders mentioned (APO-ADHOC, 2022). If telemedicine and e-prescription are implemented across the board, the market share of mail-order pharmacies will increase both in the prescription and over-the-counter segment. Discussions on the prohibition of mail-order sales of prescription medicines are also recurrent in Germany, not least because it is already prohibited in most other European countries. This ban on mail-order trade may have a very negative impact on the current upward trend of online pharmacies.

For the local pharmacy, it is important to focus on new business areas. In the future, the mere distribution of medicines will no longer be sufficient, as mail-order pharmacies are able to operate more efficiently and, through "same-day delivery", also compensate for the time advantage of the on-site pharmacies, which has been decisive up to now.

Increasing the acceptance of digital health means to show up the benefits of digital data.

Big data in healthcare in combination with KI has the potential to prevent diseases or lowers healthcare costs by reducing the expenses for useless treatments or labor tests.

ehealth-Apps can help patients monitoring and managing their chronical disease for easily and opens the window of opportunity for tailor medicine for individual patients. Healthcare providers can also benefit from this digital health data of their patients. Digital tools help by increasing the efficiency and improving of medical outcomes.

The benefits of big data in digital healthcare, can be summarized (TECHTARGET, 2022):

Analyzation of patient records can reduce medication errors, when a software finds inconsistencies between patient's health and prescriptions and automatically notifying the health professionals or patients of a potential medication error.

Using big data analysis can help identify a large volume of recurring patients that flooding the emergency rooms or waiting rooms of the doctors by offering preventive plans to keep this type of patients away from returning.

Improving staffing by protective analysis (e.g., weather or flu-rates) in hospitals and clinics predict admission rates so that they can improve staff scheduling.

In the end, digital health ist still a challenge in the field of digital transformation, that affect patients, medical professionals, technology providers, governmental regulation and others. Due to the massive amounts of data collected from a variety of systems that store and code data differently, data interoperability is an ongoing problem.

Additional challenges are related to data security concerns from patients and healthcare professionals, for example in case the central e-prescription server from the gematik is hacked by criminals or millions of data get lost due to a fatal error in storage?

Additional concerns are related to the use of future-technology, when medical robots are used and ethical questions about the responsibility for mistakes during a surgery, when the doctor is not located in the same room when using telemedicine from abroad.

In conclusion the digital health innovations should be designed to help saving time, increase accuracy and efficiency, and combine technologies in ways that are new to healthcare or maybe in a future “Metaverse” with virtual reality, KI and internet of things?!

6. Conclusions

6.1. Synopsis

In conclusion, the opportunities and risks of increasing digitization in the German healthcare system can be summarized as follows: There is a great need to catch up in Germany due to various factors, such as declining patient satisfaction with healthcare, rising costs due to demographic change, direct comparison in Europe with existing e-health offerings in other EU countries, and the increased need for digital solutions due to the "Corona pandemic". In particular, a look beyond national borders illustrates this need. For example, the e-prescription already exists in more than 18 EU countries (DAZ, 2019) and the first countries such as Estonia and Finland are already successfully exchanging "cross-border" prescriptions. The electronic patient file is another application that is still used far too infrequently, and mountains of paper files are often still transported from A to B when a patient is referred to a specialist or hospital by his or her family doctor.

A rethink must also take place on the part of the doctors' and pharmacists' associations, because the strategy of prevention or isolation has hardly any chance of survival in the digital age. Nowadays, the responsible patient can very easily inform himself via the Internet and obtain a second opinion or exchange information anonymously with other patients in Internet forums. In addition, the competition is not sleeping and there are numerous innovative start-ups or tech giants from the USA (e.g., Amazon, Google, Apple, etc.) as well as other established e-health providers from France, Sweden or Israel, which are also experiencing increasing popularity in Germany with their healthcare solutions.

The German healthcare system should therefore take advantage of the opportunities and not rest on its laurels of the past, because not least the Corona pandemic has highlighted the grievances. The digital transformation is a measure that has no alternative and can no longer be postponed, so that healthcare can continue to be provided for everyone in Germany in the future - both online and offline or in hybrid models.

6.2. Further Research

How the future remuneration for digital services will be structured is still completely open. What is certain is that considerable costs will be incurred by the statutory health insurance funds, as they are the payers for the provision of the telematics infrastructure.

As far as the health insurance companies as stakeholders are concerned, not many reliable statements can be made at the moment. How the future remuneration for digital services will be structured is still completely open. What is certain is that considerable costs will be incurred by the statutory health insurance funds, as they are the payers for the provision of the telematics infrastructure.

For doctors in private practice, an additional effort can be identified in the conversion phase, which can become a time advantage in the long term. Faster digital processes leave them more time for patient care. Although the pharmacy billing center was not addressed in the previous SWOT analysis, it should still be mentioned in the conclusion in the long term, the pharmacy billing centers will be confronted with underutilized prescription scanners that will have to be maintained at high costs. In the long term, the billing centers will have to focus on new business areas and, if necessary, downsize their facilities.

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