



Industrialization

Doing More with Less

to Benefit Patients, Payers, and Staff

Automation, standardization, and the concept of lean:
Industrial approaches with potential to improve efficiency in healthcare

Executive summary

Healthcare systems in many countries suffer from considerable inefficiencies. Staff, financial resources, and assets are often not optimally utilized. This is to the detriment of patients, providers, and payers, as global trends such as demographic change and the increase in lifestyle diseases are driving healthcare costs up. In countries where inefficiencies are a problem, efficiency measures are required to ensure that the healthcare systems remain affordable, and are run effectively and sustainably.

Parallels with other service and technology sectors imply that a more systematic industrialization of healthcare operations would allow increases in efficiency without, for example, sacrificing quality of care or employee satisfaction.

Industrialization approaches offer great potential in the healthcare industry: Optimization methods such as lean management, standardization, and automation that have been tried and tested in other industries – could improve competitiveness and support patient well-being. Strategies that aim to achieve more with less make economic sense and play a valuable role in reducing the financial burden on healthcare systems.



Dr. Bernd Montag
Chief Executive Officer
Siemens Healthineers

“Healthcare is changing and the industry is working harder than ever to discover new ways of improving patients’ health. In times of change where it is all about improving outcomes and lowering costs, we understand the challenges you’re facing – and your need to continually improve clinical, operational, and financial efficiency. We look forward to partnering with you and working jointly on your business success.”

A handwritten signature in black ink that reads "B. Montag". The signature is written in a cursive, slightly stylized font.

Introduction

In historical terms, industrialization is described as the transition from an agricultural society to a modern production society. As a result, it introduces mass-production processes such as automation, the division of labor, and standardized processes. Economies of scale arise through high production volumes.

In a less literal sense, industrialization in the service sector refers to the standardization and automation of methods and processes in connection with goals such as greater efficiency, lower costs, and consistent quality of results. All of these aspects are also high on the agenda in healthcare. There is also considerable debate as to whether or not industrialization approaches represent interference in the ethical conduct of healthcare provision.

This white paper defines the industrialization of healthcare as the move away from a doctor-by-doctor model of care delivery and toward a more systemic, efficient, and effective model. The idea is to optimize processes and establish best practices as standard within an organizational unit and across organizations along the treatment chain. The goal should be to avoid mistakes, reduce complexity, and eliminate resource waste while treating patients as humans and leaving room for the personalization of care.

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1. Reasons to read:

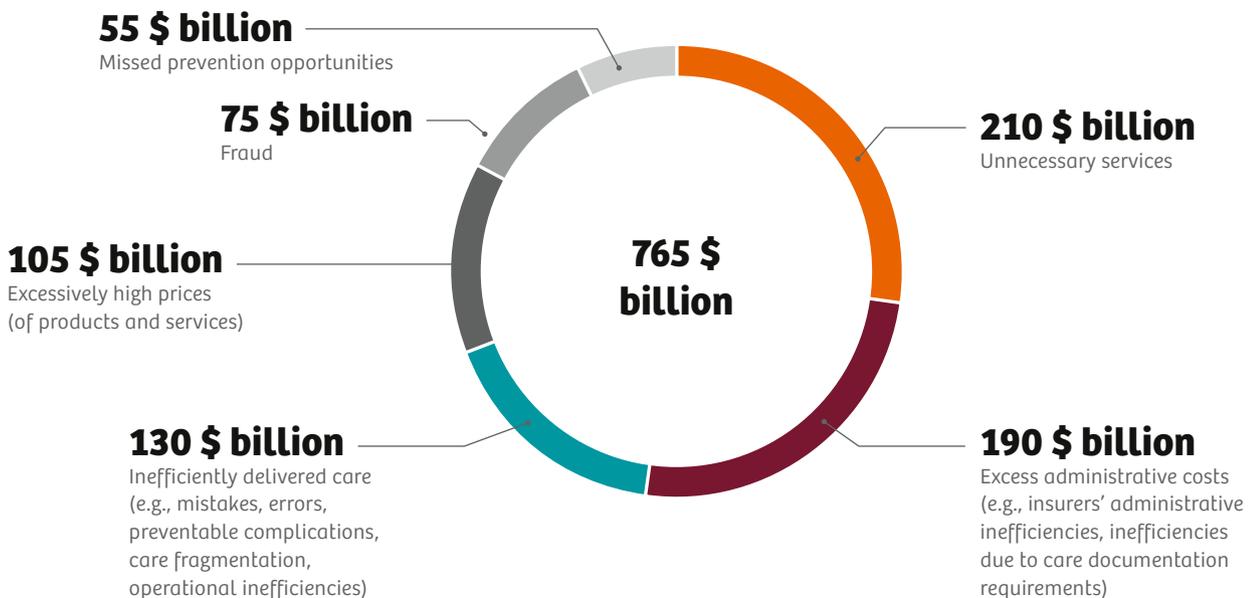
Why we need to talk about industrialization

Inefficiencies in healthcare systems call for increasing use of industrialization concepts.

A vast warehouse in Portland, Maine, USA, has 15,000 square feet (nearly 1,400 square meters) of storage and is packed to the ceiling with medical equipment that has been discarded by U.S. hospitals. Most of these products have not been used and are not damaged or past their expiration date. The equipment simply isn't needed anymore. To ensure that it does not end up in landfill, the non-profit organization Partners of World Health (PWH) distributes it to doctors and hospitals in crisis-stricken and developing countries¹. PWH estimates that U.S. hospitals discard around six million tons of unused medical supplies and equipment every year.²

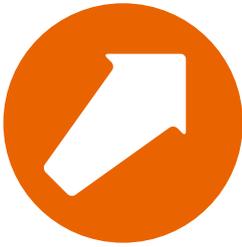
Although this waste of resources is partly due to strict security laws and regulations, activities like those of PWH and similar organizations³ in the U.S. and Europe highlight inefficiencies that are typical of healthcare systems in many countries. In addition to medical equipment, staff and capital are also often not optimally utilized.

Excess costs in the U.S.: Sources of waste in healthcare⁴



Source: National Academy of Medicine (formerly Institute of Medicine)

Looking at the U.S., avoidable expenses add up to \$765 billion per year. In the year under review (2009), this corresponded to more than 30 percent of total health spending and could have paid for the insurance coverage of 150 million American workers. According to the National Academy of Medicine, inefficiently delivered care and excessively high prices are among the major items in this calculation.⁴

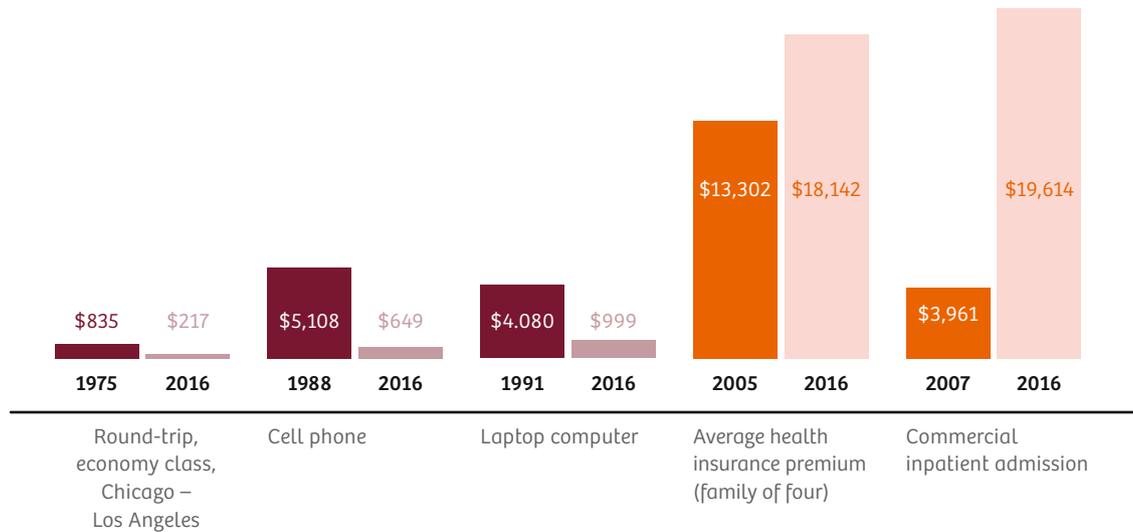


30% of U.S. healthcare spending could be saved annually if healthcare was organized and delivered more efficiently.⁴

The United States is not alone in struggling with increasing healthcare spending.⁵ In many other countries, economic growth over the next few years is unlikely to be sufficient to keep healthcare financeable in the long run.⁶ For example, the consultancy firm Deloitte estimates that emerging economies such as China and India will have high expenditure growth of 7.5 percent per year through 2020. In the Australasia region, growth in healthcare spending is also above average at five percent. Demographic change, the growing burden from chronic diseases, and rapid scientific progress are among the drivers of increasing cost pressure.⁶

Measures to boost productivity in the healthcare sector can thus help give as many people as possible affordable access to adequate healthcare. Many countries need to take action because of issues such as a lack of transparency in prices and services, or infrastructure problems that are making it increasingly difficult for public healthcare systems to sustain current levels of service and affordability.⁷

Higher productivity leads to lower prices⁷



Source: McKinsey, 2016

Comparisons with other high-tech and service industries show that many companies have already succeeded in increasing productivity by adopting industrial approaches such as supply-chain-thinking, holistic workflow management, and consistent automation. At the same time, they have significantly reduced prices while maintaining or even improving quality. According to McKinsey, similar advances are possible in the healthcare sector as well.⁷

Not taking advantage of these opportunities would be economically unwise and socially irresponsible: “It is unconscionable that we’re not only wasting money in healthcare, but that in doing so we are sacrificing other important social needs,” says Dr. Mark D. Smith of the National Academy of Medicine.¹ While efficient management of resources is ethically imperative in industrialized countries – for reasons of sustainability and to relieve the financial burden on healthcare systems – it is even more important in emerging economies and developing countries, where many people have no or inadequate access to health services.

“It is unconscionable that we’re not only wasting money in healthcare, but that in doing so we are sacrificing other important social needs.”¹

Mark D. Smith, MD,
National Academy of Medicine, United States

2. Evidence & strategy:

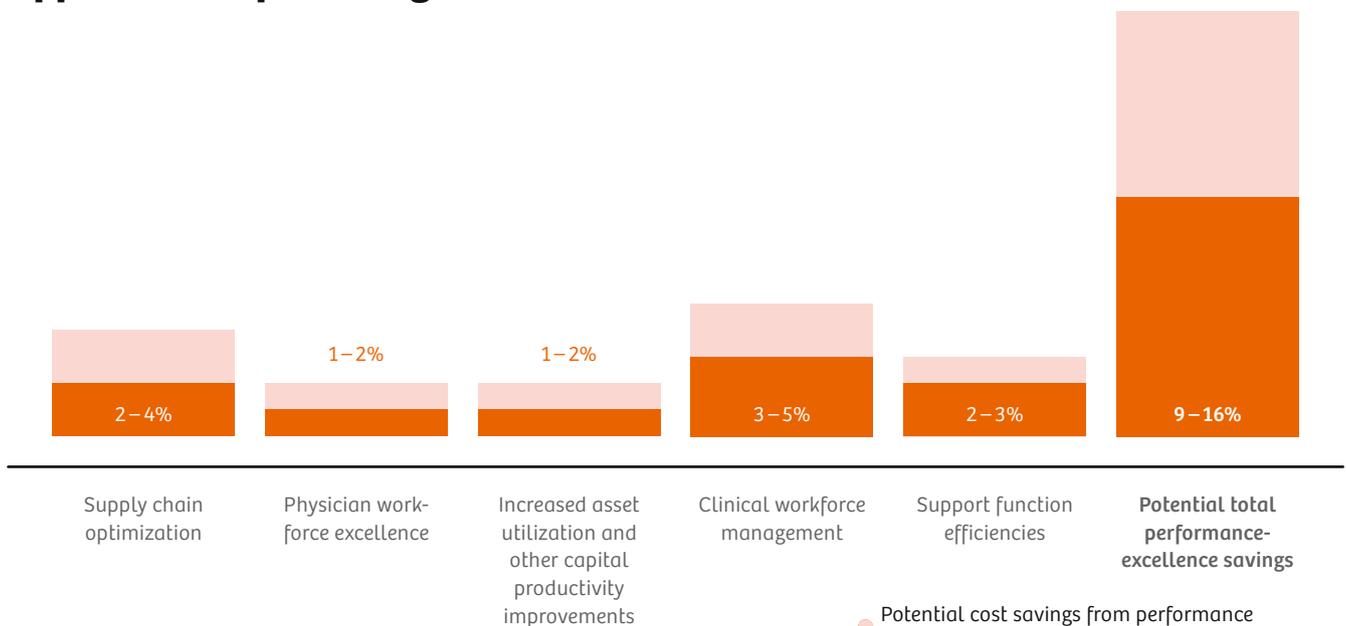
How healthcare providers are using industrial approaches

Modern methods of production organizations are increasingly being employed in the healthcare sector.

Although patients are obviously not cars, and doctors and nurses are not production resources, similarities between industrial production and treatment processes do exist and can be used to identify opportunities for optimization. Healthcare delivery in many organizations is actually more or less in the process of industrializing already, in that the organization of work is undergoing changes which mirror those that began in other industries a century ago. Today, typical characteristics of industrialization – such as a high division of labor, standardization of roles and tasks, and the rise of a managerial superstructure – are found in hospitals.⁸ Much like a factory, a hospital also has suppliers (instructing doctors) and downstream stages (inpatient and outpatient rehab, outpatient aftercare, nursing homes).

In some cases, this leads to similar problems, such as the lack of an overview of the complete production process (end-to-end view) or patient journey.⁹ Thus, much like in the manufacturing industry, consultants see starting points for increasing efficiency in areas such as staff deployment, the supply chain, and the utilization of capital-intensive assets.⁷

Possible productivity growth for healthcare providers: Opportunities for savings⁷



Source: McKinsey, 2016

The concept of lean: Hospitals learning from other industries

The core philosophy of lean is to continually improve a process by removing steps that do not add value and are therefore waste. This is backed up by the observation that wasteful steps typically outnumber the value-adding steps by a factor of 9:1.⁹

Lean has been on the rise in the healthcare sector worldwide since the early 2000s. The Royal Bolton NHS Foundation Trust launched one of the first projects in the U.K. in 2005 to improve patient care by “reducing wasteful processes in the system (e.g., duplication, errors and work-round solutions) in order to provide safe and high quality services,” says the then-Chief Executive David Fillingham. Since its inception, the process improvement programme has resulted in major improvements for the Trust including reduced mortality rates and shorter stays for patients.¹⁰

Canada has also reported successes using lean concepts. In the province of Quebec, for instance, a lean approach across the entire hospital system cut annual growth in healthcare costs by 0.7 percent. The approach focuses on eliminating practices that are ineffective or wasteful, allowing decision-making by those who are “closest to the action,” and promoting coordinated teamwork among health professionals to eliminate unnecessary referrals and improve patient outcomes. This allowed Quebec’s health system to become the lowest-cost provincial health system in Canada.¹¹

In the U.S., the Virginia Mason Medical Center in Seattle is a lean pioneer. In 2002, the hospital introduced a management method based on lean. As with the Japanese model, the Virginia Mason Production System (VPMS) is based on continuous process optimization (kaizen). The hospital reported impressive results within the first few years:

- Saved \$11 million in planned capital investment by using space more efficiently, and freed up an estimated 25,000 square feet by using better designs
- Reduced the time it takes to report lab test results to the patient by more than 85 percent
- Reduced supply costs by \$2 million through inventory reduction
- Standardization efforts and contract renegotiations continue to save more than \$2 million per year in such areas as orthopedic implant standardization
- Reduced nurse walking distance in the hospital by 750 miles per day, freeing up more than 250 hours of time spent walking for direct patient care
- Reduced labor expense in overtime and temporary labor by \$500,000 in just one year
- Reduced premiums for professional liability insurance by 76 percent since 2004

Virginia Mason’s in-house institute now trains hospital managers from all over the world in lean management.

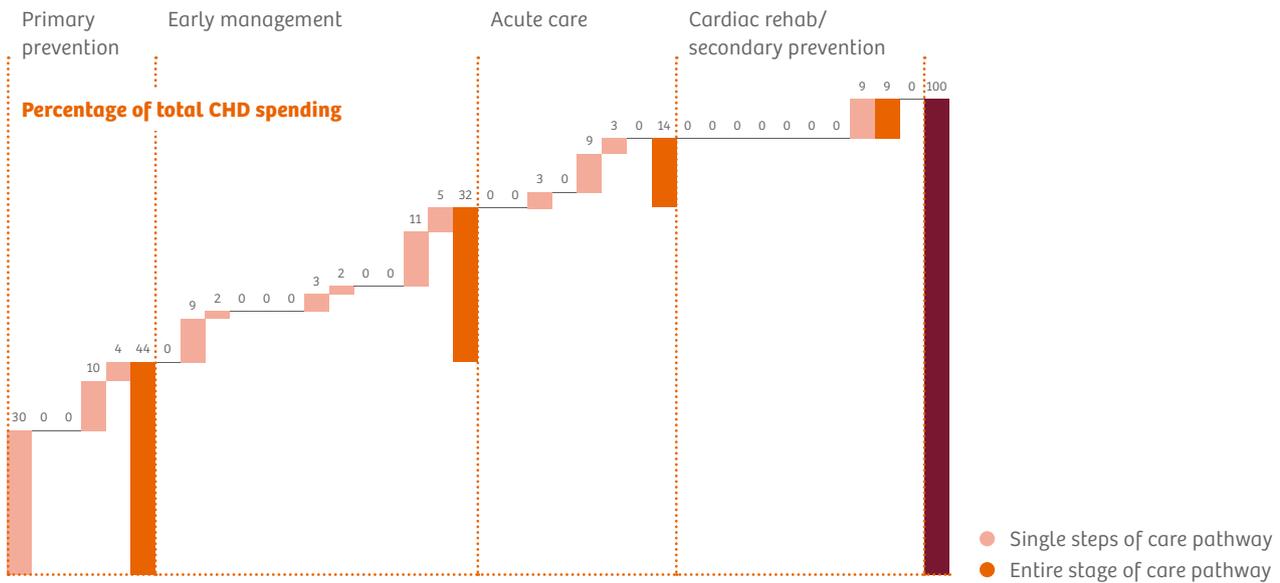
Strategic challenge: Initiators of lean projects report that changing the culture of organizations is difficult and requires time, commitment, and courage – especially from management. In addition, people often fear that new industrial and working methods are designed to reduce staff and that patients will suffer as a result. However, successful real-life examples show that staff and patients benefit from improved processes.

Standardization of care: Clinical pathways on the rise

Successful industrial production would be inconceivable without standards. Standards facilitate collaboration with upstream and downstream stages, guarantee consistent quality, and simplify decision-making.

This is why many protagonists in the healthcare sector advocate standardizing care. As the Institute of Medicine (now the National Academy of Medicine) noted in its “Best Care at Lower Cost” report just a few years ago, “if airline travel were like healthcare, each pilot would be free to design his or her own preflight safety check, or not to perform one at all.”⁴ Clinical pathways (also known as care or critical pathways) are seen as a promising solution. They enable health systems and other healthcare organizations to make evidence-based decisions about where to focus improvement efforts.¹³

A cost waterfall based on a care pathway (here: coronary heart disease) helps clarify where money is being spent¹³



McKinsey took a closer look at how the use of care pathways improves health systems overall. By drawing a typical care pathway for the indication of coronary heart disease (CHD), the health system can make use of the level of granular detail to determine whether some of its spending should be reallocated. In this example, the system’s total spending on its CHD pathway was roughly equivalent (in purchasing-power parity) to US \$84 per person. Of this total, about \$37 was allocated to primary prevention; \$27, to early management; \$12, to acute care; and \$8, to rehabilitation and secondary prevention.⁷

Even though motivated and initiated by legal regulations, the Enhanced Recovery Program (ERP) in the U.K.'s NHS is a good example of successful standardization. Its goal is to speed up the recovery and release of patients after elective surgery such as hip and knee replacements, major colorectal surgery, and cancer surgery. The program is based on a care pathway consisting of standardized elements before, during, and after surgery. They include preoperative therapy classes, standardized surgical and anesthetic protocols, and postoperative pain treatment. In its first four years, ERP saved close to 170,000 bed days – despite an increasing number of operations.¹⁴

Not only can a systematic use of reliable and proven standards improve the efficiency of healthcare providers, it can also enhance patient safety. In a study involving cancer patients at Xi'an General Hospital in China, a specific clinical pathway was designed to standardize the treatment of hepatectomy (removal of the liver) for patients with HCC (liver cell carcinoma). In all fields of postoperative outcomes – total complications, mortality, and readmissions – the results were clearly in favor of patients who were treated according to the clinical pathway as opposed to those who were not.¹⁵

Since quality standards have discernible benefits, they are becoming increasingly popular, and healthcare providers are publicizing them more. Over 800 hospitals worldwide have received accreditation for patient-centered care and healthcare organization management according to the standards of the Joint Commission International (JCI). These standards are designed to offer quantifiable benchmarks for quality and patient safety, to enhance efficiency, and to reduce costs through standardized care. Several studies show that JCI-accredited hospitals achieve above-average performance over the long term.¹⁶ A pilot study in Spain, for instance, demonstrated that over four years of accreditation, one JCI-accredited hospital achieved almost €11.5 million in annual savings thanks to shorter hospital stays, reduced incidence of Caesarean sections, and fewer readmissions.¹⁷

Strategic challenge: Standards can significantly improve profitability and patient outcomes. For this, existing processes must be reliably recorded, analyzed, and regularly reviewed. Transparency and attention to detail are key to identifying critical steps and possible levers for improvements.

Automation: Efficiency gains through IT

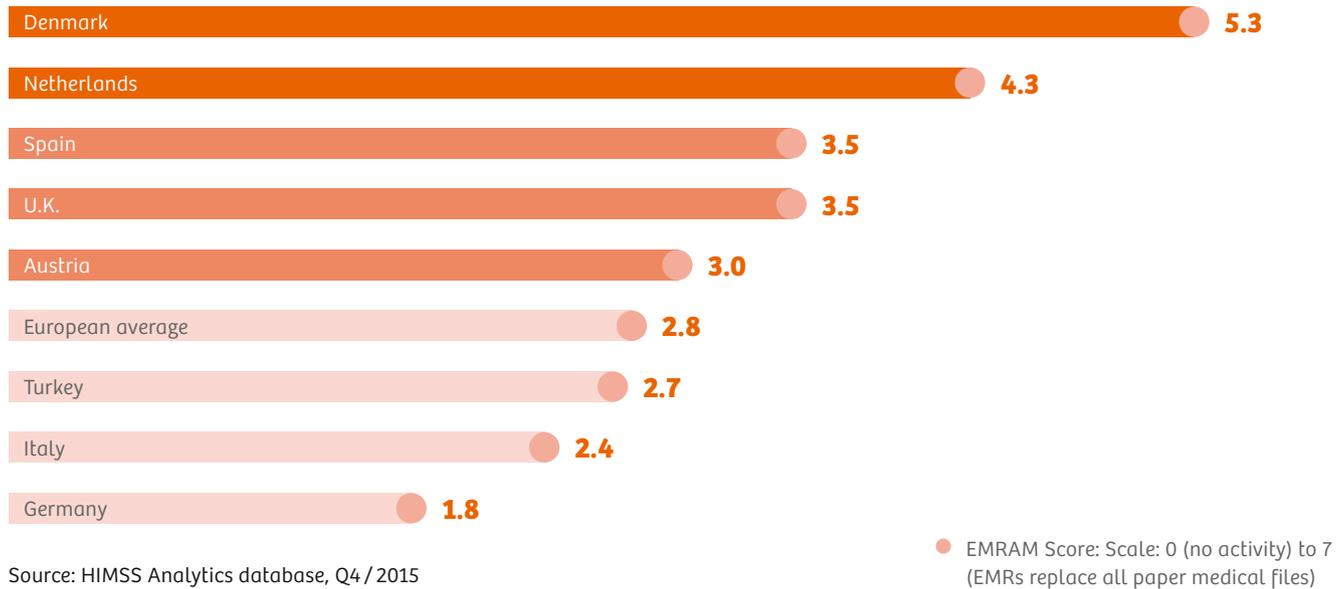
In almost all industries, measures to improve processes now involve the use of modern IT. The healthcare sector still has a lot of catching up to do here.

In the area of invoicing alone, IT can often significantly reduce costs. In the U.S., for example, more than three billion transactions between health plans and providers are still conducted manually every year. On average, a manual transaction costs approximately \$3 more than an electronic transaction. Transitioning from manual to electronic processes could save medical health plans and providers an estimated \$9.4 billion in direct costs each year (CAQH Index 2016).¹⁸ Around the world, great expectations are also placed on the introduction and systematic development of electronic medical records (EMRs). In a comparison of European countries, the eight-stage Electronic Medical Record Adoption Model (EMRAM; Stage 0 = no activity, Stage 7 = EMRs completely replace all paper medical files) shows that digitally savvy Denmark has already made great progress on the path to achieving paperless hospitals.¹⁹



\$9.4 billion: Commercial medical health plans and providers in the U.S. could save this amount per year by switching from manual to electronic processes.

Digitalization of patient files in Europe

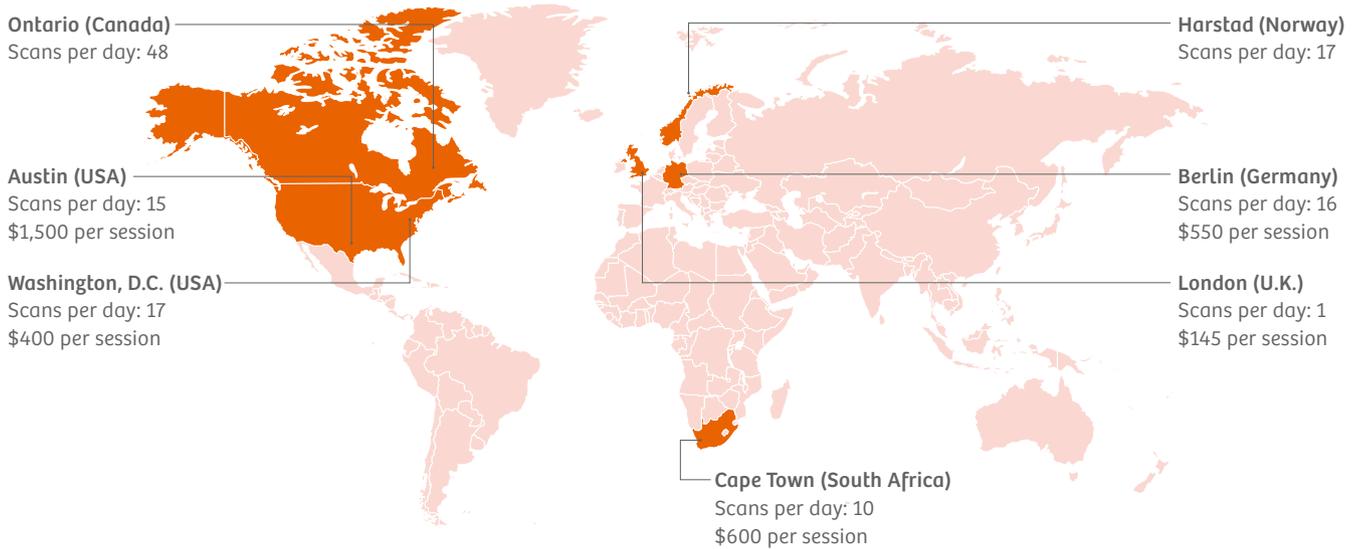


Although the framework conditions for switching to EMRs vary worldwide, case studies from different countries show that systematic implementation can provide a significant return on investment.

For example, Marina Salud de Denia Hospital in Spain is one of the few hospitals in Europe with EMRAM Stage 7 status (it has held this since 2012). All nurses and physicians at Marina Salud record their clinical notes online. Likewise, the medical imaging department makes all images available online across the hospital network. Physicians enter orders electronically using an intelligent clinical decision support system. In addition, a clinical and business intelligence program allows staff to analyze care quality and efficiency. The most impressive results include a ten-percent reduction in the average length of stay and a nearly 90-percent increase in occupancy. This resulted in calculated savings of \$11 million. Moreover, the hospital calculated an estimated \$240,000 in savings attributed to increasing operating room (OR) occupancy from approximately 60 to 70 percent – nicely showing how improved asset utilization positively influences the bottom line.²⁰

Much like using equipment in a modern production facility, making optimal use of ORs and the plethora of sophisticated medical equipment in a modern hospital is a complex management task. Magnetic resonance imaging (MRI), for example, has become an irreplaceable diagnostic tool for many diseases. Yet data from PwC show that MRI usage rates vary widely. While the reasons for underutilization of medical equipment are rooted in multiple factors, the results can affect patient throughput, waiting times, and return on investment. This is where digital fleet management portals can help. By closely monitoring medical equipment, they help identify workflow problems, facilitate maintenance, and plan investments, and can thus reduce the inefficient underutilization of expensive equipment.

Utilization and cost of MRI systems: An international comparison²¹



Source: PwC Health Research Institute

The example of Ruijin Hospital in Shanghai China, shows how digital fleet monitoring can improve efficiency in everyday routines. The university hospital comprises 1,700 beds and has around 10,000 outpatients per day. It has seven CT scanners and five MRI scanners, and each one performs an average of 150 (CT) and 80 (MRI) exams every day. If one of the systems fails even briefly, it slows down workflows throughout the entire hospital, forcing patients to wait longer and employees to work overtime. The hospital introduced a digital service management portal in 2014. It delivers 24/7, near-real-time information on performance metrics and equipment status for all of the hospital’s imaging systems. It also keeps track of maintenance schedules and repair histories. Service technicians are automatically notified of the tools and spare parts required so that they can bring them along. In this respect, the hospital no longer differs from an ultra-modern industrial production facility. The priority is to reduce equipment downtimes. Methods include predictive maintenance, whereby repair and maintenance work is not carried out according to a fixed calendar cycle, but is scheduled according to actual need in a cost-efficient, productivity-enhancing, and forward-looking way.

Strategic challenge: Digital opportunities in healthcare are attracting new and serious competition. As payers and providers rethink their business models, improving productivity drastically and quickly must be uppermost in their minds. The first incumbents that can do this will gain a significant competitive advantage. Thus, radical new ideas should be strongly considered – minor tweaks will not be sufficient in a world where an Amazon- or Walmart-like attacker could materialize.⁷

Key takeaways

1. Healthcare systems worldwide suffer from considerable inefficiencies

Staff, financial resources, and assets such as operating rooms and large-scale medical equipment are often not optimally utilized – all to the detriment of patients, providers, and payers.

2. Other industries offer best practices on how to improve efficiencies

Indicators from other industries suggest that a more systematic industrialization of healthcare operations would enable efficiency gains. Possible starting points include improved staff deployment, supply-chain-thinking, and the thoughtful utilization of capital-intensive assets.

3. Systematic methods such as lean are becoming established in healthcare

The concept of lean – to continually improve a process by removing steps that do not add value and are therefore waste – is already well implemented in other industries. Gradually, it is finding its way into healthcare; examples of successful real-life implementation show that employees and patients often benefit from the process optimizations achieved.

4. Standards can significantly improve profitability and patient outcomes

Clinical pathways are seen as a promising way to standardize quality of care. If implemented correctly and adhered to in daily routine, they could positively influence the quality of care. Reliable and proven standards not only improve the efficiency of healthcare providers but also enhance patient safety.

5. Automated processes and modern IT help to reduce costs and increase efficiency

In terms of automation and IT, the healthcare sector still has a lot of catching up to do. In many cases, healthcare providers and health plans should introduce and make more systematic use of concepts such as electronic billing and documentation, as well as paperless patient files.

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