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ADDRESSING THE INDUSTRY'S MOST IMPORTANT SUPPLY CHAIN ISSUES

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INFLATION AND HEALTHCARE SUPPLY CHAINS

Thoughts from Supply Chain Management Faculty at the Sam M. Walton College of Business

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REPORT HIGHLIGHTS

Inflation has become a universal concern, particularly for the healthcare industry. Domestically produced healthcare inputs, labor, diagnostics, and lab equipment have all seen dramatic price increases.

Healthcare inflation indices likely underestimate price increases because they do not account for pandemic-related product shifts, expensive new drugs entering the market, and additional expenses associated with stockouts of supplies.

Pandemic-related disruptions, sudden shifts in product demand, and price volatility expose healthcare supply chains to substantial inventory risk and reverse arbitrage.

While upstream prices tend to be more flexible, rising with inflation, multi-year reimbursement contracts are sticky and cannot be adjusted frequently. Healthcare providers are then faced with increasing costs and flat revenues, many times resulting in significant financial loses.

WHAT MAKES HEALTHCARE SUPPLY CHAINS UNIQUE

GENERAL INFLATION

Beginning in the spring of 2021, prices began to rise faster than the US Federal Reserve's target rate of 2%. A year later, the rate of price growth had surpassed 8%. Inflation has become a universal concern, but for reasons we discuss below, it has been particularly challenging for the healthcare sector. The purpose of this white paper is threefold. First, we report on inflationary trends affecting the healthcare industry by analyzing recent data from the federal Bureau of Labor Statistics (BLS). Second, we integrate insights from industry interviews to expound on our interpretation of that data. Third, we integrate our data analysis with industry feedback to synthesize and identify key concerns for healthcare supply chain executives and all senior leaders. To begin, we have all heard the term "inflation," but what exactly is it and why is it important in healthcare?

Inflation–the rate of increase in prices averaged over the entire economy–is an average, so it smooths over the variable price evolutions of different items. Some prices have increased much more than average, while others are more "sticky," having barely moved. Depending on how input and output prices have changed, some companies experience windfall gains, while others are hit with stunning losses. This variability in price changes makes inflation a critical concern in healthcare.

WHY THE DESIGN OF HEALTHCARE SUPPLY CHAINS MAKES INFLATION A BIG DEAL

The macro healthcare supply chain can be viewed in three delineated sections described as upstream, middle, and downstream. The upstream portion is composed of organizations involved in the development of important elements of the care bundle, including medical device manufacturers, biotech firms, and pharmaceutical manufacturers. The middle of the macro healthcare supply chain deals with the financing and claims administration associated with care delivery and is occupied by government payors, insurance companies, and third-party administrators (TPAs).

When considering hospital supplies, group purchasing organizations (GPOs) and medical surgical distributors operate in the middle tier. These organizations ensure that healthcare providers have the materials they need and are reimbursed. Finally, the downstream portion of the macro healthcare supply chain is made up of providers involved in healthcare delivery—specifically physicians, hospitals, clinics, home-health services, hospice, and patients.

Fig 1. A macro view of the healthcare supply chain.[1]

- Medical devices - Equipment - Pharma - Biotech	- Group purchasing organizations (GPOs) - Medical surgical distributors - Financiers of healthcare	- Physicians - Allied health professionals - Patients
Upstream inputs: Development of care		Downstream outputs: Delivery of care

[1] Dobrzykowski, D., McFadden, K. and Vonderembse, M. (2016). Examining pathways to safety and financial performance in hospitals: A study of lean in professional service operations. *Journal of Operations Management*, 42-43, 39-51.

Healthcare supply chain leaders often ask us, "Why can't my supply chain perform like Walmart's or General Motors?" This warrants some discussion of the unique nuances of the healthcare supply chain that differentiate it from more mainstream manufacturing or retail supply chains. This could be a lengthy monologue, but we will focus on the elements that are most relevant in understanding the effects of inflation on healthcare supply chains. In more mainstream supply chains, the key functional areas—such as sourcing (or procurement), operations, transportation, and distribution—often exist in vertically integrated organizations. For example, GM sources parts for automobiles and contracts with suppliers; they transport the inbound and outbound delivery of those parts to manufacturing and assembly plants where automobiles are "made" (operations); and they manage the distribution of finished automobiles to dealerships that follow strict franchise guidelines for sale to end customers.

Healthcare supply chains are organized very differently. Historically, hospitals (and other integrated delivery systems) have largely outsourced key supply chain activities, such as sourcing/contracting and distribution. Specifically, GPOs have filled the sourcing role for most hospitals and health systems, while medical surgical distributors have generally transported materials from manufacturers to hospital end users. For example, a typical hospital will place an order for supplies to a medical surgical distributor by midafternoon, then the distributor will pick the order from their inventory previously obtained from a manufacturer and deliver it to the hospital loading dock the next morning. Most of these orders are made on GPO contracts that specify pricing and delivery requirements agreed upon by manufacturers. Both examples (automobiles and healthcare) are a bit of an over-generalization, but they illustrate the idea.[2]

The highly mediated healthcare supply chain model involving GPOs and medical surgical distributors... produced two relevant consequences when contemplating the effects of inflation on healthcare supply chains: asymmetrical price stickiness and inadequate supply chain infrastructure for many hospitals."

The highly mediated healthcare supply chain model involving GPOs and medical surgical distributors emerged over the last thirty years or so and served healthcare providers adequately. It was rooted in hospitals' strategy to join GPOs to exploit larger purchasing volumes (quantity discounts) and to better focus on their core competency of delivering healthcare (not managing supplies). Over time, hospitals relied more and more on these channel partners to meet growing demand for volume and variety of supplies due to innovation and new procedures, globalization

[2] Vonderembse, M.A. and Dobrzykowski, D.D. (2017). *A Healthcare Solution: A Patient-Centered, Resource Management Perspective*. CRC Press / Taylor & Francis. 281 pages, 14 chapters. ISBN 9781498758758 – CAT# K27658.

of supply chains, and the need to keep pace with evolving supply chain technology. This produced two relevant consequences when contemplating the effects of inflation on healthcare supply chains: asymmetrical price stickiness and inadequate supply chain infrastructure for many hospitals.

The contractual arrangements that serve to coordinate most supply chains have created asymmetrical price stickiness among suppliers and their hospital clients. Namely, suppliers can pass on fuel surcharges and other inflationary costs to their hospital clients, while hospitals have very limited or no ability to raise their fee schedule with payors, as these are typically annual (or longer) contractual terms. It should be noted that the suppliers interviewed for this report indicated they use these surcharges only as a last resort to preserve adequate financial performance. On the other hand, suppliers can face a reverse arbitrage in instances when hospitals order supplies on new GPO contracts that may have lower unit prices than the suppliers' purchasing costs (as has happened recently with personal protective equipment (PPE), which has decreased in price following the pandemic). Next, the outsourcing of many supply chain activities has resulted in inadequate infrastructure (i.e., technology and expertise) in managing important cost drivers, such as supply disruptions and substitutions, as well as in meeting performance objectives like on-time-in-full (OTIF) inventory metrics. The implications of these challenges are discussed throughout this white paper.

WHY IS INFLATION IMPORTANT TO HEALTHCARE PROVIDERS RIGHT NOW?

Hospitals faced several financial challenges before the pandemic, including underpayment from Medicare and Medicaid,[3] pressure to cut costs and improve quality to benefit from Medicare's value-based purchasing program, and staffing shortages[4] that often required raising wages. While some hospitals thrived, the median hospital profit margin was only 3.5%.[5]

COVID-19 brought new challenges, forcing firms throughout the healthcare supply chain to deal with soaring costs, price gouging, supply chain disruptions, product shortages and substitutions, unprecedented demand for certain goods and services, and employee burnout.

As COVID case numbers started to dip in spring 2021, inflation began gaining momentum and compounding companies' financial woes. Recent financial reports show how badly many healthcare providers are struggling in this inflationary environment, with some large hospital systems posting operating losses in the hundreds of millions[6] and others experiencing quarterly losses exceeding $1 billion.[7] Let's consider what the publicly available data measuring inflation might tell us about what is happening in healthcare supply chains.

[3] https://www.aha.org/system/files/2019-01/underpayment-by-medicare-medicaid-fact-sheet-jan-2019.pdf

[4] https://www.tmc.edu/news/2019/08/whats-behind-the-nursing-shortage-how-can-we-fix-it/

[5] https://www.aha.org/guidesreports/2020-07-20-effect-covid-19-hospital-financial-health

[6] https://www.beckershospitalreview.com/finance/providence-s-operating-loss-grows-to-934m-as-it-shrinks-leadership-team.html

[7] https://www.beckershospitalreview.com/finance/kaiser-posts-1-4b-loss-in-q2.html

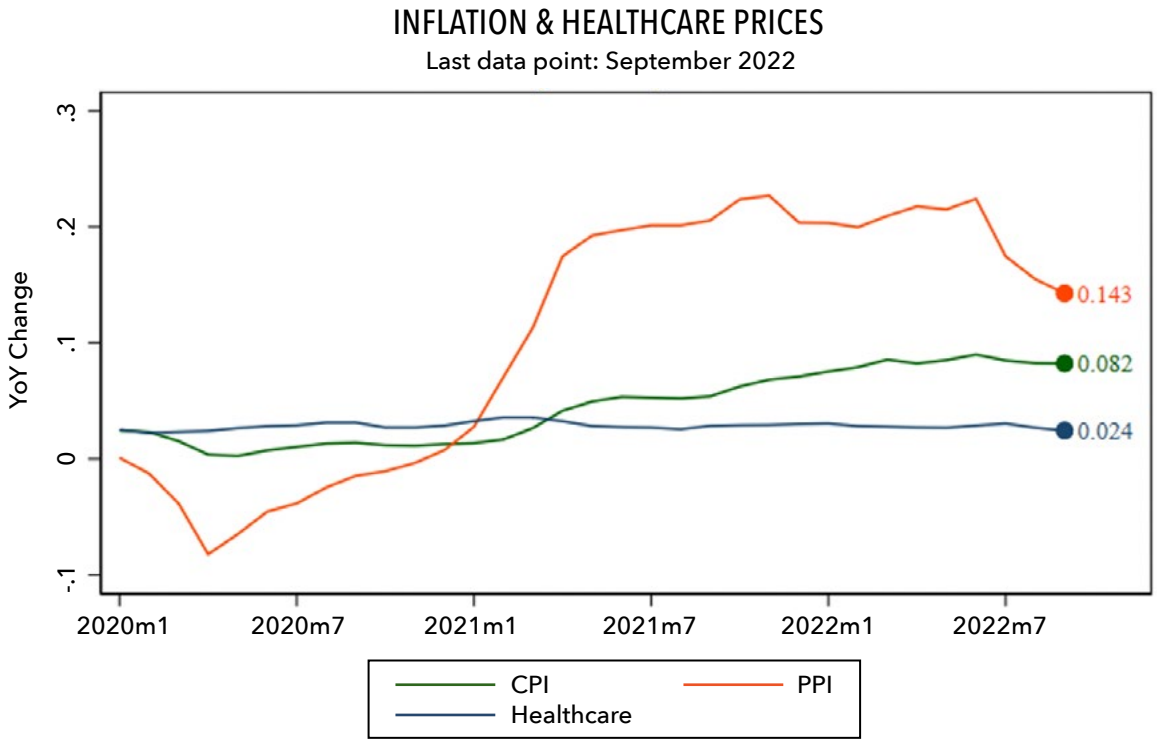
TRENDS: A LOOK AT THE DATA

IT'S NOT OFTEN THAT HEALTHCARE IS CONSIDERED CHEAP

The healthcare supply chain has both sticky and flexible prices at different points. On the consumer-facing end, prices for healthcare services have been stable, having been largely set in rigid, long-period contracts between insurance companies and hospitals, and by administrative fiat. Prices for medical and surgical equipment, a necessary input for healthcare provision, have been much more variable. These general trends are evident in Figure 2. Prices for the final consumer goods economy-wide have risen 8.2% (green line, measured by the Consumer Price Index (CPI)). In contrast, the average price of healthcare services has increased at a slower rate of 2.4% (blue line). Input costs in the economy, as measured by the Producer Price Index (PPI, an index of many intermediate goods used in production) has increased much faster—at 14.3% (orange line). These trends have created a squeeze in healthcare supply chains, where prices at the patient end have been stable while per-patient input costs have exploded.

Inflation trends have created a squeeze in healthcare supply chains, where process for patients and payors have been stable while per-patient input costs have exploded.

Fig 2. Key inflationary trends.

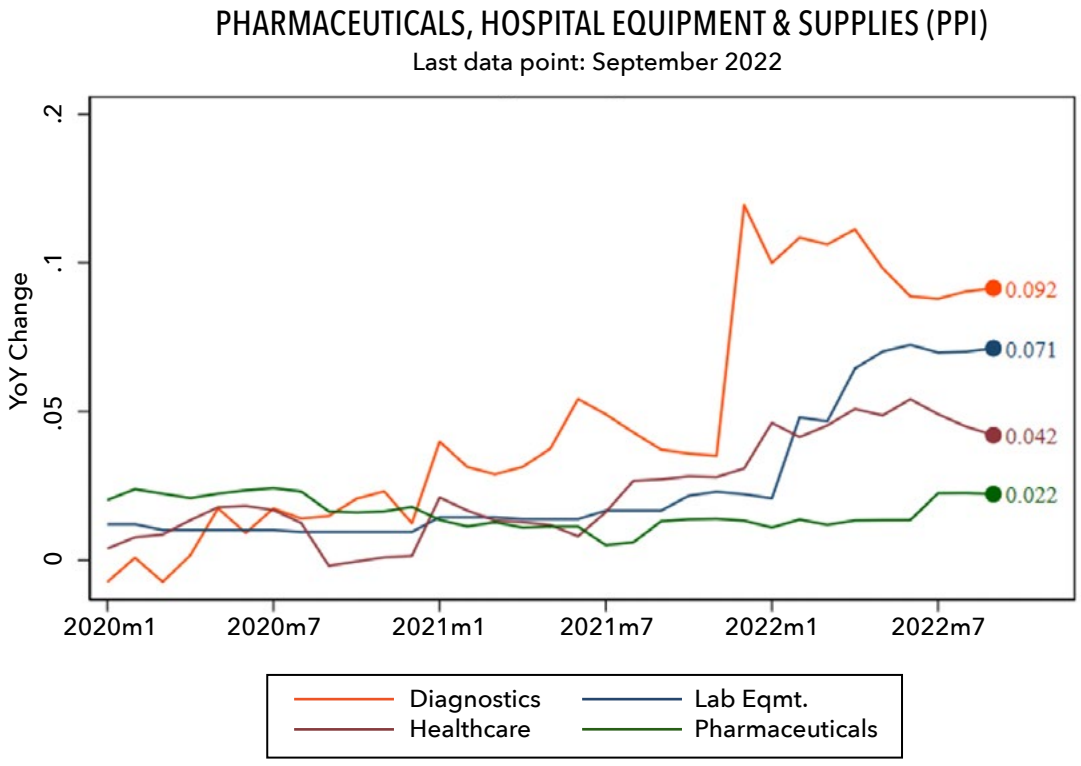


*PPI is by commodity classification

The BLS data tell part of the story of inflation in healthcare supply chains. Figure 3 shows prices manufacturers charge for diagnostic reagents for testing (up 9.2%), lab equipment (up 7.1%), surgical/medical supplies (up 4.2%), and pharmaceuticals (up 2.2%). It is conceivable that diagnostics and laboratory equipment have increased more substantially than other categories—in part, because of dramatically increased demand for testing supplies driven by COVID. Surgical and medical supplies have increased, but at a more moderate rate, which may point to a lag in pent-up inflationary pressure awaiting providers when comparing the overall Producer Price Index in Figure 3 (14.3%) and the surgical/medical PPI (4.2%).

Though the data suggest that pharmaceutical costs have remained relatively flat amid soaring inflation, the 2.2% figure could be misleading. BLS economists track prices for a predetermined "basket" of commonly prescribed drugs. The current basket was set before March 2020, so the data below may not reflect price spikes for drugs that were in unusually high demand during the pandemic. The data also do not reflect costs for new-brand and specialty drugs with high price tags that hit the market after the BLS basket was set.

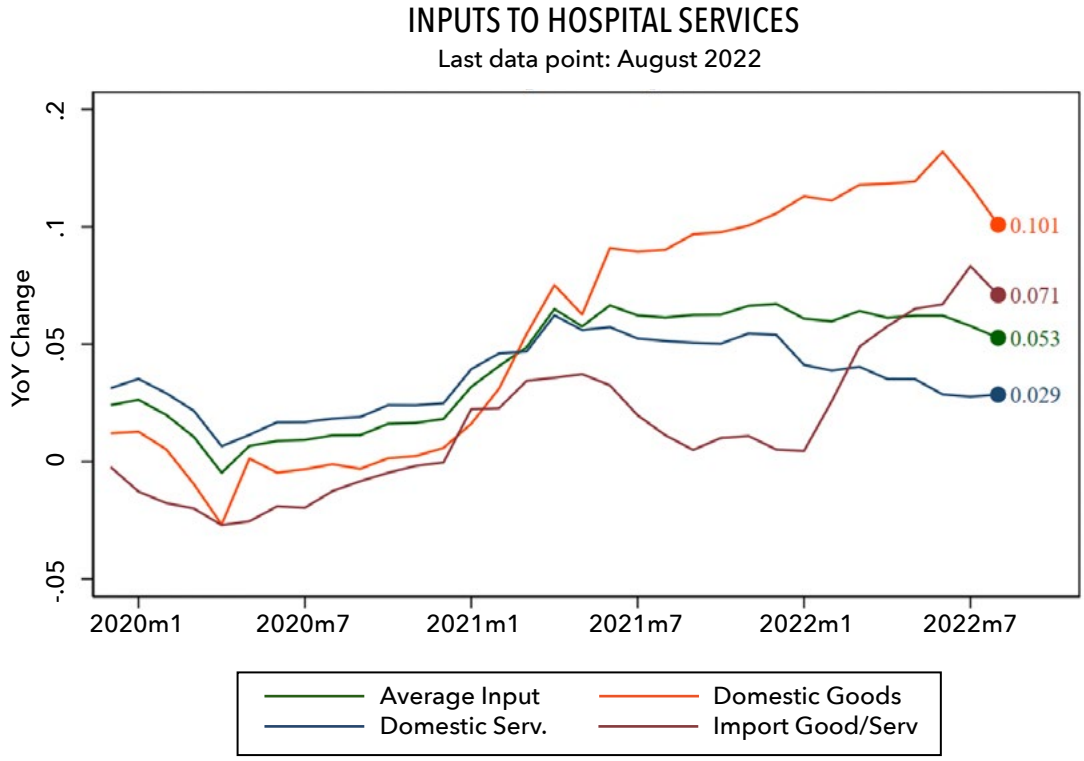
Fig 3. Year-over-year inflation for key medical product categories.



INFLATION AND RESILIENCY MAY NOT MIX!

Re-shoring and near-shoring of healthcare manufacturing became popular discussion topics during the pandemic, as strong global demand and supply chain disruptions made it extremely difficult to import certain products. While many firms are taking steps to re-shore or near-shore, Figure 4 below suggests it will be difficult. The gap between the costs of domestic goods (up 10.1%) and imported goods (up 7.1%) attests to more rapid price increases for manufacturing in the US. This may provide early evidence of the higher costs associated with many resiliency strategies.[8]

Fig 4. Hospital input costs.



LABOR SHORTAGES: HEALTHCARE IS TOUGH WORK!

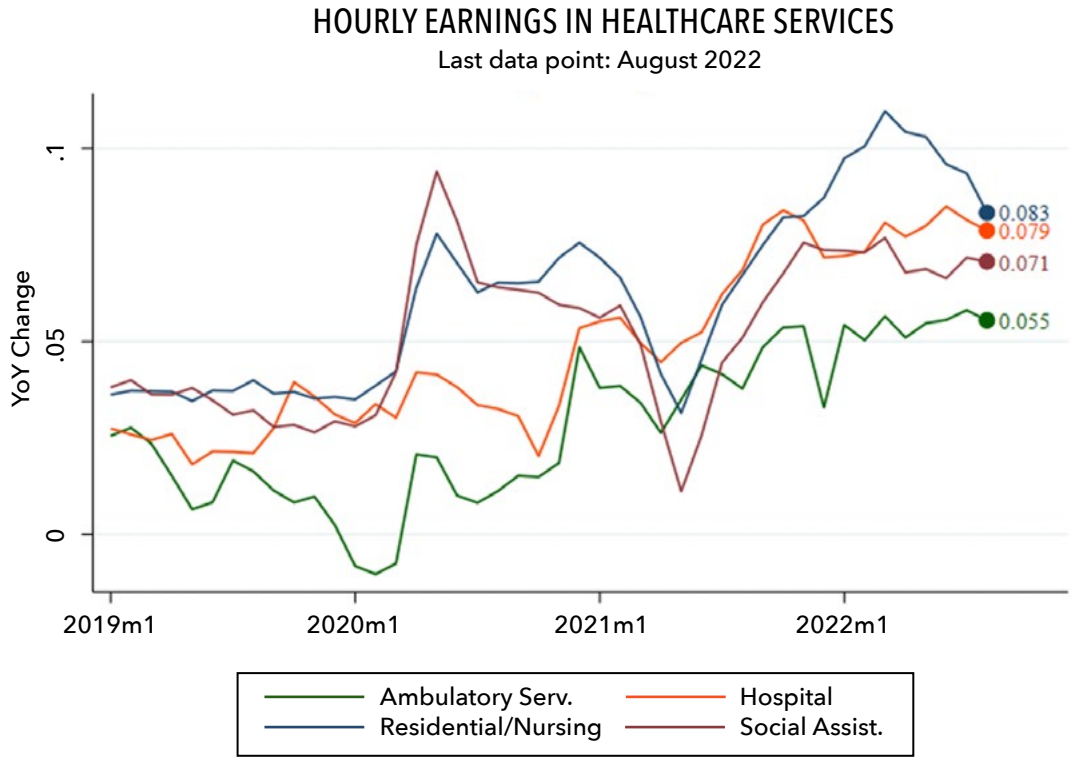
Healthcare worker burnout and labor shortages were problems before the pandemic, and they were only made worse by COVID and a tight labor market. The Surgeon General recently suggested that providers "build a thriving health workforce" by "ensuring living competitive wages" and even offering "hazard or retention pay opportunities."

The 5.5% to 8.3% year-over-year wage increases we see below suggest that providers were already doing those things. But healthcare revenues only rose 2.4% from August 2021 to August 2022,

[8] https://www.smisupplychain.com/speaking-of-supply-chain?tmpl=component

so providers faced a difficult balancing act as they tried to maintain staffing. Inflationary labor pressure was first and most substantially felt in the residential/nursing category (8.3% year-over-year), followed by hospital staff (7.9%), social assistance (7.1%), and ambulatory services (5.5%). Initially, these trends may surprise individuals who would expect lower-skilled occupations, such as residential/nursing positions, to increase at a lesser rate than their counterparts; however, these lesser-skilled categories likely face the greatest competition for labor from other non-healthcare provider industries, such as restaurants and entertainment, that offer less demanding work at comparable pay rates. See Figure 5 below.

Fig 5. Healthcare labor costs.



WHAT ARE SUPPLY CHAIN LEADERS SAYING?

The Bureau of Labor Statistics is the most comprehensive and representative source for inflation data. Nonetheless, any methodology used in calculating an inflation index involves fundamental trade-offs that result in unavoidable biases. These biases are likely to be particularly acute in the healthcare sector so that true inflation is systematically *underestimated*. First, as previously mentioned, the goods monitored by the BLS were chosen prior to the pandemic. The onset of COVID caused the healthcare industry to shift purchases towards pandemic-related items that were in short supply and growing in price. This purchasing shift means true cost inflation in the

healthcare sector is significantly higher than reported. Second, inflation indices do not measure product availability. Product substitution possibilities are more limited in the healthcare sector, making backorders and stockouts extremely costly. An item being unavailable can result in substantial cost increases to providers, even though the item's menu price has not changed. These sorts of stock-outs are the most important source of cost inflation in the industry. Since the indices do not capture them, it is vital to canvass industry supply chain managers to get a full view of the price pressures. For this white paper, we interviewed a dozen strategically placed healthcare supply chain executives to get a better sense of how inflationary pressures are affecting the sector.

DISRUPTIONS MAY BE A BIGGER COST DRIVER THAN INFLATION

In addition to the effect of inflation on aspects such as labor costs and medical supplies, healthcare providers must deal with the effects of supply chain disruptions around the globe. The healthcare supply chain has not been immune to the effects of lockdowns in Asian countries, ongoing congestion at ports, and a shortage of truck drivers, to name a few. As a result, shortages of medical supplies and drugs have become common over the last two years. Even in recent months, healthcare providers have been forced to deal with shortages of key items, such as contrast media, after a GE plant in Shanghai had to temporarily close following a lockdown caused by a surge in COVID cases.[9] Changes in demand patterns, as well as global transportation delays, have recently caused shortages of blood specimen collection tubes in another example of supply chain disruptions affecting healthcare providers.[10]

For an industry where patient care is critical, going without essential drugs and supplies is not an option. Ongoing shortages are forcing providers to purchase these necessary items from alternative suppliers or buy more expensive substitutes, ultimately increasing costs. This is largely because many substitute products are purchased by hospitals "off contract," meaning they cannot take advantage of GPO pricing. One chief supply chain officer from an integrated delivery system in the Midwest shared with us, "The cost of a backorder is much greater than the cost of the widget."

"The cost of a backorder is much greater than the cost of the widget."

These disruptions may be most visible in the downstream healthcare provider tier of the supply chain, but they obviously adversely affect operations upstream for distributors, GPOs, logistics and transportation organizations, suppliers, and manufacturers. For example, healthcare distributors and manufacturers are also dealing with the effects of inflation, uncertainty in availability of raw material and/or finished products, challenges associated with transportation, etc. While we often

[9] https://www.medtechdive.com/news/ge-end-contrast-media-shortage/624846/
[10] https://www.bmj.com/content/374/bmj.n2174

think of price increases as a main issue in an inflationary environment, even when protected by sticky contracts, some suppliers implement more opaque but still adverse actions in their trade relationships. A C-level executive with a major medical surgical distributor commented on their supply relationships with manufacturers, saying, "If price increases weren't allowed, then terms were changed."

Medical surgical suppliers have been forced to increase inventory levels to ensure reliable product supply to healthcare providers. More inventory creates not only the obvious increase in holding costs, but also a sort of reverse arbitrage for distributors.

The ongoing supply chain disruptions since the onset of the pandemic have caused significant price variations for gloves, masks, and related products. These products experienced huge price increases during the start of the pandemic, with prices stabilizing later as availability returned. The practice of holding more inventory increases risks significantly for medical surgical suppliers when market prices drop, causing inventory to lose value. Moreover, challenges associated with a shortage of truck drivers and increased fuel prices have caused transportation costs to swell, undermining manufacturer and supplier bottom lines.

THE EFFECTS OF LABOR CHALLENGES

Healthcare services are labor intensive, representing the largest portion of most hospitals' budgets. Physicians, nurses, and laboratory technicians are some examples of highly skilled labor that is required to provide patient care.[11] In addition, healthcare services also rely heavily on support staff to ensure drugs and medical supplies are available for patient care. It is not surprising then that labor represents the greatest expense for service providers. Shortages of nurses were common prior to COVID, and the sudden increase in number of patients only compounded the problem. In addition, multiple waves of the pandemic resulted in clinician

[11] Dobrzykowski, D. and McFadden, K. (2020). Examining governance in hospital operations: The effects of trust and physician employment in achieving efficiency and patient satisfaction. *Decision Sciences Journal*, 51(1), 74-109.

burnout, further increasing staffing shortages. Hospitals relied on traveling nurses to fill the gap, significantly increasing labor costs. While rates for traveling nurses vary regionally, the increase in demand was reflected by the margins captured by staffing agencies. The average margin retained by staffing agencies for travel nurses in 2019 was about 15%, compared to 62% in January 2022.[12]

Providers also had to deal with labor shortages for support staff in charge of auxiliary services. Nursing homes, as well as skilled-nursing facilities, were particularly impacted by this trend. Many of their support-staff positions appeal to entry-level workers, and, as a result, high turnover rates in this healthcare sector are common. Now, nursing homes and skilled-nursing facilities must compete not just with other healthcare providers, but also with employers in unrelated fields like restaurants and retail. One C-level supply chain executive from an integrated delivery system in the Midwest said: "Emptying bedpans and caring for nursing home residents is hard work… it can be hard to compete when caregivers can earn $17 per hour at Chipotle." This labor trend is not exclusive to healthcare providers. Medical suppliers and manufacturers are also struggling to compete for labor with other industries, as entry-level wages have increased rapidly.[13]

"Emptying bedpans and caring for nursing home residents is hard work… it can be hard to compete when caregivers can earn $17 per hour at Chipotle."

[12] AHA Report: https://www.aha.org/system/files/media/file/2022/04/2022-Hospital-Expenses-Increase-Report-Final-Final.pdf

[13] https://www.bostonglobe.com/2021/12/09/business/first-time-decades-earnings-are-rising-faster-lower-wage-workers/

DISRUPTIONS ARE CAUSING FRACTURED RELATIONSHIPS BETWEEN DISTRIBUTORS AND PROVIDERS

With demand outpacing supply for items such as masks, gloves, syringes, etc., suppliers have been forced to impose quotas, or allocations, upon healthcare providers in an effort to fairly distribute scarce products among their customers. Disruptions and substitutions also have strained relationships between suppliers and healthcare providers, sometimes resulting in providers turning elsewhere. An executive with a major medical surgical distributor summed it up by saying, "It has never been a worse time to be an incumbent supplier." The executive went on to explain that some suppliers may even be diverting product from primary hospital clients to secondary clients in an attempt to gain a foothold from a business-development perspective. Provider feedback seems to reaffirm this risk. "We are open to going out to bid if necessary," said one chief supply chain officer.

While the pandemic has tested certain provider-supplier relationships, it has strengthened others. Manufacturers and suppliers that increased their level of transparency and communication during the height of COVID were able to forge stronger partnerships with healthcare providers who saw this willingness to share information as a way to increase supply chain resilience. Multiple medical surgical distributors have developed teams that provide hospital clients with regular risk/disruption alert dashboards. This addresses some of the previously described supply chain infrastructure issues faced by hospitals.

Finally, collaboration among suppliers and hospitals is key to improving supply chain performance, particularly during times of extreme strain. Unfortunately, disruptions may actually be hampering the very behavior and approaches needed to make strategic systemic improvements. A chief supply chain officer from a large integrated delivery system stated that their firm has not gotten into conversations about lowering costs, reducing skews, and other strategic approaches to improve supply chain performance. The officer said they "are in a knife fight just getting product in the door," which has hampered efforts to make strategic improvements.

THESE COSTS ARE NOT GOING AWAY IN THE MEDIUM TERM

KaufmanHall[14] in 2021 estimated that at least one-third of healthcare providers operated under negative margins, combining for a loss of $54 billion in net income. Over the last few months, examples of healthcare systems reporting increased operating costs, as well as losses, have become common. Mayo Clinic reported an increase of 11% in year-over-year expenses in the second quarter of 2022.[15] Increases were observed in all categories, including salaries and benefits. The University of Pittsburgh Medical Center (UPMC) also reported higher operating expenses in the first half of 2022, up 6.9% from 2021 ($11.6 billion to $12.4 billion). Expenses were reported to increase over all categories, including supplies, salaries, and benefits.[16] UPMC also reported a net loss of $844.1 million in the first half of the year. Given our analyses described earlier, cost pressure will likely persist when considering the difference between the PPI (14.3% in Figure 2) and the increases passed on to hospitals from medical/surgical suppliers (4.2% in Figure 3). With inflation still at near-historic high levels, along with staff shortages and continued supply chain disruptions, it is reasonable to expect that increased costs are here to stay, at least for now.

The combination of ongoing workforce shortages, as well as increased hospital expenses, is forcing providers to make difficult decisions regarding services that can be offered. According to Becker's Hospital Review,[17] ***13 hospitals reported scaling back services like labor and delivery, pediatric inpatient units, emergency services, psychiatric units, and more.***

From our discussions with hospital executives, we also learned that in addition to closing service lines, hospitals are working hard to deliver care more efficiently. This is requiring high levels of collaboration across healthcare organizations that include bringing together physicians, hospital management, and supply chain administrators to devise care plans that can mitigate the effect of product shortages while making hospital operations more efficient.

[14] https://www.aha.org/system/files/media/file/2021/09/AHA-KH-Ebook-Financial-Effects-of-COVID-Outlook-9-21-21.pdf

[15] https://www.beckershospitalreview.com/finance/mayo-clinic-operating-income-slips-66-in-q2.html?origin=BHRE&utm_source=BHRE&utm_medium=email&utm_content=newsletter&oly_enc_id=9652A9919923J1D

[16] https://www.beckershospitalreview.com/finance/upmc-s-operating-income-sinks-86-in-first-half-of-year.html?origin=CFOE&utm_source=CFOE&utm_medium=email&utm_content=newsletter&oly_enc_id=9652A9919923J1D

[17] https://www.beckershospitalreview.com/care-coordination/10-hospitals-cutting-services-712.html

CLOSING THOUGHTS AND RECOMMENDATIONS GOING FORWARD

Inflation will likely continue to plague healthcare supply chains for the next 18 months. While the Federal Reserve expects overall inflation to attenuate substantially through 2023,[18] pricing rigidities within healthcare mean that inflationary trends in that sector will lag the rest of the economy. We therefore close this white paper with some recommendations.

There are two paths to improving financial performance: increase revenue or become more efficient. On the revenue side, it is critical that hospital leaders not only attempt to renegotiate payor contracts for more favorable rates and terms, but also seek new revenue streams.

This is a place where local market share achieved through the development of integrated delivery systems can provide providers with leverage in renegotiating fees with payors. Unfortunately, 'size' does little to help health systems 'leverage' their spend with upstream partners (explaining the current industry structure and roles of GPOs). However, new or expanded revenue streams could include direct-to-employer strategies that shore up referral streams and allow hospitals to capture what were previously the payor's margins. From an employer perspective, Walmart's Centers of Excellence approach provides a relevant example.[19] More related to supply chain, leaders ought to think about not only developing improved procurement/sourcing, materials management, and process expertise, but these competencies can also be bundled and provided to other (perhaps smaller) healthcare providers in need of these consulting services. These innovations will likely include developing regional GPOs, private-label manufacturing capabilities, and potentially even consolidated service centers. As a relevant example, Mercy Health Resource Optimization and Innovation (ROi) was recently acquired by HealthTrust.

On the efficiency side, labor costs will continue to represent a significant expense to providers. Any measures that can reduce the need for labor or improve efficiency will provide necessary relief to overworked healthcare professionals. Payroll pressures may force health systems to look more seriously at new forms of automation,[20] as well as information technology that can streamline healthcare delivery and allow patients to play a more active role in their health outside of hospital walls. These innovations might include wearable technologies to monitor patient health and automated technology for supply tracking and replenishment. It is worth noting that interviews with hospital supply chain leaders indicate that the business case for automation is often more

[18] https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20220615.pdf
[19] https://one.walmart.com/content/dam/themepage/pdfs/centers-of-excellence-overview-2022.pdf
[20] https://ivypanda.com/essays/management-information-system/

successful than when seeking funding for artificial intelligence and other technologies that offer value that is more speculative or requires the translation of 'insights' into improved operational performance. From a strategic perspective, as the financial performance of some hospitals suffer, more industry consolidation is likely.

Regardless of an efficiency or revenue-oriented strategy, collaboration throughout the supply chain will be key to success. This is a bit of a paradox, given that health systems seem more inclined in this environment to solicit requests for proposals and potentially realign with new supply chain partners. All these initiatives will require changes to existing and developing new clinical and business processes that rely on supply chain integration.

Finally, it is incumbent upon us to highlight the opportunities recent years have brought about to develop more advanced, sophisticated thinking around healthcare supply chain management. The last decade has seen an increase in business education for healthcare leaders, as evidenced by the growth in graduate healthcare management education.[21] Moving forward, it is evident that more specialized knowledge, such as that offered by master's degree programs in supply chain management, can help healthcare leaders invest in skills they can leverage to bring innovation that grows both revenue and efficiencies. Specialty master's programs tend to be more targeted, shorter, and less expensive than traditional MBA degrees, allowing professionals to accelerate their organizational impact.[22] Hospitals and health systems are not the only audience for this kind of skills development, but moving forward, we expect that customer-facing professionals in the healthcare supplier community will also benefit from developing this type of expertise that will allow them to work more effectively with their hospital supply chain partners.

[21] Commission on Accreditation of Healthcare Management Education: https://drive.google.com/file/d/1PXriOGTlJrqbqwq_zlf7LLgBr-iv3fzE/view?pli=1

[22] Learn more about our Masters in SCM programs at the Walton College of Business: https://walton.uark.edu/graduate-programs/supply-chain-masters-degree/

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[23] https://dobrzykowski.wordpress.com/
[24] https://walton.uark.edu/departments/supplychain/directory/uid/crosales/name/Claudia+Rosales/
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