



**Pittsburgh Regional Autonomous Patient Safety** PITTSBURGH REGIONAL HEALTH INITIATIVE

## Regional Autonomous Patient Safety Initiative

*Establishing Pittsburgh as a Tech Hub for Developing Autonomous Patient Safety Solutions*

### The Problem

Today, the healthcare industry is at a tipping point. It is facing a "triple crisis" of workforce shortages and burnout, a rise in safety issues, and a growing lack of trust. To fill the 30% vacancy rates in healthcare jobs and retain the workforce, the healthcare industry will need to invest in autonomous tech-enabled solutions to improve safety.

In the wake of COVID-19, burnout, staffing shortages, turnover, and concerns of being unable to provide safe care continue to push many providers to leave the profession. Former hospital workers in Pittsburgh indicated they left due to understaffing (73%), mental and emotional demands (69%), and being unable to deliver quality care (52%). Nationally, 55% of hospital nurses indicated that less than half the time their unit does not have the necessary staff to provide quality care.

It is unfortunately not surprising that when fewer people are asked to take on more work in an already unsafe and chaotic work environment, errors occur and injury/harm increases. During the pandemic, CMS and the CDC observed a substantial deterioration in patient safety measures, which had already affected 25% of patients.

In the midst of this triple crisis, the healthcare industry can't ask frontline providers to follow more steps in a manual process or safety checklist. Instead, the industry needs to use a human-factors engineering lens to build care teams a safer work environment with autonomous, technology-enabled solutions that prevent errors, increase job satisfaction, and convert time spent on workarounds and data entry into patient care. This need is especially acute in Pennsylvania since the State is projected to have one of the most severe shortages in the nation.

### The Technology-based Potential of the Region

The Pittsburgh region is primed to become a leader in creating these solutions by deploying its world-renowned regional assets in robotics, AI/ML, autonomous technologies, health sciences, and safety. A few examples are provided below.

The **CMU Center for Digital Health Innovation's Initiative for Patient Safety Research (IPSR)** is building on the significant successes of its Center for Machine Learning and Health. With an initial focus on medication errors, the IPSR team aims to: build and educate a community of patient safety researchers across CMU's schools and centers; create a benchmark data set with external data partners; and analyze the **benchmark data set with ML technologies** to refine problem definitions, identify outliers, conduct root-cause analyses, and generate proofs-of-concept methods to detect and prevent medication errors. The IPSR will result in diverse teams of faculty and PhD students, producing proof-of-concept innovations based on the benchmark data for anticipating, identifying, and preventing medication errors by the end summer 2024. These insights and discoveries have the potential to alert providers to anomalous situations, recommend actions, and predict changes in patients' conditions.

The **Pitt Department of Biomedical Informatics' Medication Error Avoidance at Region Scale (MEARS)** study aims to reduce preventable adverse drug events among skilled nursing facility (SNF) patients who transition between the hospital and SNF facilities. The MEARS team is accomplishing this by piloting a novel medication monitoring **clinical decision support tool** that uses medication error rules, computable phenotypes, and data from multiple settings to support patient-specific medication risk assessment and enable population-level monitoring of medication safety concerns. The MEARS study team is also sharing data with the CMU IPSR team.

An interdisciplinary team of researchers from the University of Pittsburgh, CMU, and UPMC used **AI and genomics** to create the **Enhanced Detection System for Healthcare-Associated Transmission (EDS-HAT) system**. EDS-HAT screens for patients with near-identical strains of an infection, scopes out any related connections between them, and alerts the infection prevention team for further investigation. Whereas previously infection prevention required a labor-intensive process dependent on healthcare workers to notice and communicate those concerns up the chain, the EDS-HAT system enables autonomous and rapid response to identify and prevent outbreaks that reduces costs and improves safety for patients and workers.

The **University of Pittsburgh's Winter Institute for Simulation, Education and Research (WISER)** is a world class multidisciplinary training, development, and research facility. It is dedicated to the advancement of healthcare **simulation technology** and education to improve patient safety, education, mentorship, systems design and research. They engage in academic curricula, hospital-based training initiatives, research, advanced instructional technology, and the development of innovative simulation programs.

The **University of Pittsburgh's Center for Military Medicine Research (CMMR)** facilitates innovative collaborative opportunities to work with military medical researchers and apply for DoD and DARPA funding to advance medicine for wounded service members and their families. Since 2013, CMMR helped facilitate numerous federal research grants, totaling more than \$400 million in grant funding. For example, TRAuma Care In a Rucksack (TRACIR) was funded in May 2019 to provide the U.S. military with a portable, **autonomous medical system** that can provide robotically controlled critical care interventions to patients in remote and austere environments. The TRACIR team includes academic partners from CMU and industry partners.

**Omnicell**, a global company in Pittsburgh, has a suite of **automated pharmacy** and medication management solutions, including medication dispensing robots. These solutions reduce human error, reallocate more clinician time to patient care, simplify workflows to increase efficiency and reduce costs, and increase visibility for real-time data insights on medication supply and inventory management. Beyond the automated Central Pharmacy, Omnicell has solutions for IV utilization and analytics, point of care medication dispensing in nursing units, and operating rooms, and enterprise-wide software for effective logistics and management.

**TeleTracking Inc.**, another global company in Pittsburgh, developed and implemented over 100 NASA-like **Command Centers** in health systems. Their technology creates system-wide situational awareness and operational foresight to streamline operations, allocate resources, improve patient flow, and enable rapid responses to prevent crises.

**Mine Safety (MSA Safety)** has an over 100-year history in manufacturing safety products across multiple industries that involve dangerous work environments both domestically and even globally. They are most well-known for their iconic protective headgear, the V-Gard helmet, with an estimated 200 million units made. During the initial phases of the COVID-19 pandemic with the critical shortage of personal protective equipment across the country, Allegheny Health Network partnered with MSA Safety to develop a new product to address the situation. They developed an elastomeric half-mask respirator, which are tight-fitting respirators made of synthetic or rubber material designed to be repeatedly disinfected, cleaned, and reused. This would provide not only protection quality similar to the N95, but also enable significant cost savings that circumvent the disposable nature of N95s. This synergistic partnership focused on worker safety in the healthcare space highlights an opportunity for disruption and improvement from our current standards.

## The Regional Autonomous Patient Safety Initiative (RAPS)

To further establish Pittsburgh as a global tech hub for developing autonomous patient safety technologies, the Jewish Healthcare Foundation (JHF) and Pittsburgh Regional Health Initiative (PRHI) created the Regional Autonomous Patient Safety (RAPS) initiative in 2022.

To plant a flag in Pittsburgh, JHF funded:

- the AI/ML in Healthcare Symposium in Pittsburgh in May 2022 with the University of Pittsburgh's Center for Military Medicine Research;
- the CMU Initiative for Patient Safety Research (IPSR);
- the University of Pittsburgh Department of Biomedical Informatics' (DBMI) "Medication Error Avoidance at Region Scale" (MEARS) study team, which is also collaborating with the CMU IPSR team; and
- the [RAPS Launch Event](#), which included over 110 people from the region and generated ideas and excitement about the region's potential to become a tech hub for autonomous patient safety solutions.

To follow-up on the ideas from the Launch Event and stimulate a pipeline of new patient safety R&D in the region, PRHI is now:

- Convening a [Regional Advisory Group](#) with researchers, health system leaders, and tech innovators.
- Commissioning an [Economic Analysis](#) to capture the regional assets, describe the current opportunities and threats, estimate the impact on the number of jobs created and retained, and recommend next steps for becoming a global tech hub for patient safety R&D.
- Creating a [Seed Grant Program](#) to provide early-stage grants to start-ups, multi-disciplinary R&D teams, and tech companies in the Pittsburgh region that are in the earliest stages of developing, testing, and promoting autonomous solutions to prevent medical errors.
- Organizing a series of [Patient Safety R&D Salons](#) for multi-disciplinary research teams, providers, payers, tech companies, and start-ups in the region to learn about patient safety priorities, the business case, lab-to-market approaches in the region, opportunities to work across silos, and federal funding opportunities
- Helping to organize proposals for patient safety tech R&D in response to federal funding opportunities, including [ARPA-H's BAA](#).