

Optimization of and the Use of IT for Healthcare Processes

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Healthcare processes (e.g. patient pathways) are often very complex and can involve various parties within an organization or between organizations such as hospitals and other caregivers, as well as the patients. Implementing efficient processes aims at providing faster, safer and more effective care, necessitating organizing and sharing information among all participants involved in patient care. While the need for well-defined healthcare processes is clear, there are many obstacles and opportunities for research, including technical, behavioral, and organizational topics.

Information technology (IT) has played an important role in enhancing productivity through coordination in many industries, such as manufacturing and services. Nowhere is this role more critical than in healthcare, where IT has the potential to improve patient health and, in many cases, save lives, through improved coordination between various parties such as hospitals, providers, and patients. However, use of IT in healthcare presents some unique challenges and issues.

This minitrack focuses on the analysis, design and optimization of healthcare processes, the use of IT to support and improve those processes as well as non-IT assets such as process changes, innovative IT artefacts, and interoperability standards.

The minitrack consists of 6 papers that show the variety of potential applications and research questions around healthcare processes. It also provides different perspectives on the role of information technology in improving healthcare processes and enabling healthcare coordination, as well as identifies some challenges. In addition, the papers 1 to 3 apply operations research (OR) in different contexts and show the usability of OR for healthcare related problems.

The first paper “Optimal Dispatch of Volunteers to Out-of-hospital Cardiac Arrest Patients” proposes a mathematical model to optimally select how many and which volunteers to send to a patient in case of a cardiac arrest. It also decides who should pick up and deliver an AED. Compared to simple decision rules currently used in practice, the results show that the model increases the patients’ survival probability.

The second paper “Centralising the Admission Process in a German Hospital” presents an approach based on analytics and OR for determining staffing levels for nurses who administer the admission process. A simulation is used to study the utilization. The hospital that is considered in the paper targets a fully digitalized admission process in the future.

Paper 3 “An Integrated Decision Making Framework for Medical Audit Sampling” presents an integrated decision making framework for medical audit sampling. The proposed optimization model targets the trade-offs between recovery and cost while having valid overpayment amount estimates. For testing the framework, the authors use U.S. Medicare Part B claims payment data with a number of resource allocation designs.

The authors of paper 4 “The Role of Mediators in Transforming and Translating Information Quality: A Case of Quality Assurance in a Norwegian Hospital Trust” have conducted a qualitative case study of quality assurance in a Norwegian healthcare organization. They illustrate how information quality mediators can distort or create shared understanding of quality assurance information. The aim is to get a better understanding of how roles influence information quality in healthcare.

Paper 5 “The digital transformation of physician–patient consultations: Identifying problems and approaches to improve adherence” targets the communication between physicians and patients. Based on interviews with physicians, therapists, and patients, they define a problem scenario that contains the discovered problems of current consultation practices. They discuss potential information technology solutions, such as digital medical assistants.

In the last paper “Usage and Acceptance of Drone Technology in Healthcare – Exploring Patients and Physicians Perspective” the authors investigate use cases for drones in Swiss healthcare. They present a systematic review for defining use cases which are then rated by employees and patients of hospitals in the German speaking part of Switzerland. The results are analyzed for different groups (e.g. hospital types).