

Using Our Moxi: Implementing Robotics to Remove Staff Delivery Tasks

David Marshall, DNP, JD, RN, FAONL

The SARS-CoV-2 pandemic emphasized the essential role nurses play in the delivery of care across settings. References to front-line health care workers as superheroes, including nurses, abounded. The pandemic surges arrived in waves and varied in their geographic impact and intensity across the United States and the world. Los Angeles County, Calif., has experienced four surges. The third surge began in early November 2020. It resulted in the county's highest peak census of hospitalized SARS-CoV-2 positive and suspected patients during any time in the pandemic on Jan. 4, 2021.

The current realities in health care reflect the impact of many aspects of the pandemic's demands: an emotionally and physically exhausted workforce, a faltering supply chain and widespread reports of a shortage of nurses, among others. When demand projections are compared to supply estimates, California has a current estimated shortfall of 40,563 RNs. The shortfall is not expected to abate until 2026, when supply is projected to exceed demand (Spetz et al., 2021).

The time to unburden front-line health care workers from tasks that add no value to the care delivered may never have been more pressing, including finding ways to relieve front-line health care workers from the delivery and retrieval tasks. Robots specifically designed to take on point-to-point delivery tasks in health care settings can take on most of these tasks.

For many years Cedars-Sinai, Los Angeles, has used a robot known as an automated guided vehicle system (AGVS) to move food carts, linen and supplies through tracks located behind the scenes. The AGVS has successfully taken thousands of point-to-point delivery tasks away from health care workers annually and automated the movement of those items throughout the medical center. These robots do not directly impact the workload of nurses. In addition to the AGVS, Cedars-Sinai has deployed robotics to support front-line health care workers and surgeons in other areas. For instance, in the perioperative area, robot-assisted surgeries are commonplace.

In their report, Tietze & McBride (2020) share findings from examining three pilot sites implementing service robots to support nursing. The report indicates that robots can support efficient supply delivery, improve nurse productivity, increase worker time with patients and elicit a positive emotional response from families, patients and staff. The two researchers reported the three

pilot institutions had common characteristics: American Nurses Credentialing Center Magnet designation and “the institutions’ leadership and nursing staff spoke to the institutions’ commitment to transformational and innovative solutions to support their nursing staff in delivering quality care.”

Cedars-Sinai has a long history of exploring and implementing innovative solutions to support health care workers, making them more efficient and their patients safer and more comfortable. Concerns at Cedars-Sinai over the well-being of front-line health care workers, including nurses, have intensified after four SARS-CoV-2 surges. One way to relieve stress: reduce waiting on the delivery of equipment or supplies to initiate or complete care. During frequent leadership rounds during the SARS-CoV-2 surges, leaders often heard stories about long waits for infusion pumps. Staff were concerned such delays would result in infusion pump hoarding in high-use areas. If hoarding began, it would mean that front-line workers would take on the task of cleaning infusion pumps between patients, possibly skipping routine safety checks normally performed during the cleaning process when infusion pumps are returned to a central supply area after each use.

Partnering on a delivery solution

Diligent Robotics, Inc. (2021) describes itself as “an artificial intelligence (AI) company creating robot assistants that help health care workers with routine tasks so they can focus on what they do best: patient care.” The company joined Class 6 of the accelerator program at Cedars-Sinai. This three-month program provides companies with \$100,000 in funding, mentorship from more than 300 leading clinicians and executives and access to Cedars-Sinai Medical Center. In addition, participating companies receive exposure to a broad network of health care experts, including health system executives from a wide range of organizations. It also provides access to experienced health care entrepreneurs, industry advisers, and health care investors. The accelerator has helped dozens of companies transform health care delivery and patient care since 2015 (Cedars-Sinai, 2021). Diligent Robotics’ participation in the accelerator program led to the exploration of offloading point-to-point delivery and retrieval tasks through a pilot project with its robot, Moxi. Their approach aims to make Moxi a teammate, taking on delivery

tasks to lessen the burden on nurses and other front-line health care workers. Moxi possesses several features that make it an ideal teammate:

- Artificial intelligence enables Moxi to quickly learn what to do in a new hospital.
- A robotic arm allows manipulation of doors and sensors.
- High-speed Wi-Fi allows the use of customers' existing Wi-Fi access.
- Locking access-controlled storage allows for transporting a wide variety of health care equipment and supplies.
- Sensors allow safe social navigation housewide.
- LED eye expressions creates a friendly face that nurses and patients look forward to seeing.
- Audit logs and data dashboards allow for workflow insights.

Two Moxi robots arrived at Cedars-Sinai on July 6, 2021 for the pilot project. The first pilot project task: conducting a workflow discovery on critical care, medical-surgical and mother-baby nursing units and patient care support areas (such as central supply, central transport, lab and pharmacy). During workflow discovery, Moxi traveled the facility to map and gather semantic data. The discovery identified four workflow automation opportunities to provide a predictable turnaround time with status updates directly to the requestor's facility-provided, secure communication device.

The four opportunities were:

- Delivery of supplies would remove such tasks from the workload of central supply staff.
- Delivery of discharge medications that could not be delivered by pneumatic tube from the distant outpatient pharmacy would assist in supporting the institutional objective to speed the time from discharge order to actual discharge.
- Delivery of non-valuable, secured patient belongings to discharging patients would relieve nursing staff from the responsibility of retrieving those belongings from security, speeding the discharge of patients.
- Delivery of laboratory specimens not capable of being sent to the laboratory through the pneumatic tube would allow central transport to focus on patient transport activities instead of specimen delivery.

A variety of additional workflow opportunities were identified outside of support for the inpatient nursing units.

The next task in the pilot project was to identify the pilot unit(s) and priority workflows. Units were ranked based on the maximum workflow opportunities that could impact a unit and a subjective assessment of unit engagement/readiness. Four medical/surgical units were identified to be in the initial scope for the pilot. Moxi joined these units as a staff teammate.

Moxi was set up to accept requests from the requestor's facility-provided, secure communication device, and the pilot commenced with the workflow opportunities previously identified. Staff education was accomplished through in-service training and rounding with every involved department. In addition, flyers and tent cards were distributed and walk-through training and support were provided during the first month of go-live with Moxi.



David Marshall, senior vice president and chief nursing executive at Cedars-Sinai, Los Angeles, poses with Moxi.

Measuring success

The pilot began on Sept. 9, 2021. Before implementation, measures of success were identified. These included:

- Moxi utilization (# of tasks)
- Moxi availability (queue times)
- Distance traveled (steps saved)
- Staff feedback
- Impact on leading indicators of Quadruple Aim.

Thus far, Moxi is providing deliveries faster than the status quo. Total delivery time is less than 30 minutes from the time requested to delivery, averaging 25 minutes. Anecdotal evidence suggests this performance is four times faster than when staff made deliveries. Moxi's availability is almost immediate. The average time a task currently sits in the queue is less than four minutes. Staff report feeling confident that items will arrive within thirty minutes, and they report feeling secure that it will never take two hours for an item to arrive. Maintaining Moxi availability and reliability will be essential to factor into fleet size going forward as utilization increases. In addition, since the pilot began, Moxi has traveled 298 miles, saving 677,145 steps, an average of more than 15,750 steps per day.

Staff praise for Moxi's capabilities has been high. "This is such a huge help! Sometimes central supply gets busy and they can't deliver immediately, but Moxi can," said one pilot unit staffer.

Using Our Moxi: Implementing Robotics to Remove Staff Delivery Tasks

“It is so great!” In addition, Moxi was recently spotted engaging a pediatric patient in a short peek-a-boo encounter.

Diligent Robotics, Inc. offers Moxi robots via a “robot-as-a-service” model. The company works closely with every hospital or clinical environment to deliver a tailored service that fits the facility’s evolving needs. Pricing is based on a per-robot hourly rate, plus a utilization cost for time on task.

Using the robot to relieve front-line health care workers from point-to-point delivery and retrieval tasks has been successful in the limited pilot. Work is now underway to prepare and present a business plan for expansion with a clear articulation of the return on investment. In addition, further work will be done to prioritize and explore the other workflow opportunities identified during the workflow exploration. ♦

References

- Cedars-Sinai Accelerator. (2021). About the program. <https://csaccelerator.com/program>
- Diligent Robotics, Inc. (2021). About. <https://www.diligentrobots.com/about>
- Spetz, J., Chu, L., & Blash, L. (2021). *The impact of the COVID-19 pandemic on California’s nurse workforce: Preliminary data.*

UCSF Health Workforce Research Center on Long-Term Care. <https://healthworkforce.ucsf.edu/sites/healthworkforce.ucsf.edu/files/Impact%20of%20the%20COVID-19%20Pandemic%20on%20California%E2%80%99s%20Registered%20Nurse%20Workforce%20-%20Preliminary%20Data.pdf>

Tietze, M. & McBride, S. (2020). *Robotics and the impact on nursing practice: Case study and pilot site analysis* [White Paper]. American Nurses Association. https://www.nursingworld.org/~494055/globalassets/innovation/robotics-and-the-impact-on-nursing-practice_print_12-2-2020-pdf-1.pdf

ABOUT THE AUTHOR



David Marshall, DNP, JD, RN, FAONL, is senior vice president and chief nursing executive at Cedars-Sinai, Los Angeles.

Finance and Business Skills for Nurse Managers

April 11 | San Antonio

This course helps equip nurse managers for financial discussions, building a foundational knowledge in nursing finance. Topics covered include building a business case, preparing a budget, and monitoring unit operations. This program is co-taught by AONL and Healthcare Financial Management Association faculty. This in-person program will take place as a pre-conference offering at AONL 2022. For more information go to aonl.org/education/nurse-manager-finance.

Certified in Executive Nursing Practice Essentials Review Course

April 11 | San Antonio

The Certified in Executive Nursing Practice (CENP) Essentials Review Course assists nurse executives in preparing for the CENP exam through a review of the AONE Nurse Executive Competencies and practical application of the competencies. The competencies covered include communication and relationship building, knowledge of the health care environment, leadership, professionalism and business skills. This in-person program will take place as a pre-conference offering at AONL 2022. For more information, visit aone.org/cenp.

Do We Have Your Updated Information?

Have you moved, changed jobs or switched addresses? Go to aonl.org/myaccount to update your information and explore your profile.