MAYO CLINIC

DEPLOYING AUTONOMOUS ROBOTICS TO SUPPORT STAFF AND CRITICAL OPERATIONS

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BACKGROUND: Technological advances within healthcare drive organizations to transform infrastructure and prepare for future care models. Healthcare continues to be challenged by staffing shortages, which impact employee safety and the ability to care for patients. As such, there is a responsibility to protect employee safety through efforts to reduce repetitive tasks and avoid workplace injury. Additionally, healthcare transformation includes considering how resources move throughout healthcare facilities and campuses.

Early exploration reveals promise in utilizing autonomous mobile robots (AMRs) to move supplies and equipment across campuses. Mayo Clinic formed a robotics and automation steering group in 2021 to assume responsibility for facilitating successful implementations throughout the Rochester campus. Robotics implementations, specifically those with the potential to be used for multiple purposes or by multiple departments (such as delivering supplies), require consideration of how the operation will impact the overall larger operational function of the hospital or clinic in which they are deployed.

OBJECTIVES: The organizational mission statement is “to inspire hope and contribute to health and well-being by providing the best care to every patient through integrated clinical practice, education, and research.” Innovation is recognized as key to improving the care expected across the organization. Implementing robotics will support staff and patients in transforming the care and delivery of resources, including supplies and equipment. The primary goal is to facilitate the successful implementation of robotics and automation to support the workforce, increase efficiency, improve quality, and optimize human-to-human connections. Coordination of efforts and processes that promote scalability, change management, and staff engagement is central to the continued evolution of robotics to support care models.

PLANNING: Operational partners were identified across the organization to facilitate coordination and provide direction for this early utilization of AMRs. Members of ten different departments were selected to form the steering groups, ensuring representation of end users, administrative perspective, support functions (such as Information Technology and Healthcare Technology Management), and risk and safety perspective. This workgroup is tasked with developing guidelines, reviewing changes, sharing information, and endorsing recommendations.

IMPLEMENTATION METHODS: 16 robots are currently deployed across six departments in non-clinical functions. Four early robotics projects were identified and studied as they progressed from ideation through testing and, for some, implementation. Early use cases include cleaning functions (Environmental Services), food delivery (Food Services), and equipment and supply transportation (Central Services and Supply Chain Management) in non-clinical and clinical spaces across both inpatient and outpatient settings. Key learnings throughout the various stages include understanding specific requirements for safe operation, testing multiple concepts, measuring specific outcomes both for results and optimization.

Throughout robotic deployments, there has been interest in understanding patient and staff perceptions of AMRs in healthcare. Patient intercept surveys have been completed as deployments occur to capture patient sentiment. These early robotic deployments created a comprehensive strategy to guide further exploration and utilization of robotics in phases. First, the proof-of-concept phase demonstrates specific requirements for safe operation, such as obstacle recognition, elevator utilization, and transport of various items. Next is the pilot phase, where multiple proven concepts are combined to begin testing use cases, such as transporting specific items or equipment. The implementation phase commences with a review of outcomes from the pilot phase to evaluate effectiveness before implementation occurs. Finally, optimization occurs, where the effectiveness and efficiency of the robotic use case are evaluated, and effort is placed to improve utilization.

RESULTS: Early survey responses reveal largely positive patient sentiment regarding robotics. In survey responses from 63 patients, 95% (60/63) indicated feeling comfortable physically being around the robot and 79% (50/63) positively indicated comfort with robotics in healthcare. Specifically relating to robots used in food service functions, 97% (31/32) indicated the robot positively impacted the mealtime experience. 63% of responses (19/30) felt confident that areas cleaned by robots were adequately clean.

LESSONS LEARNED: Establishing a common vision, recruiting early engagement from impacted stakeholders, and outlining a communication plan have proven successful in maintaining momentum for expanding robotics. Additionally, early work setting standard operational metrics to define organizational success in robotics ensures alignment in the definition of success and will enable the program to move pilots into implementation. Healthcare accreditation and regulatory bodies have not yet provided standards for using robotics in the healthcare setting. It is essential to follow existing standards for the safe operation of robotics as well as establish and enforce organizational expectations to address the unique circumstances of healthcare facilities.

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