

Decision Support for Healthcare Processes and Services

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While the COVID pandemic has increased the pressure on healthcare systems worldwide, it has also proven the importance of decision support for healthcare processes and services based on optimization, simulation and information technology research. In many countries, a shortage of staff and intensive care beds on the one hand and unclear predictions about future demand has led to critical situations and high challenges for everyone involved. Many surgeries, treatments and screening were cancelled or postponed, leading to an extensive backlog that healthcare services providers now need to deal with. This also opens up many new research questions for OR/OM and IS researchers.

The pandemic has emphasized the need for integrated planning with a system's perspective, for interdisciplinary approaches bringing knowledge from different areas together and for a strong collaboration between research and practice. While in some countries scientists have been successfully present in the media and advised decision makers, especially OR/OM researchers have to better promote their methods and demonstrate the benefit of applying them for decision making in practice.

Healthcare processes (e.g. patient pathways) and services 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. The design of services is often different from traditional service design - as for many healthcare services patients receive care, but insurance companies pay for it. Implementing processes in this domain should result in 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.

Operational Research approaches including mathematical programming and simulation modelling can help address and solve logistical challenges in designing and managing healthcare processes and services. While mathematical programming can give the

optimal locations of ambulances or shift schedules for hospital doctors, simulation approaches are a crucial tool to analyze different scenarios and model complex settings like emergency departments or operating rooms.

Decision support systems play a crucial role in healthcare, not only in the form of clinical decision support systems to assist physicians and other health professionals with medical decision making, but also to support logistical and organizational processes.

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

In its fourth year (with slight changes in title and minitrack chairs), the minitrack received 22 high quality submissions of which we were able to accept nine papers. These show the variety of potential applications and research questions around decision support for healthcare processes and services, providing different perspectives on the role of optimization, simulation and information technology. Covered topics include appointment scheduling, machine learning, discrete-event and Monte-Carlo simulation, fraud detection, patient length of stay, visitor admission, healthcare access, patient information leaflets, mental health, intensive care as well as visual analytics. The minitrack comprises the following nine papers:

1. *Extended Length of Hospital Stay for Surgical and Medical Patients – Insights from Hospital and Psychosocial Predictors* (Chinedu Ossai, Nilmini Wickramasinghe)
2. *Intra-day Dynamic Rescheduling under Patient No-shows* (Aditya Shetty, Harry Groenevelt, Vera Tilson)
3. *Managing hospital visitor admission during Covid-19: A discrete-event simulation by the data of a German University Hospital* (Christina Bartenschlager, Ramona Frey, Marie Freitag, Johanna-Maria Classen, Helmut Messmann, Jens O. Brunner, Selin Temizel, Christoph Römmele)

4. *On Intelligence Augmentation and Visual Analytics to Enhance Clinical Decision Support Systems* (Tsipi Heart, Rema Padman, Ofir Ben-Assuli, David Gefen, Robert Klempfner)
5. *Processing Patient Information Leaflets with Embeddings* (Sven Stahlmann, Stefan Hirschmeier, Detlef Schoder)
6. *Modelling the Accessibility of Adult Psychology Services Using Discrete Event Simulation* (Matthew Howells, Liz Andrew, Daniel Gartner)
7. *Towards a Model for Inclusive Healthcare Access post COVID-19* (Paras Bhatt, Oluwafemi Akanfe, Yuanxiong Guo, Yanmin Gong)
8. *Show Me Your Claims and I'll Tell You Your Offenses: Machine Learning-Based Decision Support for Fraud Detection on Medical Claim Data* (Tizian Matschak, Christoph Prinz, Florian Rampold, Simon Trang)
9. *Monte-Carlo Simulation Based on Patient-Individual Distributions for Supporting Intensive Care Occupancy Management* (Arne Witteborg, Rainer Borgstedt, Markus Günther, Gerrit Jansen, Michael Römer)

Due to the number of high quality submissions and the fact that the topic has gained even more interest during the pandemic, we aim to organize the minitrack again next year and we really hope to be able to organize the session in person then again in beautiful Hawaii.