Lernende Systeme
GERMANY'S PLATFORM FOR ARTIFICIAL INTELLIGENCE

AI for better processes in medicine and care

White Paper

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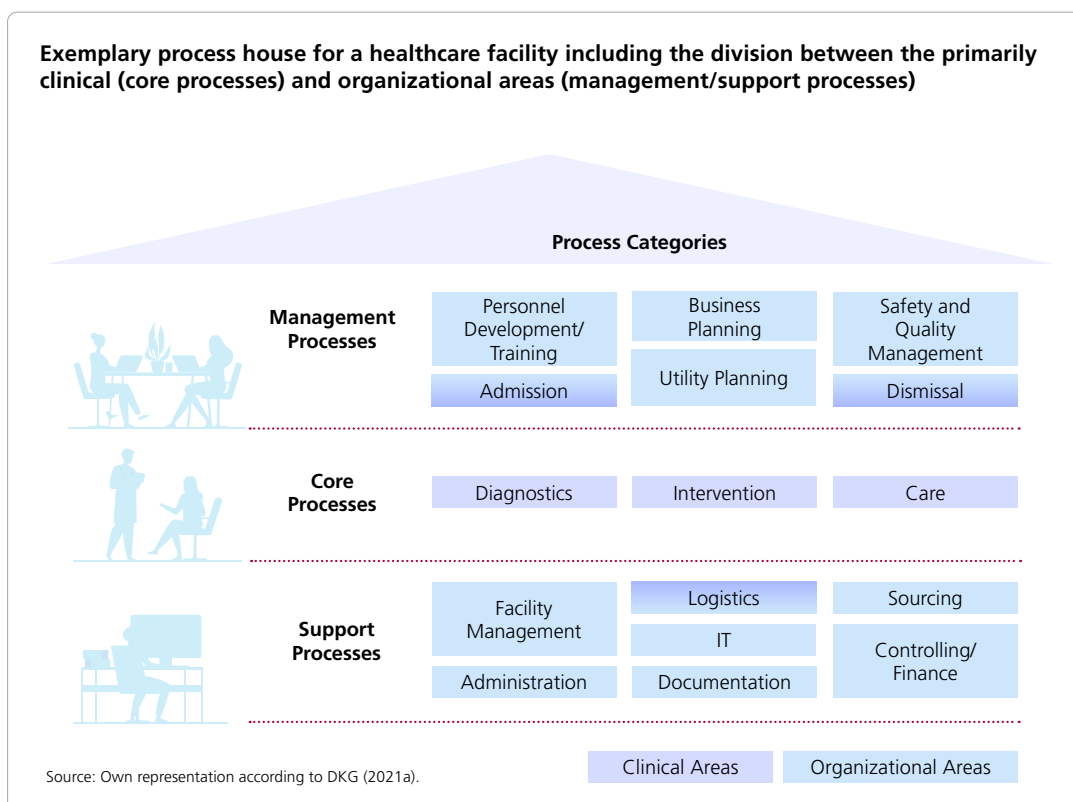Medical Technology, Care

Executive Summary

Artificial intelligence in healthcare offers enormous potential. Its use can change and sustainably improve the healthcare system: for example, by optimizing patient care through personalized therapeutic approaches, relieving the burden on healthcare staff and reducing costs. The current focus of AI is on clinical applications, which are primarily used in research institutions; however, there are also many potential applications in the organizational area of healthcare, such as personnel planning, appointment management and billing. Workflows can thus be optimized, resources are better utilized and bottlenecks are avoided, which in turn relieves the burden on healthcare professionals and improves the quality of care.

Around 25 percent of healthcare professionals' daily working time is spent on purely organizational activities. The use of AI applications in these processes therefore makes economic sense as, unlike clinical applications, they do not depend on funding via reimbursement, but instead enable immediate time and financial savings. The implementation of AI-based technologies in organizational processes also increases efficiency in the long term and creates the basis for the use of AI solutions in clinical processes. The prerequisite for this is the adaptation of AI technologies to the needs of healthcare professionals and integration into existing processes.

Around six million people work in the healthcare sector in a wide variety of facilities that are directly and indirectly involved in healthcare provision. These include both clinical and organizational processes. The latter in particular are similar across institutions and differ only in terms of scope and specific content. As operational units, healthcare facilities are similar in structure to companies and can therefore benefit from adapted process management – only tailored specifically to their needs as healthcare facilities!

Processes in the healthcare sector can be divided into core, management and support processes. As core processes, clinical processes serve the primary purpose of healthcare facilities, namely patient care. Organizational processes are divided into management and support processes (figure). These include, for example, discharge management in hospitals or the billing of services. The need for management and support processes arises from the fact that service providers in the healthcare sector not only have to ensure the provision of care but also have to organize themselves as a business and be economically viable at the same time. Process orientation (as with companies in general) enables a continuous increase in efficiency on the one hand and forms the basis for quality assurance and quality improvement through clearly defined and evaluable processes on the other.

And this is where AI technologies come into play! AI can be used as part of process management in all three process categories – management, core and support processes – in order to standardize processes as far as possible and sensible and thus also the organization of the processes.

Exemplary process house for a healthcare facility including the division between the primarily clinical (core processes) and organizational areas (management/support processes)

	Process Categories		
Management Processes	Personnel Development/ Training	Business Planning	Safety and Quality Management
	Admission	Utility Planning	Dismissal
Core Processes	Diagnostics	Intervention	Care
Support Processes	Facility Management	Logistics	Sourcing
		IT	Controlling/ Finance
	Administration	Documentation	

Clinical Areas   Organizational Areas

Source: Own representation according to DKG (2021a).

Management processes – AI for predictive planning: Management processes refer to organizational and planning processes and can be significantly improved by AI. For example, AI can make perioperative processes in clinics – which often cause costs in the millions when processes are inefficient – more efficient, reduce costs and increase patient satisfaction through automated appointment coordination and resource planning and, as a result, reduce waiting times. Automated rostering, which takes into account staff preferences such as family and rest periods or vacations, leads to better and fairer staff planning and also enables better coordination of training. Similar opportunities for process optimization through AI also arise in the planning of care capacities or the optimization of patient pathways for better communication and planning, for example in bed allocation.

Core processes – AI to relieve the burden on healthcare professionals: Core processes are primarily used to care for patients – via diagnosis, therapy and aftercare or nursing care in day-to-day care. On the one hand, AI systems can speed up and simplify existing core processes; on the other hand, parts of these processes can be outsourced using AI assistance systems, leaving healthcare professionals more time for direct patient care. For example, AI-supported image analysis supports diagnosis and optimizes processes, which avoids redundant examinations and saves resources. As a result, AI technologies also contribute to better working conditions in hospitals and doctors' surgeries, as excessive working hours and overloads are reduced. AI assistants can make everyday care easier by optimizing stroke care through decentralized decision support and fast information processing. Virtual care assistants, such as apps or chatbots, support telemedical services, monitor health status and medication intake and transmit this information to healthcare professionals. They also adapt to the preferences of those affected and enable personalized medical advice.

Support processes – AI for the automation of administration and billing: Support processes are necessary to maintain core processes and ensure smooth operations. With the help of AI, administrative (routine) tasks, such as documentation or billing, can be automated and accelerated. Above all, AI processes help to reduce the daily administrative work of doctors, more than 80 percent of whom spend an average of three hours on this, for example preparing discharge reports. AI can be a great help with such tasks: AI can use natural language processing to create notes from conversations and convert unstructured notes into a structured format. AI can also collect information from various sources and automatically generate the necessary documents. AI can also support time-consuming admission and discharge management by automatically recording and summarizing information. The same applies to the billing of care services. In addition, the use of AI can above all save time and reduce errors.

Opportunities

The added value that the use of AI alone can have for the quality of care – and therefore for patients – is illustrated by the scenario "With Artificial Intelligence against cancer" (2018); even if the focus here is more on clinical processes: the acceleration of measurements and shortening of radiation times using AI processes in cancer treatments not only brings enormous financial benefits, but also leads to less psychological and physical stress for patients due to shorter waiting times for treatment appointments. In practice, there are already numerous concrete AI applications in which AI effectively supports organizational processes as well as clinical processes. The listed application examples from Germany and around the world clearly show the diverse application possibilities and potential of AI in organizational processes in the healthcare sector.

Overall, it can be said that AI-based applications in organizational processes relieve the burden on healthcare professionals and improve the quality of care, as more time can be invested in actual interaction with patients. By focusing on existing care processes, organizational AI applications also offer a low-threshold way of getting healthcare professionals and patients used to interacting with AI systems and highlighting the associated benefits in practice, such as shorter waiting times, improved transparency and a reduced workload. The implementation of AI applications in the organizational area would benefit considerably from consistent and standardized data structures and data flows in the healthcare sector.

With regard to the introduction and feasibility of AI-based procedures to support clinical and organizational processes in healthcare, the following assessment can be made based on the current framework conditions:

- In the short and medium term, improvements in organizational processes in day-to-day care can be implemented economically.

- The implementation of AI-supported technologies in organizational processes leads to greater efficiency in the long term and forms the basis for the implementation of AI solutions in clinical processes.

- AI solutions for organizational processes offer great potential for time and financial savings.

- In an international comparison, Germany lags behind in the development of AI applications for the organizational area.

Challenges

Even if AI applications in the organizational area do not contribute directly to medical decisions, errors in these applications can lead to harm for those affected. Examples of this include delayed treatment due to incorrectly prioritized appointments in appointment management or the incorrect or incomplete recording of information in the documentation process. The same applies to data security, as sensitive health data is sometimes used for AI in organizational applications, which is why corresponding data security requirements must be met.

A study commissioned by the European Parliament on the use of AI in healthcare has identified seven key risks for this area, which apply to both the organizational and clinical areas: 1) harm to patients due to AI errors – 2) misuse of medical AI tools – 3) bias in AI and perpetuation of existing inequalities – 4) lack of transparency – 5) data protection and security issues – 6) gaps in accountability – 7) barriers to implementation. These requirements must be met by AI technologies in healthcare to ensure transparency, security, accountability and compliance.

Specific funding programmes or future funds for AI applications in organizational processes should be set up so that AI applications can be used quickly in everyday healthcare, taking into account data protection regulations and risks. To make AI solutions technically possible, **IT infrastructure for real-time utilisation and the provision of structured, interoperable healthcare data** are also required. The **development of digital skills and networking between healthcare professionals and developers** are fundamental to the use of AI applications by healthcare professionals. It is to be expected that many of these applications will become widespread, as added value can generally be expected in the short term – both financially for the providers and manufacturers involved and indirectly in terms of the quality of care for patients.

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