

## Applying Digital Technologies and AI in Virtual Hospitals: Exploring Global Innovative Models

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Health systems globally are experiencing challenges reaching crises levels. Manifestations of these crises that compromise standards of care include difficulties in accommodating patients visiting emergency departments or needing admissions to hospitals, or overcrowding of acute care facilities with a lack of beds to accommodate demands in hospital admissions. As a result, patients experience prolonged emergency department (ED) waits to access urgent care, and many patients who are admitted are boarded in the ED due to a lack of bed spaces to treat patients. These challenges result in poor patient experiences, unexpected deteriorations or even mortality in the ED waiting rooms, compromised care of admitted patients, overall health system dissatisfactions, and health professional burn-out.

Innovative solutions using health technologies and data sciences offer opportunities to address ED and hospital overcrowding through virtual hospital models. With opportunities of virtual ED to triage patients, virtual beds to treat patients in their own homes through virtual care, and post-admission discharge using remote patient monitoring to support convalescence, virtual hospitals can deliver safe and cost-effective care to reduce unnecessary ED visits, reduce hospitalization and treat acutely ill patients in the comfort of their own homes. Virtual care, remote patient monitoring, remote medications dispensing and administration, and artificial intelligence for decision support for health professionals and patients are core technologies to enable virtual hospital operationalization.

This track is to showcase different virtual hospital models being implemented in various health systems in different countries, exploring their designs, implementation, evaluation, strengths, and issues needing calibration or attention. We endeavour to

understand why and how virtual hospitals function in these contexts, common success factors, and also contextual variations and differences to promote knowledge exchange and establish good practices of virtual hospitals through this global exchange.

This minitrack aims to explore multidisciplinary approaches for digital technologies and AI in virtual hospitals. It will consider both research in progress and completed working papers in the related topics. This mini-track is associated with EPSRC Future Blood Testing for Inclusive Monitoring and Personalised Analytics Network+ (EP/W000652/1). The following papers were selected for presentation at the conference:

- Enhancing Early Warning Systems: Predicting Next Vital Signs Using Recurrent Neural Networks and Attention Models by Basra Jehangir and Weizi Li
- Remote Management of Atrial Fibrillation from a Virtual Ward by Saif-Ur-Rehman Kazi, Joseph Nunan, Rob Williams, Jon Swinburn, Andrew P Walden

This is a new mini-track in the HICSS conference and the selected paper offer an exploration into different topics at the intersection of digital technologies and AI in virtual hospitals. Key discussions and application areas are around patient deterioration prediction and remote management. This includes real-world case studies of using time-series machine learning that leverage vital signs and associated multimodal electronic patient records to identify if patient would be safe to be triaged to virtual ward, and real-world case study of managing atrial fibrillation remotely from a virtual ward.