Aspects of the Level of Digitisation in Medical Care in Germany: Development of a Typology

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Original Article

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Abstract:

Introduction. Today, most people own smartphones, which fit into their pockets and are more powerful than the first supercomputers, and which they can use to communicate, stream music or measure their pulse. There is no end in sight to this rapid technological development. This also applies to the rapidly growing volume of health-related data.

Objectives: In doctor's practices, medical data, such as medical history, blood test results and diagnostic findings, are recorded directly in the computer system. In biomedical research entire genomes, for example those of malignant tumors, are sequenced almost routinely and are also stored and processed electronically. And, more and more people are themselves using smartphone apps, wearables and in future perhaps also implanted biosensors for continuously measuring their blood pressure, blood sugar levels and pulse.

Methodology: In qualitative social research, there are only a few approaches that involve a detailed explanation and systematization of the typology process. As the concept of type is of central importance for qualitative social research, it is crucial to clarify the concept and the process of typology, as presented by Kluge in her essay published in the FQM (Forum for Qualitative Social Research). In the evaluation of secondary data from the KBV (National Association of Statutory Health Insurance Physicians), the methodology of this approach is based on the procedure of typology development according to Kluge (2000), with the aim of demonstrating a systematic and transparent development of types and typologies in the digitization process.

Findings

How far has the digitization process already progressed in medicine? Are there different types in relation to the level of digitization, and what are the properties of these new types?

Conclusions: What does digitization mean for health science? Is it possible to research such a wave of development objectively? What characteristics do the types of digitization have, and what influences the level of digitization?

Introduction

The increasing digitization of social life is changing the requirements that apply to modern healthcare while offering opportunities for a more efficient healthcare system. In future, the interlinking and processing of health data will make it increasingly possible to design better diagnostic procedures and treatments tailored to the needs of the individual patient. (N.A. 2022, www.bmbf.de).

Analysis of semantic connections and typology

Table 1 Semantic connections (1)

Analysis of semantic connections and typology					
Form of digitisation		Doctor-Doctor	Doctor-Hospital	Doctor-Patient	Doctor-KV
Level of digitisation		2019: 51%	2019: 85%	2019: 25%	2019: 52%
Type 1 very high	80–100%		Type 1 Doctor-Hospital		Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV
Type 2 high	60–80%				
Type 3 medium	40–60%	Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV			
Type 4 low	20–40%			Type 4 Doctor-Patient	
Type 5 very low	0–20%				
Type 1 Doctor-Hospital					
Type 2 Practice Management_ Medicines					
Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV					
Type 4 Doctor-Patient					

Source: Author's own depiction, based on Kluge (2000)

Table 2 Semantic connections (2)

Analysis of semantic connections and typology					
Form of digitisation		Practice management	Healthcare Data	Emergency Data Record	Medicines
Level of digitisation		2019: 60%	2019: 47%	2019: 40%	2019: 79%
Type 1 very high	80–100%				
Type 2 high	60–80%	Type 2 Practice Management_ Medicines			Type 2 Practice Management_ Medicines
Type 3 medium	40–60%		Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV	Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV	
Type 4 low	20–40%				
Type 5 very low	0–20%				
Type 1 Doctor-Hospital					
Type 2 Practice Management_ Medicines					
Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV					
Type 4 Doctor-Patient					

Source: Author's own depiction, based on Kluge (2000)

Graphic representation of developed types

Table 3 Graphic representation of the types (1)

Analysis of semantic connections and typology					
Form of digitisation		Practice Management	Healthcare Data	Emergency Data Record	Medicines
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Type 1 very high	80–100%				
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Type 3 medium	40–60%		Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV	Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV	
Type 4 low	20–40%				
Type 5 very low	0–20%				
Type 1 Doctor-Hospital					
Type 2 Practice Management_ Medicines					
Doctor_ Healthcare Data_ Emergency Data Record_					
Type 4 Doctor-Patient					

Source: Author's own depiction, based on Kluge (2000)

Table 4 Graphic representation of the types (2)

Analysis of semantic connections and typology					
Form of digitisation		Doctor-Doctor	Doctor-Hospital	Doctor-Patient	Doctor-KV
Level of digitisation		2019: 51%	2019: 85%	2019: 25%	2019: 52%
Type 1 very high	80–100%		Type 1 Doctor-Hospital		
Type 2 high	60–80%				
Type 3 medium	40–60%	Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV			Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV
Type 4 low	20–40%			Type 4 Doctor-Patient	
Type 5 very low	0–20%				
Type 1 Doctor-Hospital					
Type 2 Practice Management_ Medicines					
Type 3 Doctor-Doctor_ Healthcare Data_ Emergency Data Record_ Doctor-KV					
Type 4 Doctor-Patient					

Source: Author's own depiction, based on Kluge (2000)

Characterization of the developed types

Type 1
Doctor-Hospital/digitization very high

In general, communication with clinics is still largely analogue. The information most frequently exchanged between practices and hospitals continues to be discharge letters. The percentage of practices exchanging findings, surgery reports and other treatment-related information with hospitals digitally is still below 5%.

Among the large practices, the percentage of practices that are digitally connected with

hospitals (e.g. via referral portals) is higher (23%) than in 2018 (16%). The percentage among the large practices that carry out at least half of their communication with hospitals digitally was also considerably higher: while this was only 8% of large practices in 2018, it is almost every fifth large practice in 2019 (N.A. 2022c).

Type 1 has a weighting of 1/8, corresponding to 12.5%.

Type 2
Practice Management –
Medicines/digitization high

Level of digitization in practice management

In practice organization, a higher degree of use of digital applications can be observed in certain areas when comparing the two surveys (2018 & 2019). In certain subgroups, such as medium-sized practices and practices providing specialist medical care, an opposite trend can be observed. The greatest increase can be seen in hygiene and quality management, which is partially the result of examples being provided in the survey. The larger and more specialized the practice, measured by the number of doctors working at the practice, the more digital applications for practice management are used (N.A. 2022b).

Cross-linking, interfaces and medication safety

79% of doctor's practices are equipped with medical devices (ultrasound, electrocardiogram and the like) with digital interfaces to transmit measurement results. Across all practice groups,

this represents a slight increase in comparison with the previous year.

Of these, 91% have linked their devices entirely or predominantly with their EDP-based practice management systems (PMS) so that they can transfer data. This also represents a slight increase (N.A. 2022a). Type 2 has a weighting of 2/8, corresponding to 25%.

Type 3
Doctor-Doctor_Health Data_Emergency Data Record_Doctor-KV/digitization medium

A year-on-year comparison of the use of digital transmission channels such as email/KV-Connect between doctor's practices and the content sent via digital channels does not reveal any clear pattern. Doctors and psychotherapists most commonly use email for digital communication with colleagues: 45% of practices in 2018; 51% in 2019 make use of this digital medium. All other forms of digital communication, such as messenger services/text messages, video conferences or online chats, are used much less often, although a slight increase can be observed. The more specialized doctors are, the more often they communicate via email.

The doctor's practices most commonly receive laboratory data in digital form from other outpatient care facilities, provided they exchange data digitally. This still applies to more than two thirds of them. Above all, general practitioner practices are set up for this, followed by interdisciplinary practices. Much less common is the digital receipt of findings, discharge letters and image material for diagnostics in the doctor's practices. A considerable percentage of doctor's practices do not receive any digital data from outpatient facilities. Digital receipt of data is most common in larger practices – measured by the number of doctors working there (N.A. 2022d).

Practices were asked to provide an assessment of the benefit of various digital applications – both those already in use and those that could be used in future. In comparison with 2018, the electronic medication regimen is still considered as the application with the most benefit, closely followed as before by the digital emergency data record. The greatest increase was in relation to the provision of online diagnosis/treatment (with a rise from 11% to 18%) and in the creation and maintenance of a digital emergency data record

(from 24% to 40%). In contrast, the number of practices willing to offer general online or video consultation has hardly increased in total – with the exception of psychotherapy practices.

Almost every second doctor's practice (which is an increase compared to 2018) considers digital prescriptions, transferals and certifications (digital versions of maternity card, vaccination/allergy/implant card or examination records) to be very highly or somewhat highly beneficial for patient care. Psychotherapeutic practices were not included. Multiple answers could be given (N.A. 2022a).

Compared with the previous year, more practices communicate with their SHI-accredited doctors association (KV) digitally in most or almost all cases (2018: 24%; 2019: 52%).

Correspondence with public bodies other than the KVs and other healthcare facilities (e.g. statutory health insurance companies, pension insurance, employers' liability insurance associations) is still predominantly carried out in paper form in most practices (N.A. 2022e).

Type 3 has a weighting of 4/8, corresponding to 50%.

Type 4
Doctor-Patient/digitization low

The percentage of practices that communicate digitally with their patients outside the practice has more than doubled in comparison with the previous year, increasing from 12% to 25%. There was a particularly strong increase (relatively speaking) among the general and specialist practices and among larger practice units.

Among the potential forms of digital communication with patients outside the practice, email continues to dominate; messenger services or text messages are the second most widely used form, although the rates are much lower (2019: 20% vs. 2018: 16%). Psychotherapists make use of email and messenger services / text messages particularly often when communicating with patients (N.A. 2022f). Type 4 has a weighting of 1/8, corresponding to 12.5%.

Discussion

Communication between doctors and patients is the decisive factor when it comes to medical care, and is vital for correct diagnosis and optimal treatment. In the course of digitization, new

potential for communication is opening up for doctors and patients. Because of digitization, patients – and their relatives – are more actively involved in the recovery process; doctors and pharmaceutical companies are now dealing with "smart" patients. Patients who are not satisfied with trusting their doctors but who instead want to have more control over their treatment. Digitizing this communication can help to increase the efficiency and quality of medical care. Patients can be provided with a competent contact person at an earlier stage, helping them to navigate the healthcare system better. The use of different communication and information channels (video telephony, VoIP, messaging, uploading photos and data) makes it possible for doctors and patients to communicate both easily and securely. This makes digital technology an opportunity to increase the quality of outpatient medical care. With this in mind, the question arises as to how digitization may change doctor-patient communication and what professional requirements apply (Meier, Holderried, Kraus, 2018).

The types identified in the study are naturally subject to a range of factors that explain their frequency and their level of digitization. It is nevertheless important to apply a typology here, to benefit the transfer of information.

Type 1 Doctor-Hospital has the highest level of digitization and a weighting of 12.5% of cases. This is followed by type 2 Practice Management / Medicines with a high degree of digitization (weighting 25% of cases) and type 3 Doctor-Doctor / Health Data / Emergency Data Record / Doctor-KV with a still medium level of digitization and a weighting of 50% of cases. Type 4 Doctor-Patient has a low level of digitization and a weighting of 12.5% of cases.

Conclusions

It is clear that certain types have a substantially high level of digitization and as can be established based on the reference years 2018 and 2019 the rates are set to increase in future. It will be very interesting to see what the future development of digitization will mean for us.

Certain tendencies are not always apparent at first sight. Clusterings and typologies go one step further and can highlight tendencies and new aspects. Further investigation of the types defined here and refining their features scientifically can

be the object of future research. The reference to public health is plain to see.

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