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Digital innovation: a catalyst for improving health care in the southern hemisphere

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Thanks to increasing global digitalisation and simultaneously decreasing costs, technology is now more accessible to a wider range of people than ever before – including those in the southern hemisphere. Modern information and communications technology (ICT) offers a major opportunity to ensure healthy lives and promote well-being for all at all ages (SDG 3).

The potential uses of digital technology in the health care sector are highly diverse and constantly evolving. Basically, digital applications in this area can help:

- to increase the sector's efficiency, e.g. through cost-saving digitalisation of processes in areas like patient management, electronic patient records, invoicing and health insurance, or by ensuring faster availability of data such as management information or early warning systems, such as in epidemics and pandemics like the current coronavirus crisis;
- to improve access to health care services or enable such access in the first place, for instance in structurally underdeveloped rural areas, by making use of digital access to medical advice services and remote diagnoses;
- to improve the quality of health care, e.g. by using telemedicine to involve specialists, using artificial intelligence to enable more precise diagnostics, including assessment of X-rays, digital training and supervision opportunities etc.

However, digital applications also have their limits and carry risks, especially under the conditions which often prevail in the southern hemisphere. These include unreliable electricity supply, limited local maintenance and repair services, restricted digital literacy among users, growing inequality/digital gap and risks associated with handling sensitive patient data (cyber security, data misuse).

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Principles for digital development

To ensure targeted and effective implementation of digital approaches in southern hemisphere countries despite the complex context and particular risks, several development institutions (including KfW) have agreed nine Principles for Digital Development. These serve as a guide when executing digitalisation projects (including in the health care sector):

1. Design together with the user;
2. Understand the existing ecosystem;
3. Design for scalability;
4. Build for sustainability right from the start;
5. Be data-driven;
6. Use open standards, open data, open source software and open innovation;
7. Reuse and improve;
8. Address data privacy and security;
9. Be collaborative.

The following highlights some

Financial Cooperation (FC) approaches which, on the one hand, indicate the breadth of applications that digital solutions can have and, on the other, show how these can be applied to typical FC health care programmes. Naturally, digital applications should not be used for their own sake – they only make sense where they actually promise clear added value after the opportunities and risks have been assessed.

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Example 1: building a national blood bank system in Pakistan

The health care situation in Pakistan is characterised by qualitative and quantitative deficits, including with regard to blood transfusion which is largely unregulated and highly fragmented. However, there is significant demand for blood products, especially for women who experience pregnancy complications, for emergency procedures and for patients suffering from anaemia with a variety of causes. To combat this gap between demand and supply, KfW is financing the creation of a network of blood banks, including a digital management system (BBMIS). A network of regional blood banks will be built to ensure a supply of reliably tested blood products and provide the people of Pakistan with better access to safer blood transfusions. Via a central information system, blood banks can quickly make tested donated blood available to public and private hospitals. The system will also help to improve the quality and efficiency of these blood banks.

Information systems as a basis for evidence-based decision-making

In the health care sector, digital information systems (health management information systems) are becoming of key importance. They form the basis of monitoring and evaluation, thereby assisting with health care planning: health data which has been collected, aggregated and analysed is recorded in digital health information systems which enable decentralised data use and evidence-based decision-making at policy level. On the one hand, this replaces the fragmented, paper-based health reporting system and on the other, it improves the precision, up-to-dateness and uniformity of data and avoids duplication.

They are closely related to electronic hospital information systems which record relevant information about patients (such as personal details, health insurance, payments, bed occupancy, diagnoses, medication etc.). These digital systems not only allow hospitals to manage patient data more efficiently; they also generate essential information to facilitate clinical, administrative and financial management of the hospital.

Digital early warning systems as the backbone of the fight against epidemics and pandemics

When it comes to the global spread of illnesses and the associated risk of epidemics and pandemics, early warning systems play a key role in protecting national and global health security. This is becoming clear during the current global coronavirus pandemic. With digital ICT, information on highly dangerous pathogens like Sars-CoV2 can be recorded in databases in real time. This enables better recording and analysis of the spread of diseases, and in turn, it gives us a better understanding of the illnesses and helps us identify factors which could encourage or hinder further spread.

With modern ICT, automated triggers within a network can send out early warnings. Quick reaction times are essential to ensure that political decisions can be made at the right time, guaranteeing adequate treatment on the one hand, and minimising damage on the other. The database can be used again in this context to compare the effectiveness of treatment methods and ensure that the most effective countermeasures are adopted.

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Example 2: OSCAR – digital decision-making support system

In humanitarian crises, the information needed to ensure that deployed resources reach those who need them most is often lacking. To counter this deficit, the integrated digital decision-making support system OSCAR was launched by KfW on behalf of the Federal Ministry for Economic Cooperation and Development, in collaboration with humanitarian and scientific partner institutions. OSCAR collates data from various sources to form an overall picture of the situation, which can then be analysed. In the context of COVID-19 monitoring in South-East Asia, OSCAR is being used to record the geographical distribution of case numbers and forecast intensive care demand at sub-national level based on a mathematical model. Through the subsequent comparison with the available treatment capacity figures, OSCAR allows decision-makers to prioritise the use of stretched resources and thus contain the pandemic as effectively as possible. Based on the Principles for Digital Development, OSCAR enhances and builds on the existing information systems by adding a level of interoperability to reduce the complexity of information management in different types of emergency. OSCAR is provided in an open source format.

Supply chain management to ensure high-quality medicines

The health care situation also depends on the availability and quality of medical products. WHO data suggest that one in ten medical products in southern hemisphere countries is counterfeit or low-quality. This not only places a huge burden on budgets; it may also be life-threatening for people suffering from diseases. One solution to assuring the quality of drugs could be digital management systems (including based on blockchain technology).

Barcodes or QR codes can be used to trace and verify the path of drugs at all levels of the health care system in real time. The blockchain technology makes sure that this information can be accessed through a platform by all stakeholders in real time and process decisions can be documented without a risk of forgery. This makes it much

easier and quicker to spot illegal trading in counterfeit medicines and corruption. Blockchain-based solutions are currently being piloted in various contexts, both within and outside development cooperation (e.g. using the TruBudget platform, developed by KfW, for applications including the tracing of critical vaccine supply chains).

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Example 3: regional training centre for health care logistics staff in the East African Community (EAC)

Among other things, high-quality health care requires efficient health care systems, including supply chain management. In the EAC there is an acute shortage of well-trained specialists to manage these supply chains properly in health care systems at national and regional level, as well as in districts and individual health care facilities. This is why KfW, with German Federal Government funds, is promoting the establishment of a regional centre of excellence to strengthen supply management. Specifically, this will mean the creation of high-quality training programmes for health care logistics in the EAC and of a point of contact in the region for the introduction and dissemination of innovations and tried-and-tested methods. ICT (e.g. a logistics management information system) will play a key role in training health care specialists in supply chain management and in the procurement, delivery and logistics of health care products.

Furthermore, information technology can enable more efficient planning and management of procurement and health care costs. This can prevent drugs from being wasted and expiring. Overall, this contributes significantly to increasing cost efficiency in procurement, improving the availability of drugs and guaranteeing their quality.

Access to health care through social security

Insufficient ability to reach target groups is another major challenge in reaching SDG goal "Good Health and Well-Being" which includes universal health care and coverage. According to the WHO, around 100 million people fall below the poverty line each year because they have to pay for the health services that they use out of their own pocket. The number of people who cannot afford the cost of treatment and drugs and therefore receive no treatment is suspected to be far higher.

The use of digital technology in the field of social security can help people who need them to access the required health services. With automated insurance management, where invoices for services rendered are created and submitted digitally, transaction costs can be substantially reduced and processing time is much shorter.

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Example 4: expanding health insurance with digital solutions in Tanzania

The Tanzanian government plans to introduce mandatory health insurance for the entire population. Rolling out such an expansion of the insurance system requires both expanding the IT structure and harmonising the associated organisational processes. Only digitalisation can enable the substantial reduction in transaction costs which means insurance can be provided to large swathes of the population. This is why KfW, on behalf of the German Federal Government, is financing the development of ICT-based system solutions for core business processes (digital invoicing, electronic insurance cards and card readers, SMS enrolment). This will make a significant contribution to health coverage in general.

Member registration using online services or mobile technology also makes it possible to reach larger target groups. Digital offerings often permit decentralised customer communication as well, which enables a quick response to unmet demand for necessary services. The improved transparency can help to prevent fraud too, ensuring that the services actually reach the people who need them. Above all, this fosters public trust in state institutions.

Telemedicine to bundle specialist expertise for fast responses

Another reason for bad health care, especially in rural regions and fragile contexts, is a lack of technical and social infrastructure (health units with the right equipment and qualified staff).

In both reducing this gap in provision and preventing errors in diagnosis and treatment, telemedicine plays a key role. Telemedicine covers all health care services in the fields of diagnostics, therapy and rehabilitation and clinical consultation, which can be provided at a spatial and temporal distance using telecommunications.

ICT can help to guarantee a significant improvement in patients' quality of life by providing better access to higher-quality care and information. This is especially important in fragile contexts as people in these areas are often far removed from any functional infrastructure. Increased communication between health experts also ensures that specialist expertise can be bundled more efficiently and effectively for fast diagnoses. This close interaction helps to build specialist capacity as well.

Artificial intelligence for precise and reliable diagnostics

To improve quality and efficiency, artificial intelligence (AI) can be used to support diagnostics. AI, in the form of self learning algorithmic systems, can search large quantities of health data to find patterns (anomalies, discrepancies or similarities) and thus help health care experts with diagnosis and clinical decision-making.

AI can also assist with the development of new drugs: for example, machine learning algorithms can use comprehensive health data to automatically find suitable subjects for clinical trials. This significantly speeds up the clinical trial process, which is essential for the development of new drugs. This means that the necessary drugs become available more quickly (while simultaneously ensuring that quality standards are maintained).

E-learning for sustainable capacity building

The approaches described above can only achieve their full inherent

potential if they are accompanied by qualified staff. However, structurally weak regions and countries suffer badly from "brain drain" which often exacerbates the poor care situation.

E-learning, meaning online training courses, contributes significantly to improving the skills of health care professionals and thus the quality of health care. Using video lectures and online e-learning platforms, health care staff can learn more about both the basics and the latest topics in their field.

The advantage of e-learning as an approach is that these courses are not only excellent value for money, they can also be used at any time and anywhere. This means that the training can often be completed alongside a job.

Data security and robustness of technical solutions

Above all, digital solutions offer huge advantages in terms of efficiency when it comes to processing large quantities of data. However, health-related data is usually personal and highly sensitive. Even basic details such as ethnicity, reproductive health, sexually-transmitted diseases, genetic illnesses and risk exposure to illnesses can be misused and lead to discrimination and reduced personal safety. This is why it requires particularly stringent precautions to prevent cyber attacks, data theft and data misuse of any kind.

Digital solutions often require some minimum local infrastructure standards: a stable power supply and reliable data transmission channels are as important here as local availability of specialists who can regularly maintain the technology and repair it quickly if required.

Outlook: huge potential (and challenges) for digital solutions in the health care sector

It is no coincidence that the health care sector has been a trailblazer of digital development in many developing countries: on the one hand, there is particularly high potential for the use of digital solutions to drive forward development in these countries, and on the other, there is enormous unmet demand. And every day there are new solutions, such as digitally tailored therapies to treat various illnesses.

However, the health care sector also requires particular precautions when it comes to using digital solutions, as it is a system-critical and highly sensitive field. Alongside solutions' technical robustness and the increased data protection and cyber security requirements, special attention must be paid to ensuring system compatibility: the solutions developed at different points in the health care system must be technically compatible with one another. This is the only way to achieve synergies by combining systems, and to ensure that it is possible to aggregate data on a national and sub-national level. This is most important when it comes to identifying pandemics and epidemics quickly and fighting them efficiently.

The health care systems in many partner countries are still relatively underdeveloped. Digital solutions can help to make these systems significantly more efficient and effective. In this context, it is essential to observe the Principles for Digital Development explained at the beginning. If these efficiency gains are used to improve health care for those sections of the population which (due to a lack of technology, low digital literacy or exorbitant charges for use) otherwise benefit less from digitalisation, the health care sector could even help to reduce the risk of digitalisation increasing social inequality. ■

Photos

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