

# 2020—The Year the World Was Awakened to the Importance of Supply Chain Management

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Some consumers have an understanding of and appreciation for the importance of supply chains. However, most also take for granted that a supply chain performs flawlessly. Over many years, we have been lulled into a false sense of supply chain stability and security. From the consumer perspective, this belief is primarily the result of a product being immediately available when we shop or having it delivered the next day to our doorstep from a fulfillment center. When this happens, the obvious conclusion is, “it must be working.” The coronavirus disease 2019 (COVID-19) pandemic challenges conventional wisdom related to the resiliency and agility of the supply chains in health care and many other industries. While efforts to effectively treat and eradicate COVID-19 continue, so do supply chain efforts across health care to recover, increase resiliency, and add capabilities that best support the provision of safe, cost-effective, high-quality care for patients. This goal must be achieved in an environment in which normalcy coexists with the possibility of a resurgence of COVID-19 or, worse, a future pandemic. The year 2020 will be memorialized as the year the world was reminded, or for some, awakened, to the importance of supply chains.

## BACKGROUND

The Council of Supply Chain Management Professionals defines supply chain management as, “the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. The definition includes the coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand

management within and across companies.”<sup>1</sup> The Council of Supply Chain Management Professionals acknowledges that the definition of supply chain management has continuously evolved in response to changing world events involving supply management. This reality may not be fully acknowledged or minimally actioned by healthcare organizations because some fail to recognize that supply chain management plays a foundational role in attaining organizational strategic priorities. This view is changing with recognition of the amplified importance of supply management during the pandemic. For other industries, supply management is the lifeblood of their work because success or failure is based on the performance of their supply chain. Consumer electronics, big box retailers, grocery stores, and online retailers are good examples of megalithic supply chains that work relentlessly to move a product from manufacturer to a customer’s hands. Matching supply and demand has become a precise, data-based science utilized by companies to deliver products as cost-effectively and efficiently as possible. For many health care providers, supply chain precision is aspirational rather than a realized strategic advantage, and as COVID-19 has demonstrated, such an attitude can quickly become a vulnerability during times of acute stress.

There are notable differences between an industrial supply chain involved in manufacturing a product from raw materials to meet production quotas and a health care supply chain acquiring, storing, and inventorying, distributing, and utilizing products for patient care. In health care, products could constitute anything from basic commodity supplies to pharmaceuticals, complex medical devices, and diagnostic or therapeutic equipment. The inefficiencies of the health care

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supply chain are often compared with the efficiencies of industrial manufacturers, which are planned, predictable, and cost-effective because of their ability to anticipate their demand. Health care has little in common with the dynamics that drive those efficiencies. Although year-to-year predictability is reasonable in health care, daily variation of patients can be common. Health care providers never know with high certainty what is coming through the hospital, clinic, or emergency department door.<sup>2</sup> In addition, many health care organizations lack or do not consistently apply rigorous analytics when managing their practice. Despite the high level of daily variation in health care, the “consumer” (patient) expects personalized care, and the stakes are high—literally life and death. The starkest differences between health care and other industries’ supply chains include:

- Limited ability to predict supply needs based on demand. Although some planning can occur (largely budgetary), it is impossible to accurately plan an exact number and mix of patients any health care provider will treat on a daily basis.
- Health care supply chains plan for “just in case” rather than an exact quantity of product needed based on demand planning principles.
- Lack of transparency between health care providers and suppliers. The inability to see supply in inventory or what is in transit complicates the ability to ensure supply availability. Similarly, suppliers are shielded from knowing consumer demand.
- High degree of complexity of providing care to patients with the need for tens of thousands of products, devices, and drugs.
- Health care organizations need to accommodate an individual physician’s preference in the selection of a product or device.
- Limited investments in technology enabling visibility to inventory on hand, utilization, and robust analytics to determine supply availability over time.
- Routine presence of tens of thousands of nation-wide manufacturer or distributor back orders, recalls, stocks outs from health care suppliers.
- High degree of interproduct variability that impedes the ability to quickly switch

between products. For example, N95 masks from different vendors require user-specific fit testing and training (Figure).

- Regulatory burden of health care exceeds other economic sectors.

Although differences exist, health care supply chains have advanced. Some health care providers view their supply chains as a strategic differentiator. Over several decades, health care leaders have become increasingly astute stewards of their financial resources, constantly evolving and adapting to changing economic factors as the result of legislation, new regulations, and market challenges. From the initiation of Medicare to diagnosis-related groups, managed care, and, more recently, value-based payment programs, health care providers have had to evolve just as their supply chains have pursued new and incremental sources of value in response to strategic and economic imperatives.

As evidenced by the ever-changing dynamics across all business sectors, each year Gartner, Inc recognizes the top supply chains in industry and health care/life sciences. For 2020, Gartner focused on supply chains that exhibited adaptability and resiliency during disruption along with other differentiating capabilities. Gartner recognizes a Masters Class of companies that have demonstrated excellence over multiple years, and for 2020, the industry-wide list included [Amazon.com](https://www.amazon.com), Inc, Apple Inc, McDonald’s, Procter & Gamble, and Unilever.<sup>3</sup> In health care/life sciences, the Masters Class was represented by Cardinal Health, Intermountain Healthcare, and Mayo Clinic.<sup>4</sup>

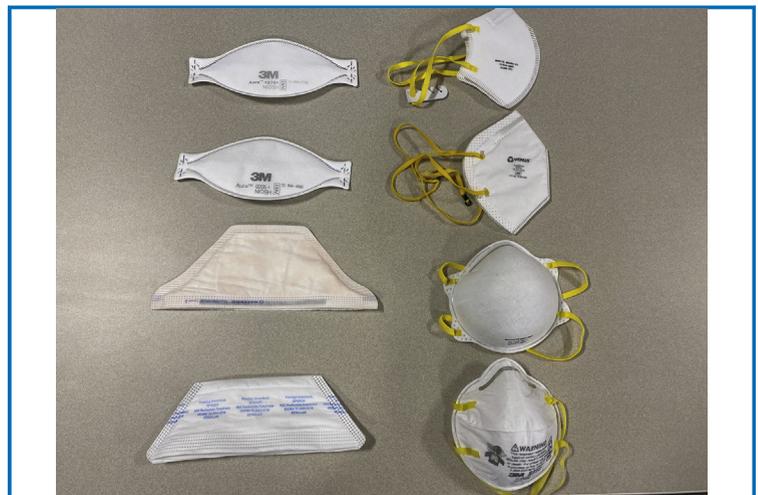
### COVID-19 IMPACT ON SUPPLY CHAINS

In order to effectively respond to a worldwide pandemic or incessant daily supply challenges, proactive monitoring of world events and potential supply disruptions followed by timely executed mitigation plans are critically important. Increasingly, health care providers have developed business continuity plans for a wide range of third-party risks in today’s operating environment. Taking actions based on such monitoring improves an organization’s agility and resiliency in the face of uncertainty. Building on lessons learned from previous infectious outbreaks such as severe acute respiratory syndrome, influenza A virus subtype

H1N1, and Ebola virus and more recently from Hurricane Maria's destruction of Puerto Rico in September 2017 that left several manufacturers scrambling to resume production, in 2018 Mayo Clinic began investing in its business continuity planning, which enabled a more rapid response to the COVID-19 pandemic.<sup>5,6</sup>

The first known case of COVID-19 was detected in the United States on January 19, 2020.<sup>7</sup> Shortly thereafter, the first case of local COVID-19 transmission in the United States was confirmed.<sup>8</sup> These cases triggered announcements of a public health emergency and subsequently a national emergency declaration issued on March 13.<sup>9</sup> Prior to these events, Mayo Clinic's supply chain was under way with mitigation activities to minimize any potential disruption to the provision of patient care. Despite best efforts, no amount of planning fully prepared health care or other industries for the coming global pandemic and its dramatic impact on supply availability. Unilateral governmental interventions such as nationalization of locally produced materials, supply blockades, disruption of transportation, and international trade complexities were contributing factors that ground supply chains to a halt. COVID-19 continues to illustrate just how fragile the supply chain can become in a few short weeks when there is an overreliance on overseas manufacturing from a single region, particularly related to personal protection equipment (PPE), some of the most critical products required during COVID-19.

Early indications of potential supply shortages began to surface in February, as the US Food and Drug Administration began monitoring COVID-19 and its impact on the health care supply chain.<sup>10</sup> Initial focus was placed on testing supplies, swabs, reagents, and other equipment needed for disease detection. It quickly pivoted to disruptions of PPE supplies and shortages of critical medical products, pharmaceuticals, and ventilators as demand surged across the globe. Health care providers had to immediately transition to a command and control mode. Traditional sources of product quickly became overburdened, resulting in manufacturers and distributors implementing allocations in an attempt to fairly distribute increasingly scarce products and



**FIGURE.** Examples of N95 masks.

more importantly, limit health care provider stockpiling. In desperation, health care organizations turned to nontraditional sources for products and conservation methods.

Directly sourcing from international suppliers, usually via a broker or multiple brokers, is uncharted territory for health care supply chain professionals despite many health care products being manufactured in foreign countries. It presents many risks such as counterfeit products, price gouging, constantly changing terms and conditions, dealing with foreign and US customs agencies, international transportation and gridlock, and nominal clarity or clear line of site to when product is to be shipped and received. While attempting to meet initial demands for critical PPE products, health care providers also had to contend with widespread shortages of medical, surgical, and pharmaceutical supplies as most manufacturing in China and other impacted areas dealt with the progression of COVID-19 into a global pandemic.

Throughout the month of March, COVID-19 impacted almost every industry and institution's supply chains. With shelter-in-place orders, work-from-home mandates, and closings of nonessential businesses, COVID-19 wreaked havoc on things many Americans consider sacrosanct. As a result, consumers experienced shortages of products and rationing (eg, groceries, meats, toilet paper) and prioritization by retailers based on what supplies were

available and capable of being delivered. Manufacturers adjusted by reducing the variety of products available, commonly referred to as stock keeping units, to enable better management of products.<sup>11</sup> Some of these dynamics were attributable to panic buying or stockpiling by consumers as a result of perceived scarcity rather than true shortages.<sup>12</sup> In an ISM survey conducted in March, more than 75% of industries reported supply chain disruptions, largely associated with transportation issues.<sup>13</sup> The worldwide impact of COVID-19 on industry supply chains was exacerbated further when a manufacturing facility experienced an outbreak of the virus requiring quarantining of personnel or temporary closures.

Despite the challenges, many health care organizations have now been able to navigate the complexities of this pandemic and meet the immediate needs for PPE supplies. In most cases, standard practices were adjusted to help meet demand (eg, Centers for Disease Control and Prevention approved use of expired N95 masks, and organizations began reusing previously single-use disposable items). Investments in automation/replenishment technology along with advanced analytics allowed for visibility to the enterprise inventory ecosystem. This visibility enables centrally controlled inventory and logistics for appropriate product distribution based on fluctuating demand. To compliment this capability, supply chain analytic resources provided clarity with data and analytics modeling. Comparing PPE burn rates to inventory levels culminated in quantifying days inventory on hand metrics based on patient demographic characteristics, acuity, and projected admissions linked to community spread. By overlaying these analytics with anticipated orders received, we were able to quickly ascertain our ability to meet the needs of patients and caregivers.

Decisions regarding PPE products purchased and utilized in accordance with standard care protocols necessitate that health care supply chains obtain input, advice, and consent of the clinical practice. Such work exemplifies the importance of clinical/supply chain integration, a topic of much interest in health care today. At Mayo Clinic, supply chain management worked extensively with the clinical practice and administrative leadership, Hospital Incident Command, Infection

Prevention and Control Committees, and a PPE taskforce charged with implementing a PPE formulary and standardized practices for use based on supply chain management recommendations and availability of product. Through an enterprise collaborative effort, standardized practices, significant conservation of PPE by all staff, new sources of products, and innovative efforts of 3-dimensional printing along with internal and local manufacturing all contributed to our ability to meet the PPE demand.

### COVID-19 IMPLICATIONS FOR SUPPLY CHAIN MANAGEMENT

Historically, the pursuit of lowest price for a supply has been the primary indicator of success in health care. In the future, price alone cannot be the primary driver of supply chain performance because low short-term prices can exact high long-term costs in the context of a pandemic. One of the shortcomings of an exclusive focus on price has been the loss of redundancy, overreliance on distant foreign sources, and single-sourced products. This past practice and lessons learned from the COVID-19 pandemic indicate that much work remains in improving fragile supply chains. Complexity will likely continue to increase as development of a vaccine will result in the next big challenge impacting the supply chain.<sup>14</sup> Manufacturing, distributing, and administering billions of vaccines worldwide will prove to be a herculean task.

To capitalize on the attention COVID-19 has brought to supply chain management, all health care providers should assess their organizational response from the lessons learned from the COVID-19 pandemic and initiate refinement of strategic and tactical plans. Adjustments in direction are required to be better prepared and also dramatically improve real-time actions to be taken the next time a crisis of this magnitude surfaces. There have been many models developed regarding what the next phase of this pandemic looks like, such as whether health care will experience a “V” or “W” recovery. Conventional wisdom suggests that regardless of the recovery model, it is likely that the provision of health care services will need to coexist in an environment with COVID-19 for the foreseeable future. Key

**TABLE. COVID-19 Implications for Supply Chain Management**

Category	Description/areas of focus	Timeframe
Short-term	<ul style="list-style-type: none"> <li>• Build a more resilient supply chain for PPE</li> <li>• Develop a new sourcing strategy</li> <li>• Develop new sources</li> <li>• Determine inventory, distribution, and logistic needs</li> <li>• Cross-train staff to ensure safe use of multisourced supplies</li> </ul>	Q4 2020-Q1 2021
Intermediate	<ul style="list-style-type: none"> <li>• Review all lessons learned from COVID-19</li> <li>• Refine business continuity plans</li> <li>• Make investments in technology/systems to improve visibility and analytics</li> </ul>	Q1-Q4 2021
Longer-term	<ul style="list-style-type: none"> <li>• Develop new and innovative partnerships with suppliers, distributors, 3PL health care providers</li> <li>• Support US manufacturing</li> <li>• Continued execution on sourcing strategies to secure and stabilize supply chain</li> <li>• Evaluate the next phase of your supply chain model</li> </ul>	2021 and beyond

COVID-19 = coronavirus disease 2019; 3PL = third-party logistics; PPE = personal protective equipment; Q = quarter.

implications and a suggested timeline for addressing these issues are summarized in the Table and discussed in depth in the following sections.

**Short-Term**

On a short-term basis, the remainder of 2020 and early 2021, health care supply chains should develop action plans for building a more resilient supply chain for PPE. This step would include identifying, in concert with the clinical practice, an appropriate multisource strategy for PPE, especially medical-grade respirators. Why multisource? The health care supply chain has demonstrated that no single supplier could meet a health care provider’s demand for personal respiratory equipment. It is unlikely that a supplier will be able to do so any time in the near future. Aligning with several manufacturers for the provision of respirators will be vital to ensuring availability of PPE under current market dynamics. Such strategies will likely require making committed purchases from production runs to ensure delivery as opposed to purchasing from (nonexistent) inventory. To facilitate the use of multiple manufacturers, health care providers will need cross-training when differences exist between products within a category to ensure smooth transitions and avoid safety risk when necessary to convert between products. Strategies for other types of PPE will also be needed

based on each individual health care provider’s experiences during COVID-19, considering the desire or need to sustain conservation efforts to balance peak demand. Likewise, also in the short-term, an understanding of additional inventory storage and distribution/logistic lessons learned will need to be considered. This step may include adjusting your inventory levels to have more safety stock on hand or determining new processes to manage inventory across the health care system.

**Intermediate-Term**

On an intermediate basis, throughout 2021, review all lessons learned and make necessary revisions and structural investments to areas such as business continuity planning. Continue to refine and improve communication tools developed as a result of this pandemic. Invest in information technology and systems designed to improve visibility to inventory and utilization of supplies. Finally, document PPE protocols developed during this pandemic for future reference and develop key contacts at the local, state, and federal levels to ensure coordination and continuity beyond the 4 walls of the organization.

**Longer-Term**

Longer-term, health care organizations must consider developing new and innovative partnerships with key suppliers going forward. Efforts should be made to shore up US

manufacturing capabilities, including balanced approaches to inventory management that result in less reliance on foreign manufacturing. Creative partnerships can be developed including investments or making committed volume purchases, ensuring a predictable demand for manufacturers. Optimize virtual and meeting technology in the event that for health or economic reasons the organization is again required to move significant portions of the workforce to work-from-home permanently. Take this opportunity to evaluate what the next phase of your supply chain looks like and design the future model. This step should include how state and federal agencies integrate into your plans.

### CONCLUSION

The experiences associated with COVID-19 demonstrated the importance and reliance health care providers have on supply chains. It is literally a matter of life and death. Health care organizations must leverage this new-found industry enlightenment to invest and advance their supply chain capabilities, addressing structural weaknesses to better prepare for both minor disruptions and the next disaster. Such efforts must be executed in concert with and in support of assisting the organization return to a state of “normalcy.” This process should include assessing the health of each product’s supply chain and adjusting sourcing strategies accordingly. COVID-19 has served as a wake-up call for consumers and health care executives regarding the importance of supply chains and how reliant we are on them for everyday life.

**Potential Competing Interests:** The authors report no conflicts of interest.

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