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Digital Transformation at Universitätsklinikum Halle Using Artificial Intelligence

An overview of the challenges faced by the German healthcare system and how AI can be used to digitally transform healthcare and make it more efficient.

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key points

- The German healthcare system operates across three primary domains: outpatient care, inpatient care (hospitals), and rehabilitation facilities.
- German hospitals are under huge pressure and are facing an unprecedented crisis. Insolvency rates continue to increase and are expected to reach historic highs in 2024.
- The current system in Germany uses Diagnosis Related Group (DRG)-based fees where patient treatments are reimbursed according to DRGs, essentially operating as a lump-sum payment system per diagnosis.
- The German Hospital Future Fund, known as “Krankenhauszukunftsfonds” in German, is a programme initiated by the German government to modernise and improve the country’s hospital infrastructure.
- Universitätsklinikum Halle is a first mover with AI and has implemented an AI system to self-triage and steer patients into the right treatment path.

The German healthcare system operates across three primary domains: outpatient care, inpatient care (hospitals), and rehabilitation facilities. Outpatient care, managed by self-employed healthcare professionals like doctors, dentists, and psychotherapists, typically begins with a visit to a family doctor (Hausarzt). These practitioners, often general practitioners, internists, or paediatricians can refer patients to specialists if needed. Additionally, patients can directly access specialists without a referral.

Alongside individual practices, Germany hosts joint practices and medical care centres where multiple healthcare professionals collaborate. These larger setups, sometimes termed “Praxiskliniken” (“practice hospitals”), can provide specialised services akin to hospital care.

Hospitals in Germany cater to all patients, regardless of insurance type, with public, charity-run, church-run, and private hospitals constituting the landscape. Inpatient treatment involves fees for accommodation and meals.

Challenges for German Healthcare

These days, German hospitals are under huge pressure and are facing an unprecedented crisis. Insolvency rates continue to increase and are expected to reach historic highs in 2024. Small and medium-sized hospitals are going bankrupt.

This is because of some key problems that need to be addressed. The first is that German hospitals, especially those with inpatient care beds, are underutilised. Studies show that one-third of inpatient beds are more or less useless now and even more in the future. The Medtech industry and treatment standards allow more treatments to be done in outpatient care. Hence, shifting patients from inpatient to outpatient is much quicker and worsens the situation of the underutilisation of the beds. There is also the problem of increasing energy costs and staff costs. The German healthcare system calculates the budget increase using the cost figures two or three years prior. However, it is impossible to foresee inflation over the next two years or the payroll hospitals would have to cover, and hospitals may not have the funds to cover their costs based on cost data from two years before.



That is why most hospitals are struggling to cover their expenses with current revenue streams. Decades of underfunding in terms of investment and the persistent absence of inflation compensation are driving this trend. German hospitals are constrained from adjusting their prices in response to inflationary pressures, which makes the situation worse.

What we need to do is reconfigure the system. Treatments should be centralised. Several studies have shown that the quantity of treatment influences the

enhance the overall structure and quality of healthcare in Germany. This endeavour also involves reducing the overall number of hospitals across the country.

German Hospital Future Fund

The German Hospital Future Fund, known as “Krankenhauszukunftsfonds” in German, is a programme initiated by the German government to promote innovation and digitisation within the healthcare sector.

The Hospital Future Act (KHZG) is a law passed in September 2020 and is intended to make a significant contribution to digitisation in the healthcare sector

quality of treatment. If a surgeon does several surgeries more often, he gets better. That’s the logic for the centralisation of services. The second thing is that you need smaller hospitals or a combination of inpatient and outpatient care that is easily accessible to people. This way, you will not need full-scale hospitals everywhere. Finally, we need to use new technologies to combine these new systems and to allow healthcare providers to work together along the patient value chain. You also need telemedicine platforms to let doctors work together on one case. You need artificial intelligence that may help doctors with diagnosis.

Diagnosis Related Group

The current system of Diagnosis Related Group (DRG)-based fees in Germany has come into focus. Under this system, patient treatments are reimbursed according to DRGs, essentially operating as a lump-sum payment system per diagnosis. While this approach has its merits, it also has drawbacks. Critics argue that it creates incentives for excessive treatments aimed at maximising DRG-based fees per patient. However, as mentioned before, numerous hospitals across Germany are teetering on the brink of closure and financial insolvency. That is why the expected reform should change things for hospitals. The core principle of this reform is to prevent occasional medicine (“Gelegenheitsmedizin”) through specialisation and centralisation and prioritising outpatient care over inpatient care. Consequently, the aim is to minimise financial incentives and focus on consolidating larger hospitals and medical facilities to

The Hospital Future Act (KHZG) is a law passed in September 2020 and is intended to make a significant contribution to digitisation in the healthcare sector. To modernise the health system and improve patient care, the law provides for the establishment of a hospital future fund (KHZF). This is a €4.3 billion initiative to bolster hospitals’ emergency capabilities, enhance digitisation, and fortify IT security.

Eligible projects encompass a range of digital advancements such as patient portals, electronic care documentation, digital medication management, AI and IT security enhancements. Additionally, the funding will support the implementation or enhancement of telemedicine, robotics, and cutting-edge medical technologies.

Digital Transformation at Universitätsklinikum Halle

At Universitätsklinikum Halle, we have been the first movers with AI and have implemented an AI system specifically customised for our needs in several languages (<https://www.umh.de/krankenversorgung/digitaler-gesundheitslotse>). We are the first hospital to use it to self-triage. Our goal is to streamline payments that come into our emergency unit and get them on the right treatment path. The project was launched in April last year, and a full-scale launch took place in September. The core software for this AI solution was bought from a third-party supplier and was then customised and integrated into our processes.



The process is simple. A patient visits a hospital and sees a doctor or nurse. Their diagnosis is adjusted as per its severity level, and based on this, they are assigned a digital health advisor and fill out their information. The quality of this information is much better. It is not a short interview in a stressful situation in the emergency department. It is information that comes directly from the patient and goes directly into their electronic health record so that nurses and physicians can work with this information. The patient can decide to leave the ED and go into a normal outpatient clinic if their case is less severe.

Not only does this streamline the patient flow, but it also automatically corrects the payment pathway. In the German healthcare system, payments are determined

shortage, not so much here in Halle, but in the rural areas. It is thus safe to assume that we will have more patients and less staff. The solution can only be that the productivity increases, and to increase the productivity of health workers, you need new tools - tools that help them diagnose faster and more accurately and that can help them with treatment procedures. These tools should a) be designed to steer patients in the right treatment path and b) help with diagnosis. The objective is to direct the patient in the right direction.

AI can also help with administrative tasks and paperwork. In Germany, clinicians still have much paperwork to deal with. At Universitätsklinikum Halle, we are implementing a check-in patient portal that will allow patients to check in from home. The documents can

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based on where the patient is treated. If there is a real emergency and the patient is treated and then goes into inpatient care, the hospital gets paid for this. However, if the patient is treated in the emergency department and is not a severe case, they will not go into inpatient care but will leave the hospital the same day. If this happens, the payment is very small. We have several thousands of these cases, and it can be estimated that this misclassification of patients could result in a loss of more than €100 per case. These patients thought they were ill but were not really that ill to justify a visit to the ED and then subsequent treatment.

The first step was a text-based chatbot; the next step in this project is to develop - an avatar like in a video game. People today prefer computer games rather than text-based tools. Our goal is to create a cool system where you could even arrange registration robots who come and say, *"Hi, welcome to the Uniclinic Halle. How can I help you today?"* Our goal is to provide this service in different languages so that immigrants can also use it easily.

It is important to understand the demographic shift, especially here in Sachsen-Anhalt. We are the oldest population in Germany, which will likely result in more cases for the health system. We also have a staff

then come in, and AI can easily streamline and manage this information. We often end up with no-shows or returns because patients often have an appointment and come in with missing information, which is rescheduled. This is a waste of time and resources. To reduce the inefficiencies of this system, we are implementing this new patient portal.

The core message is that there is a need to better utilise AI in healthcare. We need more innovative projects and more user experience. We need to streamline the insurance and payment processes, and we need clinical studies that show evidence of benefits that can be derived from these AI-based projects. We need evidence so that we can develop trust. It is not only the digital transformation of healthcare – it is the digital transformation of human beings. We need to customise AI as per our needs and develop projects that can address the inefficiencies in the system. We need leadership and encouragement to take this path; we need root-cause development, and we need the willingness to change. That is the journey to the future.

Conflict of Interest

None.