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Jewish  
Healthcare  
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# Pittsburgh's Industrial Legacy

## Has Powerful Lessons for Health Care's Future



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Pittsburgh enjoys a unique history of industrial safety and healthcare innovation. For more than a century, our city has pioneered safety solutions in some of the most dangerous occupations—a legacy that continues today. Pittsburgh has also pioneered innovations in computer science, artificial intelligence and medicine—particularly in emergency medicine and transplantation.

Out of respect for this legacy, and to remain at the frontier of discovery, the Jewish Healthcare Foundation and Pittsburgh Technology Council hosted a Safety Innovation Summit in Pittsburgh last February to marry our historic leadership in safety, technology and medicine. For all that America has achieved in medical and surgical treatment breakthroughs, it still lacks the same measurable progress in healthcare safety as other high-risk, complex industries.

The Summit was intended to spark inter-industry learning and collaboration in safety. The opportunity exists to bring new solutions to the frontline of care, given advancements in artificial intelligence, machine learning, robotics including exoskeletons, advanced analytics and informatics—where our region’s expertise is cutting edge.

Over the past year, the “Think Pittsburgh, Think Safety” series in the *Pittsburgh Business Times* explored how our region’s safety leadership in industry, transportation, manufacturing and space exploration offers valuable lessons for addressing one of health care’s most pressing challenges: avoiding preventable medical errors that harm millions and claim an estimated 250,000 American lives annually. This publication brings together these insights.

The series reveals several core principles that connect Pittsburgh’s industrial safety success to healthcare improvement:

**Technology Can Prevent Harms:** Just as industrial wearables and connected sensors have protected workers from hazards in their environments, health care could deploy similar technologies to predict risks, streamline workflows, and prevent errors before they reach patients.

**Demand Drives Commercialization:**

Post-pandemic staffing shortages were felt across industries—with resulting safety risks. These dangers could be minimized through automation, robotics and generative AI tools, as in other industries. However, health care faces steeper barriers to adoption given the complexity of the regulatory landscape and hesitancy to invest limited resources. Safety requires higher priority to drive commercial activity.

**Data Are Critical for Improvement:**

AI and machine learning can make data actionable, but this requires real-time, not doctored or recoded, data (or reliable synthetic data) that are shared and interoperable across systems.

**Cross-Disciplinary Collaboration**

**Accelerates Progress:** Pittsburgh’s greatest safety breakthroughs emerge from multidisciplinary collaborations—when researchers, clinicians, engineers and data scientists unite across institutional boundaries. Enormous potential exists in regional CMU, industry and academic partnerships.

**Training Bolsters Safety:** Simulation centers like WISER at Pitt and educational institutions throughout the region are applying hands-on training philosophies from industrial safety to healthcare settings. This deserves

more attention in all health professions education.

**Leadership Commitment Determines**

**Success:** As former Alcoa (safety) CEO Paul O’Neill demonstrated, true safety transformation requires unwavering executive commitment that prioritizes human well-being above all else.

Through these interconnected principles, Pittsburgh can continue an evolution from the birthplace of industrial safety to what we envision as the “Safety Capital of the World”—where lessons from industrial leaders create safer health care for all.

As we look forward to what comes next, we’ll be partnering once again with the *Pittsburgh Business Times* to bring you an in-depth exploration of the innovative technologies from other industries that hold the most opportunity to be adapted for health care.

Until then, enjoy the following wealth of insights from regional leaders building our legacy of safety innovation here in Pittsburgh.

**Karen Wolk Feinstein, PhD**  
President and CEO  
Jewish Healthcare Foundation and  
Pittsburgh Regional Health Initiative



# Think Pittsburgh. Think Safety.

By Laurie Bailey

Pittsburgh has a history of being not only a manufacturing epicenter, but also the birthplace of industry and occupational safety, beginning with the efforts of the lawyer, activist and reporter Crystal Eastman in the early 20th century. She radically changed common law safety standards and increased public awareness of industrial deaths and accidents.

“Western Pennsylvania has a legacy in industrial safety that needs to continue,” said Jan Wachter, former safety sciences professor at Indiana University of Pennsylvania and health and safety expert.

And Pittsburgh’s commitment to industrial safety continues to be a priority through education and training, manufacturing, research, leadership and unionization. Safety education and training centers have cropped up nationally, and many of the best are in the Pittsburgh region. Giants in the field of personal protective equipment and hazardous material monitoring – like MSA Safety and Industrial Scientific – are headquartered here. Pittsburgh is also home to the National Institute of Safety and Health (NIOSH), the working arm of Occupational Safety and Health Administration (OSHA). Hometown schools like Carnegie Mellon University and the University of Pittsburgh have various safety initiatives, like CMU’s Traffic21 with its multidisciplinary approach to develop transportation solutions.

Historically, Pittsburgh was the hub of steel, glass, mining and rail manufacturing – high-risk industries that encouraged workplace accidents and deaths. But those calamities became a catalyst for growing local expertise for efforts to eliminate occupational hazards and errors.

“From something which was bad, we were like the phoenix that grew something good,” Wachter said.



*MSA develops and manufactures advanced products and solutions that help protect firefighters from head to toe. Photo provided by MSA Safety.*

Through patient advocacy, lessons learned and shared connections among other industries, the Jewish Healthcare Foundation’s Pittsburgh Regional Health Initiative is committed to reducing errors in health care, making Pittsburgh the “Safety Capital of the World.”

Here are some of those lessons:

## THINK SAFETY INNOVATION.

Many industries are continuously leveraging the strength of new technology to make safety improvements. New safety innovation can include wearables, software, biomarkers, 3D modeling, self-learning tools and more.

The construction industry’s most novel development is “building innovation modeling,” said Ken Morris, safety representative of the International Brotherhood of Electrical Workers Local Union #5.

“It gets rid of the flat blueprint. It gives us a 3D model. It allows us to build

things off site, eliminating a lot of hazards on the job site,” he said.

And an interdisciplinary approach strengthens innovation.

Consider the Enhanced Detection System for Healthcare-Associated Transmission (EDS-HAT) system. Physician researchers from the University of Pittsburgh together with experts in artificial intelligence, machine learning and data analysis at Carnegie Mellon University developed EDS-HAT to quickly detect and characterize

emerging infectious hospital outbreaks – and to mitigate potential spread to others.

“It’s very hard to come up with an impressive discovery within the realm of only one discipline,” said Artur Dubrawski, alumni research professor of computer science at Carnegie Mellon University and a member of the research team. “Interdisciplinary is a key to making real progress.”

Pitt medical researchers are working on another project, the Semi-closed Loop

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**ARTUR DUBRAWSKI**

Carnegie Mellon University



An MSA associate at the company's Cranberry Township manufacturing facility and global headquarters tests electronics used in gas detection products. Photo provided by MSA Safety.

Control Cardiovascular Resuscitation (CRUISE), which is the healthcare component of an earlier effort, Trauma Care in a Rucksack (TRACIR). The goal of CRUISE is to close the health care gap in prehospital care in the austere setting for both military and civilian use.

"Some of the challenges you have, when you have this multidisciplinary science, are getting everyone together with a shared vision and commitment to solving a very difficult problem," Dr. Ron Poropatich, director of the Center for Military Medicine Research and professor of medicine at Pitt, said. "It's all about being able to communicate and coordinate."

And it's about fearlessly managing, identifying and mitigating the risks of any new technology, said Nate Beuse, chief safety officer at driverless truck company Aurora.

"All technology has some risks, and we're never going to be able to predict all of the things that it can be used for because it waits for nobody," he said. "It starts with the fundamental premise of a system of machines and a system of people. If the system isn't giving us the right answer, then let's figure out what we want to tweak in the system."

At Aurora, "everyone is on the Safety Team," Beuse said.

The company's Safety Management System (SMS) ensures there is accountability and that safety decisions are elevated to the right decision makers. It includes a non-retaliation Safety Concern Reporting policy that empowers everyone to speak up if something doesn't feel safe.

"The approach ties directly to our universal grounding policy which enables anyone – from our newest employee to our CEO – to ground our fleet if they have a valid concern about its safety," Beuse said

Leaders from a range of industries agree that regulation can spark innovation and promote rapid adoption of best practices. It raises the bar well beyond the standards set by communities of manufacturers, end users and industry experts – ensuring safety for both workers and consumers.

"As we're designing products, we're taking into consideration what we have to meet to pass those standards and how we can make our products robust so that passing the standard is the minimum," said Brenda Hittle, R&D

"As we're designing products, we're taking into consideration what we have to meet to pass those standards and how we can make our products robust so that passing the standard is the minimum."

**BRENDA HITTLE**  
MSA Safety

global and compliance documentation manager at MSA Safety. "We want to go above and beyond passing the standards requirements."

Demand for innovative gas detection technology is driven by higher standards for workplace safety set by agencies like the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) who continuously

update exposure limits for toxic substances and chemical hazards.

Industrial Scientific's 500,000 in-field gas detectors – monitored through a cloud platform – have triggered about 140 million alarms, preventing countless injuries and potentially fatal accidents.

"Growing awareness of occupational health and safety among employers and employees is playing a significant role," Schmid says. "Organizations are prioritizing smarter, more efficient tools that ensure compliance while improving safety and operational performance."

Regulation can encourage industries to focus on a particular problem and inspire innovation if done smartly, explained Raghu Arunachalam, chief executive officer of WorkVis.io, which provides AI-driven industrial real-time safety solutions to alert workers and managers to potential hazards.

For example, safety in confined spaces – areas like manholes, tunnels, vaults, ducts and more with limited entries or exits that may be low in oxygen or high in toxic, flammable gases, vapors or dusts – is an issue in which industries creatively worked together to focus on solutions to potentially dangerous environments.

At Edge Case Research, a company that supports developers in AI for autonomous vehicles, chief product officer and co-founder Michael Wagner believes the relatively young industry wants regulations – by informed regulators and policy makers – that help to set expectations.

"Everybody knows that stakeholders' opinions on safety are critical and that the developers are operating in good faith," he said.

**THINK SAFETY TECHNOLOGY.**

According to a recent study in the *New England Journal of Medicine*, 1 in 4 receiving health care in hospitals experience harm, and there are estimates of 250,000 preventable medical error deaths in the United States each year. Also, the National Institutes of Health reports that healthcare workers are experiencing high stress and burnout at rates of up to 70 percent, hindering patient care.



In myriad industries, advances in data management, data analytics and artificial intelligence have streamlined processes, predicted potential risks, identified hazards and networked data systems.

To further protect the thousands of workers that are exposed to hazardous chemical agents as part of their routine jobs – at manufacturing plants, construction sites, healthcare facilities and more – MSA Safety leverages data technology to enhance the performance of the personal protection equipment and gas sensing devices they've manufactured for decades. These technologies allow the century-old company's customers to continually monitor exposure to toxic chemicals and identify and mitigate problems, said Zane Frund, executive director and global leader, materials/chemical research and sensor development for MSA Safety.

"There are hundreds of thousands of these units worn by workers throughout the world," he said. "And as they are walking through different facilities, whether it's a chemical plant, a manufacturing plant, a construction (site), or a healthcare facility, a wide range of gases and toxic agents are being continually monitored.

Leaders of nearly every state have expressed the need to modernize their public health data infrastructures with systems that will provide learning from past events, analytics to predict the type of volume a facility will receive and real-time location tracking, using tools such as patient identification bands and staff badges. Artificial intelligence can eliminate numerous phone calls and advise, through central command centers, the best order in which patients are discharged, specific types of beds necessary for certain incoming patients and dispatch environmental services to safely prepare rooms.

During the pandemic, workflow efficiency company TeleTracking Technologies' central visibility platform created operational awareness and managed workflow, networking 6,400 hospitals nationally. For three years, it understood the number of available beds, distributed Care Act funding and supported federal and state resources in real-time. The platform



Michael Wagner of Edge Case Research and Paul Bartlett of New Earth Autonomy. Photo provided by Jewish Healthcare Foundation.

has since been pulled back into the government, said Chris Johnson, co-CEO TeleTracking Technologies.

"I believe it has every opportunity to come back because it's needed," he said.

TeleTracking combines health care and logistics to improve patient movement through hospitals and other care centers, ultimately enriching patient safety. Nurses work alongside software engineers who write the code that interpret flow of care requirements specified by various end users.

"The fact that you can do things efficiently allows you to not lose lives," said Michael Coen, TeleTracking chief product and technology officer.

### THINK SAFETY FUNDING AND COMMERCIALIZATION

From the Westinghouse air brake system to more recent robotic marvels that make high-risk manufacturing safer, the Pittsburgh region has seen more than its share of commercialized safety innovations that have been born and bred in our own backyard.

But unlike many other industries, the

path to commercialization of safety innovations in the healthcare sector can be challenged.

When it comes to safety, there are myriad issues that cause the adoption of technologies and the rollout to be slower in health care than in other industries, said Rich Lunak, managing director of Riverfront Ventures and former president and CEO of Innovation Works.

- Health care has a complex regulatory environment that may cost a startup two or three times the cost to develop than it would with another industry because of U.S. Food and Drug Administration (FDA) regulations or potential clinical trial or Health Insurance Portability & Accountability Act (HIPAA) requirements. Also, insurers and payors may set fixed reimbursements.
- Most providers and hospitals operate at very low margins – many in the low-single-digit percentages, or quite often, they are losing money. Trying to sell to someone with low discretionary spending money is difficult, especially if it doesn't improve quality of care and reduce costs.

- The healthcare setting can be a tough place in which to implement new safety technologies because of staff shortages and "switching costs" associated with changing systems.

Simply stated, investors, when they put money into anything new, want return on their investments.

"And if there are higher costs, lower adoption, maybe impacts on pricing, those can make it less attractive than other industries," Lunak said.

Health care is seeing some quicker adoption times, especially when it comes to recognition of data analytics and AI to solve problems that are not direct interventions but are more about diagnostics, said Steven Wray, executive director at the Block Center for Technology and Society at Carnegie Mellon University.

"If we can use AI, for example, to eliminate some errors through transcription of medical notes, that's patient safety, but that doesn't really require FDA approval," he said.

For example, Abridge – one of UPMC Enterprises' portfolio companies – uses a generative AI platform to efficiently transcribe conversations between medical providers, impacting the time clinicians spend on documentation. The technology rolled out to a new health center almost weekly in 2024, and is in more than 100 health systems in America.

Organizations invest in what is important to them, whether it's a safety device, drug discovery or something to prevent hospital readmissions, said Ilana Diamond, managing partner at 412 Venture Fund.

"If safety is important to someone, they have to provide the investment and the customer base for early-stage companies," Diamond said. "Then medical safety will be first."

Market interest and demand for IV compounding robotics continues to grow, but at a slow pace, explained Dennis Wright, Omnicell's vice president of marketing.

Omnicell, which designed and developed the IVX Station Compounding Robot,





The Peterbilt 579 truck powered by the Aurora Driver. Photo provided by Aurora.

has seen a growth rate from 5% in 2019 to 8% in 2024. The IVX Station is one of the company’s advanced robotic technologies designed to make safer the medication management process, more efficiently administer medication and improve hospital standard of care.

“Post-pandemic, healthcare facilities continue to navigate significant challenges, most notable staffing shortages, that are pushing technology investments down the priority list,” Wright said.

He added that the unique nature of medication management and patient safety implications make the adoption of technology more complicated in health care than in other industries.

One reason is that no governing body or organization has established a

requirement or “standard,” Wright said. Approval, acceptance and endorsement of novel technology from state boards of pharmacy is also difficult. And technology implementation is challenging, specifically when it comes to existing clean room space for robotics.

Government initiatives, like the Safer Compounding in Hospitals Act, may increase market share for Omnicell and other healthcare robotics companies and create incentives for hospitals to use robotic technology in the interest of patient safety. Introduced in June 2024 and sponsored by U.S. Rep. Mike Kelly (R-PA), it encourages the adoption of drug-compounding automation technology of IV drugs for Medicare patients in the hospital setting.

“These small steps to support hospitals

and health systems in adoption of automation do move the needle and bolster the industry as we prove that there is confidence in robotics and the safety and efficiency benefits that automation delivers,” Wright said.

Department of Defense projects that impact patient safety – like one at the University of Pittsburgh that provides an early specific diagnosis and target treatments for laser eye injuries – should be considered by Pittsburgh investigators, said the University of Pittsburgh’s Ron Poropatich.

“Department of Defense research funding is important to diversify investigators’ revenue stream and to further develop their science,” he said.

It’s important to consider both military and civilian needs when it comes to the

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**DENNIS WRIGHT**  
Omnicell





Chris Johnson of TeleTracking with Karen Wolk Feinstein of Jewish Healthcare Foundation at the Safety Innovation Summit in Pittsburgh. Photo provided by Jewish Healthcare Foundation.

development and commercialization of new technologies to increase market size.

"If the demand is just as great on the military side and the civilian side then there is going to be more supply and less cost," Poropatich said.

#### THINK SAFETY TRAINING.

At both IUP, which offers bachelor's, master's and doctoral degrees in safety, health and environmental applied sciences, and Slippery Rock University, where undergraduates earn a bachelor's degree in safety management, students gain real-world knowledge in labs equipped with the tools they would encounter on most jobsites.

"Injuries cost a lot of money, and the value of human life, obviously we regard that highly here in this country," said Joseph Losko, professor at Slippery Rock. "Those are the drivers of our profession – it's the culture of protecting lives and keeping people safe."

At the local Union 449 Technology Center in Harmony, safety is the underlying lesson as steamfitter apprentices learn about pipe fabrication and welding, orbital tube welding, medical gas systems, 3D computerized pipe design and more.

"It does require that people think differently about their operations... changing the way things are done, in any system, not just health care."

**CHRIS JOHNSON**  
TeleTracking

"Everything we do has to be safety oriented because some of the places that we work aren't very safe," said Thomas Doran, director of building trades education at the center.

The facility houses 150 fully functional lab stations for the 5-year apprentice program for both the mechanical services program (MES) – servicing residential and commercial air conditioning and refrigeration systems, steam and hydronic boiler system maintenance – and building trades – the installation of commercial and industrial process piping systems.

At the Pennsylvania Laborers' Education and Training Center, workers learn

everything from first aid and CPR to scaffold building.

"We give them the basic knowledge that they need to go out there in the field and work safely every day – not only for the contractors, which is very important, but also for the members to be able to go home every night with all ten fingers and all ten toes, the same way they came to that job site," said Marc Ferrari, administrator/training director.

The Winter Institute for Simulation, Education and Research (WISER) has been training students and professionals through simulation since 1994. Through its affiliation with the University of Pittsburgh's schools of health sciences, medicine, nursing, pharmacy and rehabilitation services and UPMC practicing professionals, the institution provides more than 500 training programs at its 17,000 square foot campus in Oakland and at 12 satellite facilities at UPMC hospitals. Another 12,000 square feet of simulated operating rooms and intensive care units is currently under construction in the medical school that will be completed in November 2025.

"We activate the hospital's emergency response team, and we're using the simulations to do assessments of how well the hospital is responding to patients in a proactive way," said Paul Phrampus, director of WISER. "We're teaching the science of teamwork and team leadership for routine situations and also stressful situations."

Simulation effectively helps local professionals address and execute the "thousands of products" – the diagnosis of disease and treatments and procedures – that underscore the complexity of health care, Phrampus explained.

"Across the health system we enjoy an exceptionally low rate of people being mismanaged in those critical time frames, and I'm quite sure it's because of our simulation training," he said.

#### THINK SAFETY INSPIRATION.

"I think the horizon is endless," Wachter said, referring to the application of analytics, artificial intelligence, robotics, behavioral safety and human

performance in achieving regional safety goals.

And there are challenges that need to be met, especially when it comes to new safety protocol in health care.

"It does require that people think differently about their operations... changing the way things are done, in any system, not just health care," said TeleTracking's Chris Johnson.

Improving efficiency within a healthcare system with technology that tracks and predicts patient movement and shares data can reduce hospital crowding and deaths. (A 2019 study in the *JAMA* found that patients who were admitted to the hospital during times of high emergency department crowding had a 5 percent higher risk of death.)

The good news, Johnson added, is that there are more collaborations and instances of shared data among healthcare systems post-COVID, especially in pediatrics.

MSA's Zane Frund, a biomedical engineering professor, believes there is potential for improved safety in health care through innovations such as sensors for physiological monitoring that could help detect worker fatigue and stress and report average daily exposures to hazardous chemicals. They would also be applicable across other industries, including construction, fire, service and mining. Also, apps that use artificial intelligence to accurately measure human faces for the best leak preventing respirators will improve not only health care, but safety for the public at large.

"One of the challenges innovators have is that you've got to have a market for a product," he said.

Ilana Diamond, managing partner with 412 Venture Fund suggested that technology companies partner with healthcare organizations that can test their new innovations and ultimately become early-state customers.

"Then I think companies would be willing to go to health care first, and investors would be willing to fund it," she said.



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