The Coming Transformation of the
Drug Supply Chain in Health Systems

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Healthcare is one of the few industries where all of us are consumers, but very few of us understand the complexity and chaos in the delivery and economics of patient care. Every day, health systems problem-solve and rally to fulfill the needs of patients. While the daily wins can be rewarding, the burden always seems to grow. Nowhere is this more evident than in drug logistics and pharmacy operations.

Few costs are rising as fast as prescription medications. The rising cost, combined with transitioning of care to ambulatory settings, expanding geographic footprints, evolving regulations, and growing labor shortages, puts health systems in a quagmire. The current ways of doing things, which may have served pharmacy and operational leaders well over last two decades, are stretched and strained. Incremental improvement efforts are no longer adequate under the rising pressures.

> **As the US approaches $1 trillion per year in prescription drug spending and major health systems spend over $1 billion on drug products every year, there is a need to transform how drug products are deployed, tracked, and managed across our health systems. This transformation is becoming a necessity, as current practice can't sustain the trends. Fresh thinking, new approaches, and technical innovation are sorely needed to free health systems from the current logistical quagmire.**

Fortunately, other industries have confronted this challenge and have already transformed their supply chains. The drug supply chain of the future may need to model best-in-class logistics from other industries, such as e-commerce, retail, or industrial/automotive. Doing so can dramatically improve performance – freeing capital, reducing costs, improving efficiency, and ensuring care for millions of patients.

Drug Prices Are **Going in One Direction**

Drug prices continue their unrelenting march upward. Research and science have uncovered new pathways to treat disease, generating drugs with awesome power, such as new treatments for cancer, psoriasis, arthritis, and obesity, to name a few. Their health value may be high, but so is their cost. Yet, even for existing drugs, pricing is vastly outpacing inflation.

According to the Office of Health Policy at the US Department of Human Services[1]:

- The average price of drugs increased by 15.2% from January 2022 to January 2023, which is an average increase of $590 per drug. This was more than three times the increase of $172 from the previous year.
- The median annual price for new drugs in 2023 was $300,000, which was a 35% increase from the previous year.
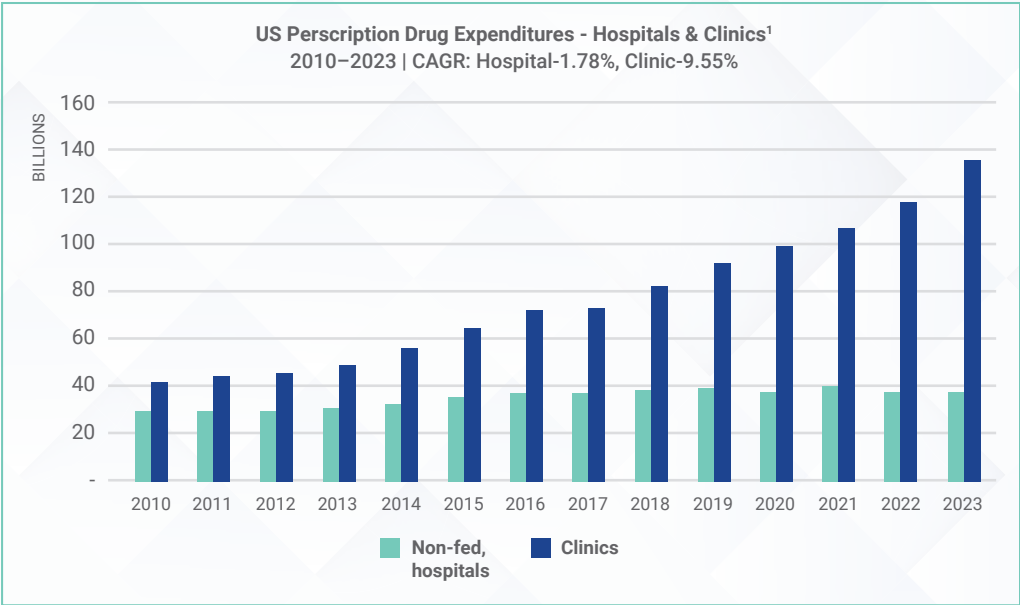
Many new drugs are categorized as 'specialty drugs', which puts new demands on providers in order to properly purchase, prescribe, distribute and administer these high-priced medications. The additional processes and labor for specialty drugs only compound the cost burden.

Growth in Care and **Spending is in the Clinic**

The increasing size and geographical footprint of health systems makes internal logistics and management of drug inventory much more challenging. The trend is toward outpatient care. The modern health system may have a dozen or more hospitals plus hundreds of clinics and/or ambulatory settings. All of these sites need support from pharmacy, and the appropriate supply of drug products to care for patients. The logistics to ensure care while controlling costs is not trivial or easy.

While recent years have seen increased interest and adoption of consolidated service centers to supply all sites of care, most health systems still rely on manual methods and rules of thumb to manage clinic inventory levels. Little visibility and control of drug inventory across the system frequently results in overstock and waste. Under these circumstances, it is difficult for health systems to quickly adapt to new drug usage patterns. Inevitable shortages add complexity to the inventory management challenge, as manual methods are burdensome and inefficient to ration and utilize available stock.

To complicate matters further, the cost of drug products has shifted to the clinic. Recent data published in the American Journal of Health System Pharmacy clearly show that the driver of increasing drug cost is the clinic rather than the hospital.[2]

US Perscription Drug Expenditures - Hospitals & Clinics¹
**2010–2023 | CAGR: Hospital-1.78%, Clinic-9.55%**

The increasing role of outpatient and clinic care, combined with the growth of drug spend in the clinic, requires attention and focus to effectively manage care and costs.

Labor Shortages **Demand Higher Productivity**

Staffing shortages add further strain to health systems, and to pharmacy in particular. The pharmacy team is tasked with deploying, tracking, and managing drugs throughout a health system. Additional sites and larger geographical footprints make logistics complex and add to the pharmacy workload. Yet, for both pharmacists and pharmacy technicians, the number of vacant positions has climbed to the highest levels in 10 years. According to recent research, over 91% of hospitals report a shortage of experienced pharmacy technicians.[3] The technician shortage compounds the pharmacist shortage, as a lack of technicians often diverts pharmacist time that would otherwise be spent on patient care.

Even when a pharmacist or technician is hired, it is hard to get them to stay - annual turnover rates have doubled since 2013. The shortage and churn have a resulting impact on costs, continuity, and performance. Lack of staffing can also impact nursing and other clinical teams, who often interact manually with the drug supply chain and are impacted by stockouts and expired inventory.

Pharmacist & Pharmacy Tech Vacancies by Year 2014-2022

Annual Turnover Rate 2013 & 2022
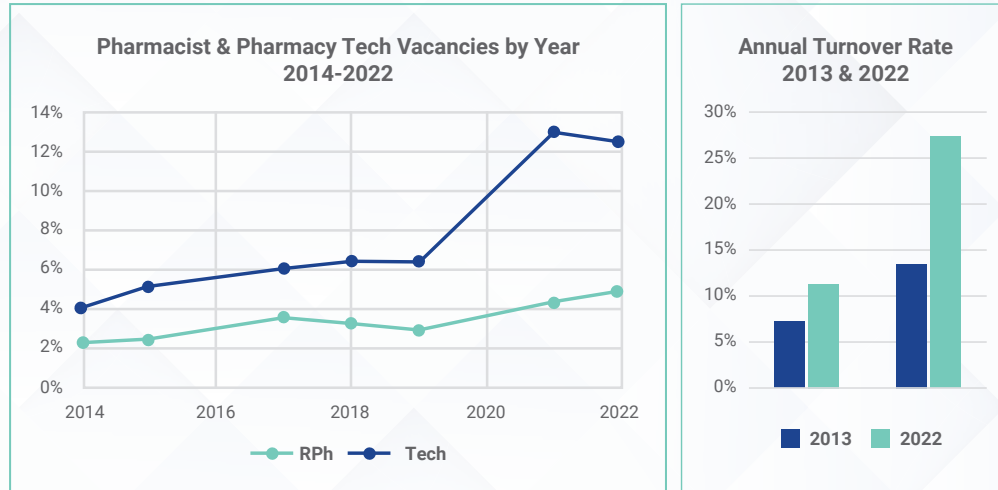
The impact of pharmacy labor shortages stretches from inflated costs to lesser patient care. While perhaps manageable in the short term, the inability to sustain a full, stable workforce has a detrimental impact on the overall performance of a health system. With labor shortages likely to continue, pharmacy will need to find ways to streamline processes, automate, improve efficiency and otherwise drive productivity.

Health Systems **Lack the Tools**

While care, cost, regulation, and labor in healthcare have been changing, the tools for medication management have not kept pace. Automated dispensing cabinets (ADC), medication carousels, and robots were introduced 20+ years ago. They were designed to support acute, inpatient sites of care, like larger hospitals.

While existing automation solutions have all evolved, growing more capable and integrated, they have also grown more expensive and complex. The cost and care of ADC's, carousels, and robots can be justified for acute, concentrated sites of care, but are they well suited to where the modern health system is going? Where care is increasingly provided in outpatient settings? The simple answer is 'no'. We need new solutions to break out of the status quo, to address longstanding trends, and to enable health system leaders to provide effective and efficient care in the future.

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The Drug Supply Chain
Transformation In Health Systems

To adapt and prepare for the future, health systems need to pursue transformational change in the pharmaceutical supply chain. Marginal improvement will not meet the needs as problems mount, care evolves, and legacy tools fail to keep pace with changes in healthcare delivery.

A transformation is needed, but the principles or foundation for the change are not unfamiliar. The path to more capable and efficient supply chains has already been paved by other industries. Healthcare needs to think more like retail, e-commerce, or industrial/automotive, and follow these principles of supply chain transformation:

Digital   **Transparent**   **Collaborative**   **Perpetual**

Digital

To support the complex drug logistics for a modern health system, the drug supply chain needs to be completely digital. Digital means real-time, passive sensing, from 'beginning to end' of the chain, to provide data without need for manual capture or intervention. For health systems, the 'end' is the growing number of sites of care where care is provided. Becoming digital is the foundation of a supply chain transformation – it creates visibility and is the data upon which action and decisions can be made. Real-time, passive sensing automates accurate, standardized data collection without burdening staff.   A digital drug supply chain is the first step in the transformation, and creates a model of the inventory in the health system, a 'digital twin', which forms the foundation for analytics, automation, and AI.

Transparent

Once the drug supply chain is digital, the inventory data becomes an asset. The data needs to be combined, aggregated and made accessible. This makes the drug supply chain transparent, which enables visualization by various stakeholders from end to end. Transparency can reduce overstock and waste, as well as mitigate impacts of drug shortages – it is a force-multiplier, enabling more systems and staff to rapidly analyze, align, improve, or address problems. Measurement and progress are only achievable with shared supply chain data.

Collaborative

Once drug product supply chains are made digital and transparent, they can be made collaborative. A major step forward is when manufacturers, wholesalers, shippers, and others make logistics a 'team game'. Working with various stakeholders broadens solution possibilities and helps optimize decisions throughout the supply chain, going far beyond what happens solely inside health systems. Collaborative supply chains can reduce or eliminate waste for all players while making it easier to respond to drug shortages and recalls in highly coordinated ways. Incorporating the principle of collaboration makes it possible to have just-in-time supply chains like those of other major industries.
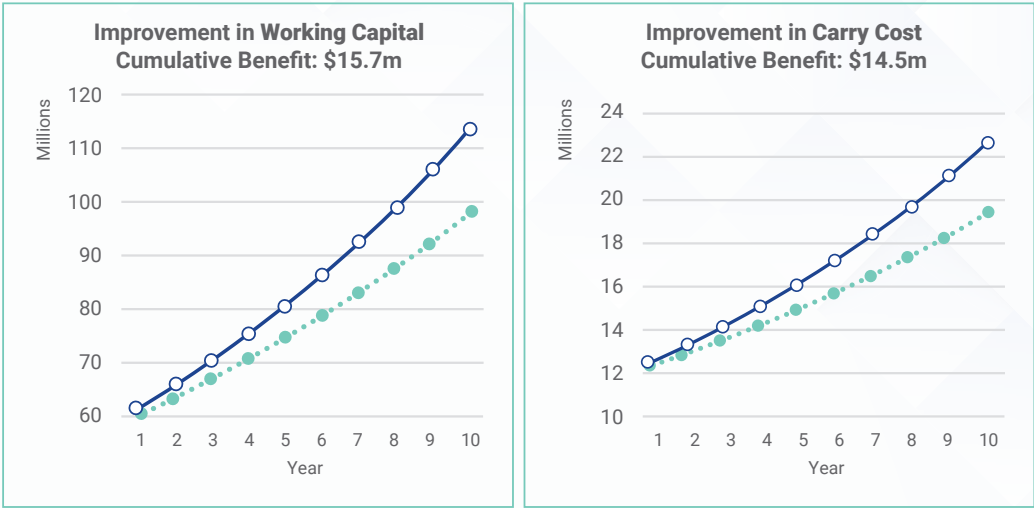
Perpetual

Digital, transparent, and collaborative drug supply chains must also operate perpetually. Operation and management of drug logistics is not a once-a-week task, or triggered cycle counting every month, it's a 24/7/365 operation. It is not manual, but rather automated, integrated, and continuous. A perpetual system gathers information, aggregates data, and initiates action to optimize the chain. Through telemetry and AI, it can engage stakeholders when necessary to intervene. The perpetual system can also scenario plan, considering new sites of care and helping in the management of drug shortages. This releases pharmacy from the nearly impossible task of manually optimizing drug logistics over a complex and broad enterprise.

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The Need is Great **and the Opportunity is Large**

In pursuing a transformation to a more digital, transparent, collaborative, and perpetual supply chain, health systems can embark on a path to meaningful change, positioning themselves to serve patients and operate in a future where costs are growing, care is dispersed, staff is short, and agility is critical.

A simple but representative, hypothetical case demonstrates the value of optimizing inventory capabilities for pharmacy. For example, consider a health system that is spending $750 million per year on drugs, where drug costs are growing 7% per year. Let's assume that the system turns inventory 13 times per year, and has a 20% inventory carrying cost (combination of cost of capital, labor, facilities/storage, and other costs associated with inventory management). If that health system improves inventory turns by just 1.5% per year, the financial savings are over $30 million over ten years.

Improvement in **Working Capital**
Cumulative Benefit: $15.7m

Millions

| | | | | | | | | | |
|120|
|110|
|100|
|90|
|80|
|70|
|60|

Year: 1 2 3 4 5 6 7 8 9 10

Improvement in **Carry Cost**
Cumulative Benefit: $14.5m

Millions

| |
|24|
|22|
|20|
|18|
|16|
|14|
|12|
|10|

Year: 1 2 3 4 5 6 7 8 9 10

Clearly, the opportunity is large. Yet, to achieve these gains and ensure a healthy future for health providers, a transformation is needed. Existing solutions are insufficient, and marginal improvements will not meet the rapidly evolving needs. While the challenges can seem overwhelming, other industries have confronted similar challenges to show a path forward. The journey to a more digital, transparent, collaborative, and perpetual future should begin now.

[1] Bosworth, A, Sheingold, S, Finegold, K, Sayed, B.A., De Lew, N, Sommers, B.D. (Issue Brief No. HP-2023-25). Washington, DC: Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. October 2023.

[2] Tishy, EM, et. al., "National trends in prescription drug expenditures and projections for 2024", AM J HEALT H-SYST PHARM, 15 Jul 2024, https://doi.org/10.1093/ajhp/zxae105

[3] Petersen, C.A., et. al., "ASHP National Survey of Pharmacy Practice in Hospital Settings: Workforce — 2022", https://doi.org/10.1093/ajhp/zxad055.