

WHITE PAPER

# Sterile IV Compounding Automation: Robotic Technology Reimagined

IV Compounding

Intravenous (IV) therapies are essential to healthcare delivery. According to the Institute for Safe Medication Practices (ISMP), more than 90% of hospitalized patients receive some form of infusion therapy.<sup>1</sup> Therefore, hospitals and health systems require confidence that they can safely deliver the life-enhancing IV therapies patients need, whenever patients need them.

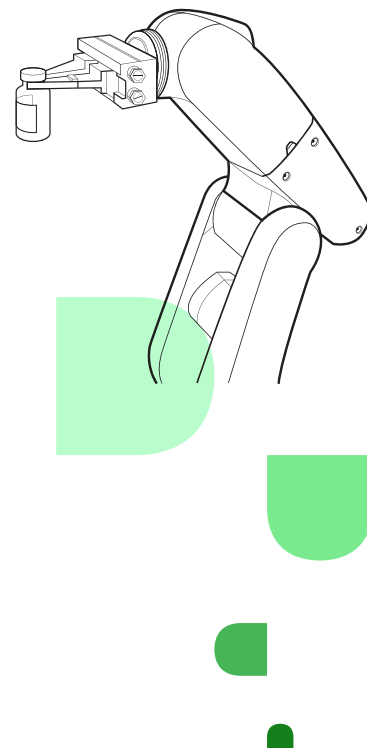
Having safely and accurately compounded IV preparations not only impacts care quality, but it can also have a significant impact on the bottom line. One study estimates that preventable inpatient adverse drug events (ADEs) associated with injectable medications increase U.S. payers' costs by \$2.7 billion to \$5.1 billion annually, averaging \$600,000 in extra costs per hospital.<sup>2</sup>

Further exacerbating the pressures associated with sterile IV preparations for hospital pharmacies are excessive costs and supply chain difficulties with 503B outsourcing facilities. The PharMEDium closure in 2020, for example, had a rippling effect on the hospitals and health systems that depended on them for their supply of IV sterile compounds.

Hospitals that have shifted away from outsourcing operating room (OR) medications have experienced challenges as well. Without access to prefilled syringes, anesthesiologists must draw up their own medications in the OR, leading to excessive waste.

Contributing to the waste is the "One & Only Campaign" injection safety guidance from the Centers for Disease Control and Prevention (CDC) and the Safe Injection Practices Coalition (SIPC).<sup>3</sup> While the campaign's commendable goal is to prevent unsafe injection practices, it requires anesthesiologists to discard any unused doses remaining in a vial after drawing up a syringe. If an anesthesiologist needs only half a vial, for instance, the rest goes unused.

Given the critical nature of IV preparations and their associated patient safety implications, the pressures to manage cost, and the need for a consistent supply chain, hospitals and health systems are in desperate need of solutions.



1. Institute for Safe Medication Practices. ISMP Safe Practice Guidelines for Adult IV Push Medications: A compilation of safe practices from the ISMP Adult IV Push Medication Safety Summit. 2015.

2. Lahue et al. National burden of preventable ADEs associated with inpatient injectable medications. *Am Health and Drug Benefits*. 2012;5(7):1-10.

3. Centers for Disease Control and Prevention website. One & Only Campaign. <https://www.cdc.gov/injectionsafety/one-and-only.html>. Accessed 1/10/22.

## IV Automation Solutions: Case Studies Demonstrate Clear Benefits

Over the past 15 years, IV robotic automation has demonstrated benefits to patient safety, accuracy, cost, compliance, and supply chain management. The following four use cases illustrate how.

### Allegheny General Hospital

**Challenge:** Like most hospitals, Allegheny General needed to strike a balance between manual processes and automation to reduce IV compounding costs, increase patient safety, and control inventory to prevent critical drug shortages.<sup>4</sup> So they began leveraging a central pharmacy IV compounding service that provided a sterile IV compounding robot, other tools, and resident expert operators co-located with the robot technology.

**Results:** The hospital reached immediate-impact cost savings through insourcing and netted a savings of \$1.5 million in one year, taking into account the cost of the technology, medications, third-party testing, and a managing pharmacist's salary. Moreover, the organization gained full visibility into compounded products used in critical care units and operating rooms, and overall control of their supply. From a compliance standpoint, the organization also recognizes benefits from a 100% automated documentation process to meet USP <797> standards.



\$1.5M

Annual Savings

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### Huntsville Hospital

**Challenge:** The continual quest to enhance patient safety drove Huntsville Hospital to evaluate its processes.<sup>5</sup> It previously purchased most of its sterile IV products from a single outsourced pharmacy but desired stronger oversight and better safety controls. So the hospital implemented two IV compounding robots and a formulary tool kit, with a trained coordinator and technicians.

**Results:** The hospital quickly found that the robots create a sterile environment; they eliminate the leading cause of IV contamination by removing humans. Consequently, the hospital has achieved zero sterility failures (as tested by an outside laboratory) and a >95% success rate for all robotic preparations. In addition, it has realized financial savings over outsourcing. It easily attained a positive ROI through large batches, pursuing extended beyond-use dating (BUD), and closely managing inventory.

Zero

Sterility Failures

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4. Buckley B. Allegheny makes a case for IV robotics. Pharmacy Practice News. Feb. 16, 2021.

5. Sykes B. Robotic IV production: best practices for quarantine management. Pharmacy Purchasing & Products. March 2020.

### University of Rochester Medical Center

**Challenge:** The multihospital University of Rochester Medical Center wanted to reduce its dependence on outsourcing and increase safety in a wide range of sterile production cases – including neonatal doses and hazardous medications.<sup>6</sup> Therefore, they adopted compounding robots and workflow automation to obtain a high degree of certainty regarding accuracy, integrity, and sterility.

**Results:** All preparations now undergo visual inspection and pharmacist verification as well as sterility testing at an outside laboratory. Nearly 200,000 doses via fully robotic production yielded 0% contamination. Additionally, more than 455,000 doses were prepared with a 0% error rate – not a single error detected – and all within expected specifications. Using standard calculations, the medical center estimates it may have avoided more than 40,000 production errors over the past five to six years, even as it achieved direct cost savings over outsourcing.

0%

Error Rate

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### Moses H. Cone Memorial Hospital

**Challenge:** The flagship hospital of a five-hospital health system, Moses H. Cone Memorial Hospital sought to minimize the complications and safety issues created every time supply chain disruptions caused shortages in ready-to-administer (RTA) drugs.<sup>7</sup> Pharmacy leaders turned to a subscription model for IV robotic insourcing of compounded sterile products with dedicated technicians.

**Results:** The hospital rapidly regained control over the quality and quantity of IV dose preparation and stabilized its RTA drug supply chain through IV robotic insourcing. This has led to improved turnaround times in many OR case procedures. Extended BUD and other RTA drug processes have significantly decreased drug waste. Plus, the hospital has achieved a 50% cost savings for select IV preparations.

50%

Cost Savings

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## Proven Benefits but Low Adoption

The fact that organizations such as these are achieving key benefits begs the question: Why aren't more hospitals and health systems leveraging IV robotics to enhance patient safety while reducing medication waste and reliance on 503B outsourcing?

Only about 7% of U.S. hospitals and health systems have adopted advanced IV robots.<sup>8</sup> This paradox is largely due to two critical pain points experienced with many IV robots: throughput and reliability.

6. Webster DF. Maximizing automation in the IV compounding process. *Pharmacy Purchasing & Products*. June 2017.

7. Omnicell Case Study: IV Robotics Service Produces Reliable Source of Ready-to-Administer (RTA) Syringes at Moses Cone. <https://www.omnicell.com/resources/iv-compounding/case-study-iv-compounding-moses-cone>.

8. IV compounding robots. *Pharmacy Purchasing & Products*. August 2021;18(8):36. <https://www.pppmag.com/article/2787>. Accessed 1/10/22.

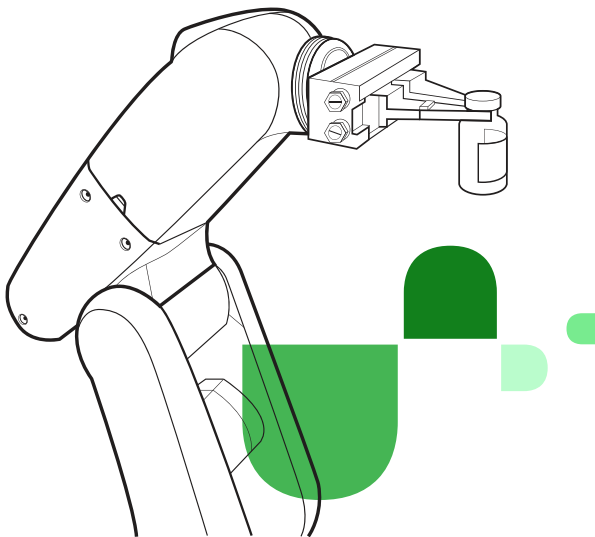
Expert editorials have consistently said that IV compounding robots are too slow and not quite reliable enough. This is summed up best by the title of a 2018 article titled “Robots in the IV Room, Still Not Ready for Prime Time.”<sup>9</sup>

Until these challenges are addressed, it will be difficult for more hospitals and health systems to benefit from the key value drivers that IV robotic technology can deliver. Fortunately, solutions are emerging that retain all the benefits of their predecessors while addressing industry issues with reliability and throughput.

## Full Benefits of IV Automation Within Reach

Traditional sterile IV compounding robotics have delivered tremendous advantages for hospitals and health systems, but they have also come with some historic pain points. Many healthcare organizations have hesitated to adopt technologies that have fallen short of expectations for throughput and reliability.

Omniceil acknowledges the past limitations and has worked to solve them. It is reimagining and redesigning sterile IV compounding robots, removing low throughput and reliability barriers, and enhancing the substantial value they offer. For hospitals and health systems, the full benefits of sterile IV compounding robotics really are within reach.



To see how Omnicell's innovative sterile IV compounding robotic technology could help your healthcare organization, visit [Omnicell.com/ivsolutions](https://Omnicell.com/ivsolutions).

9. Jerry Fahrni. Robots in the IV room, still not ready for prime time. July 22, 2018. <https://jerryfahrni.com/2018/07/robots-in-the-iv-room-still-not-ready-for-prime-time/>. Accessed 1/10/22.

