Abstract

Magnetic Resonance Imaging is a critical diagnostic imaging tool. Surging patient volume demonstrate the increasing role of MRI in patient care. However, its high operational costs and long scan times limit accessibility and efficiency. Using a combination of protocol analysis, data-driven analytics, and machine learning, this work identifies key methods to improve efficiency and utilization of the MRI systems while maintaining patient-centric care.

The cost of an MRI exam is primarily determined by the length of an MRI exam timeslot. Therefore, standardized and consistent MRI protocols are essential to maintain appropriate exam slot lengths. Through quantification of efficiency and variability of MRI exams, opportunities for potential improvement can be identified using advanced analytics.

Powerful magnetic fields and radiofrequency energy pose unique safety risks that must be carefully managed for all patients and staff interacting with the MRI environment. Completion of the MRI safety screening questionnaire is a key component of the screening process and helps establish MRI compatibility of any potential patient devices. Through online patient portals, preliminary MRI safety screening forms may be completed at the patient's convenience before their appointment. The impact of online safety screening on reducing workflow delays and post-arrival cancellations in a large patient cohort was investigated using advanced analytics.

Patient no-shows and late arrivals are persistent challenges in healthcare scheduling. A no-show is defined as a patient who fails to arrive at their appointment or cancels with less than 24-hour notice. A late arrival occurs when a patient arrives more than 30 minutes after their scheduled appointment start time. In this work, a novel predictive analytics model was developed with the goal of determining the likelihood of a patient not showing up or arriving late to their appointment.

Results support the integration of a healthcare informatics approach to MRI workflow design, and offer a pathway for a more efficient, patient-centered imaging service. This thesis details technical innovations to address the need for increased MRI value through improved patient workflow and experience. The aims focus on decreasing MRI exam time, reducing same-day cancellations, and improving access.