

1 THE RIGOUR OF QUALITY IMPROVEMENT WORK – WHY IT MATTERS, AND WHAT IT LOOKS LIKE

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Introduction Quality improvement has failed to live up to its promise. In theory, the application of a method to solve complex quality issues holds face validity. In practice however, much of what is termed quality improvement hasn't demonstrated the results that we would expect to see.

We propose the fundamental aspect of rigour as being critical to the efficacy of quality improvement. Rigour incorporates both design and evaluation – this session will describe the current landscape of QI, and outline how we can ensure effective design and evaluation in our own quality improvement work, to give it the best chance of success. As with any science, the reliability and validity of the knowledge and learning gained from the method of quality improvement are related to the rigour with which we apply it.

We will discuss the main flaws in the design of quality improvement, and propose how we can rectify this through disciplined application of the core components of improvement: Aim, theory of change, execution theory, measurement and communication. We will also dive into the best approach to evaluation, to ensure that we maximise learning and adaptation during the quality improvement process.

Methods This session will summarise the findings from the literature on the effectiveness of quality improvement, identifying the key factors that relate to success or failure of improvement work to achieve the proposed aim.

We will return back to the fundamental concepts that underpin quality improvement, and draw out the essential element of rigour. We will describe what constitutes rigour in quality improvement, and how we can all strengthen the rigour of our own quality improvement work. We will utilise the five core components of improvement design in order to structure our thinking about rigour.

We will also look at the topic of evaluation, and identify how we can best introduce simple and effective mechanisms to evaluate our quality improvement work in order to learn and adapt through the project, and continually improve our application of the method.

We propose a simple framework to assess the rigour of our quality improvement work, and to ensure that future quality improvement work applies the core components of design, and a structured approach to evaluation, in order to improve the rigour of the scientific method.

Results

REFERENCES

2 IS INFLUENZ-ER PROGRAM FEASIBLE AND SAFE? ASSESSMENT OF HOSPITAL STAFF ACCEPTABILITY AND UTILISATION OF A TELEMEDICINE-SUPPORTED EARLY DISCHARGE PROGRAM

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Introduction Timely healthcare is at core of patient safety. However, it is challenged by low hospital workforce capacity coinciding with an increasing demand for healthcare

utilization. Re-organization of healthcare services including home-based programs (eg. Hospital-at-Home, Virtual Wards) are proposed as a solution.¹ Remote monitoring via telemedicine is proposed to save travel time for both patients and hospital staff and smart alerts can support timely management. The stakeholder attitude towards virtual healthcare and their utilization of telemedicine is essential to assess as it is the key to successful outcomes for patients.

Influenz-er is a telemedicine-supported early discharge program proposed as an acceptable and safe alternative to a standard hospitalization of patients at the Department of Pulmonary and Infectious Diseases (DPID) at the North Zealand University Hospital, Denmark. Patients enrolled in the program are transferred from hospital to their home to be monitored remotely by hospital staff. A telemedicine platform facilitates health data transfer and alert hospital staff in case of sign of clinical deterioration to support timely management. Thus, the program aims to provide hospital-level safety and quality for patients in their homes.

Methods We are currently investigating the feasibility of program Influenz-er in terms of patient safety, patient and hospital staff acceptance, and implementation at hospital-department level prior to a full-scale effectiveness trial. One of the research questions is whether Influenz-er program is perceived as acceptable, appropriate, and feasible by hospital staff and whether hospital staff can provide timely care for patients who are monitored remotely from home. Both qualitative and quantitative data were collected.

We applied RE-AIM framework^{2,3} as recommended by the World Health Organization⁴ to perform a process evaluation of Influenz-er program as a part of a feasibility study with 19 patients. We focused on the RE-AIM dimensions *adoption* and *implementation*. We collected data on the proportion of the DPID staff trained within the Influenz-er program. Short staff survey was performed to assess the initial level of acceptance, perceived appropriateness, and feasibility of the program. The implementation fidelity is currently assessed via analysis of quantitative process data from the telemedicine platform (eg., time to registered action upon an incoming alert) together with qualitative field data collected during observations of how DPID staff delivered the program. Also, data on incidence of adverse events were collected.

Results Preliminary results show high level of initial adoption and acceptance among DPID staff and no severe adverse events for patients (n=19) enrolled to the program. Interestingly, the quantitative process data imply somewhat low fidelity to timely registration of clinical actions, however the observations of DPID staff reveal safe clinical actions according to the protocol. Thus, the low fidelity numbers probably mirror a bad choice of the quantitative fidelity measure and a current challenge with low workforce capacity and therefore low prioritization of non-clinical administrative tasks such as timely registration on the telemedicine platform for research purposes.

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3 THE ECONOMICS OF USING ARTIFICIAL INTELLIGENCE TO IMPROVE PATIENT SAFETY: POTENTIAL AND IMPLICATIONS FOR WORKFORCE

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Introduction Artificial intelligence (AI) is moving into the hospital with prospects of improving patient safety and freeing up staff time. To inform an economic analysis of an AI-assisted continuous vital signs monitoring (VSM) system known as WARD (Wireless Assessment of Respiratory and circulatory Distress) we reviewed the literature and analysed data from the Danish national patient registry.

We derive key points for researchers undertaking analyses of AI-assisted VSM and we quantify the potential of AI in shortening hospital admissions and preventing readmissions.

The project is funded by Innovation Fund Denmark and is joint work by VIVE, DacHE, and the WARD project group.

Artificial intelligence (AI) is increasingly being applied to technologies within healthcare and one example is the integration of AI in continuous VSM. AI-assisted continuous VSM can potentially reduce adverse events in hospitalized patients, shorten the treatment process and allows for new workflows potentially freeing (human) resources.

However, the impact of AI-assisted continuous VSM on clinical and economic outcomes, including length of stay and impact on workload, is currently understudied but needed, to demonstrate if and how such technologies can improve general patient safety and current workflows.

Methods We conducted a systematic literature search to identify studies of AI-assisted continuous VSM that assessed the impact on economic outcomes, including nonmonetary outcomes such as resource use, impact on workload, length of stay and transfers to intensive care unit.

Using Danish national registries we used coarsened exact matching to analyse the difference in length of stay between patients exposed to an adverse event during admission and comparable patients unexposed to such events. This analysis can quantify the magnitude of adverse events that could potentially be reduced by AI-assisted continuous VSM. Relevant adverse events were defined according to a pre-specified manual currently used in Danish clinical studies of AI-assisted VSM.

Using the same registries, we examined the magnitude of short-term acute admission after discharge, hence demonstrating the potential of home monitoring of patients discharged from hospital. Relevant patient groups for the analysis were identified in collaborations with clinicians from the WARD Home project, an ongoing Danish research project on AI-assisted home monitoring.

Results A comprehensive systematic literature search emphasised an evidence gap as to the impact of AI-assisted continuous VSM on important outcomes, such as length of stay and resource use.

The matched analysis revealed a 2.4 days difference in length of stay between hospitalised patients exposed and

unexposed to an adverse event, respectively. This gap could potentially be reduced by replacing current manual monitoring procedures with AI-assisted continuous monitoring.

AI-assisted continuous VSM may improve patient safety and free up resources by reducing the gap in length of stay between patients exposed and unexposed to an adverse event. Moreover, it may avoid short-term readmissions if the monitoring is performed in the patient's own home in the first days after discharge. More research still needs to be done to demonstrate that AI-assisted continuous VSM can and will meet the high expectations put on it.

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4 CREATING NEW WAYS OF WORKING WITH PATIENT TRANSFER: THE PATIENT TRANSFER AND REHABILITATION (PTR) ROBOT SUPPORTING CAREGIVERS AND PATIENTS

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Introduction Hospitals spend numerous resources on patient handling and the risk of injuries is high for patients and caregivers. Assistive technologies can help to prevent work-related injuries. The PTR Robot is an intuitive battery-powered hoist developed in a partnership between Zealand University Hospital and Blue Ocean Robotics. Different stakeholders from both partners were involved in the design process to ensure high acceptability. The data collected during two years of using the robot in hospitals gives insights on the necessary organisational changes, how the robot can support a safer work environment and how it creates new ways of working with patient transfer.

Patient transfer activities are resource intensive tasks in hospitals with a high risk of work-related injuries and low quality of patient experience (Milhem et al 2019:735). Skills and knowledge on how to correct body mechanics rarely prevent work-related injuries. Studies suggest the use of assistive technologies as beneficial in preventing work-related musculoskeletal disorders among healthcare professionals (Jakobsen et al