

**The First 90 Days:
US Biopharmaceutical Finished Goods
Supply Chain Response to COVID-19**

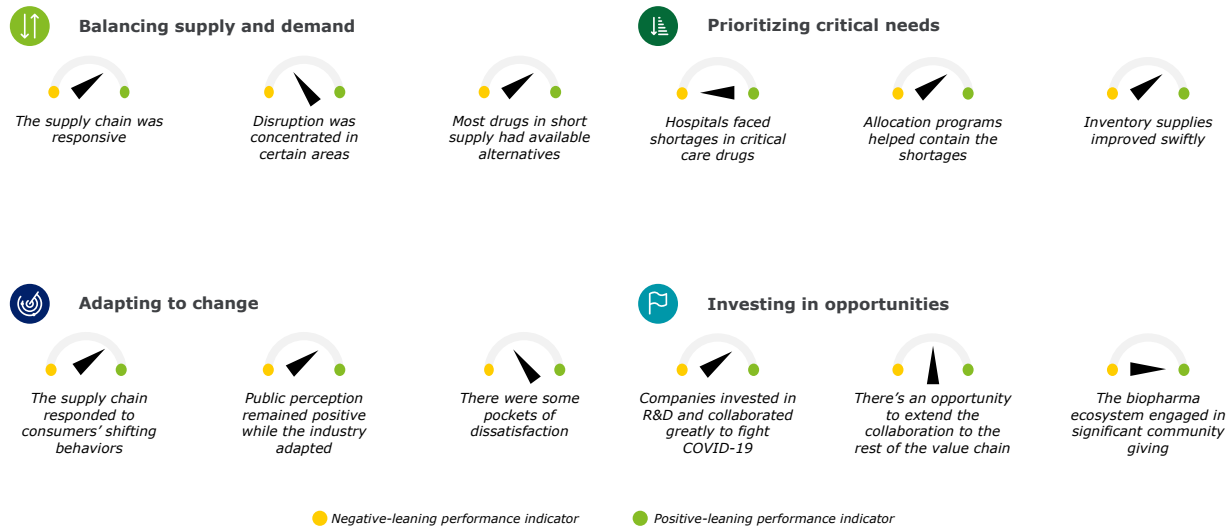
Executive summary

Amidst a global health crisis unlike any other seen in a century, the health care industry has come together to battle the spread of the novel coronavirus (COVID-19). The need to respond has been urgent: In just the first 90 days of the US outbreak¹ there were 1.8 million confirmed cases of COVID-19 and more than 213,000 hospitalizations with confirmed or probable cases.²

The biopharmaceutical finished goods supply chain has been central to the COVID-19 fight. Pharmaceutical distributors and other stakeholders have closely collaborated with upstream and downstream trading partners and government entities to protect the steady supply of critical, life-saving medicines³ to pharmacies, health care providers and patients. They have also worked to identify and speed to market coronavirus testing and therapeutics, and have mobilized resources to develop safe and effective COVID-19 vaccine candidates.

How well did the industry handle the unprecedented demands of the COVID-19 pandemic during the first 90 days of the US outbreak? A summary of this report's findings shows that the finished goods supply chain was resilient and effective in responding to the pandemic, getting medicines safely and efficiently to patients with limited disruptions concentrated around shortages of COVID-19-related drugs (figure 1). Although there was a spike in reports to the US Food and Drug Administration (FDA) of drug shortages during the first months of the pandemic, over 60% of the shortages were related to investigational COVID-19 treatments or drugs used to treat COVID-19 patients in intensive care units (ICUs).⁴ In addition, at least 83% of drugs that were reported in shortage had a second-line or alternative treatment available.⁵ Also, Deloitte's social sentiment assessment, which monitored and analyzed consumers' online comments about perceived supply disruptions during the first 90 days shows that patients had an overall positive perception of the industry's performance in managing COVID-19-related challenges during the critical period between March 1 and June 1, 2020.

Figure 1. Biopharmaceutical finished goods supply chain impact assessment¹



Note:¹This figure shows an aggregated summary of industry performance using a comprehensive set of metrics, details of which can be found in the "Impact assessment of biopharmaceutical industry's response" section of this paper

Source: Deloitte Analysis

Going forward, the biopharmaceutical finished goods supply chain can build upon its effective response and lessons learned during the pandemic's early days to prepare for possible scenarios that are likely to materialize in the next 6 to 12 months and enhance resilience to future disruptions.

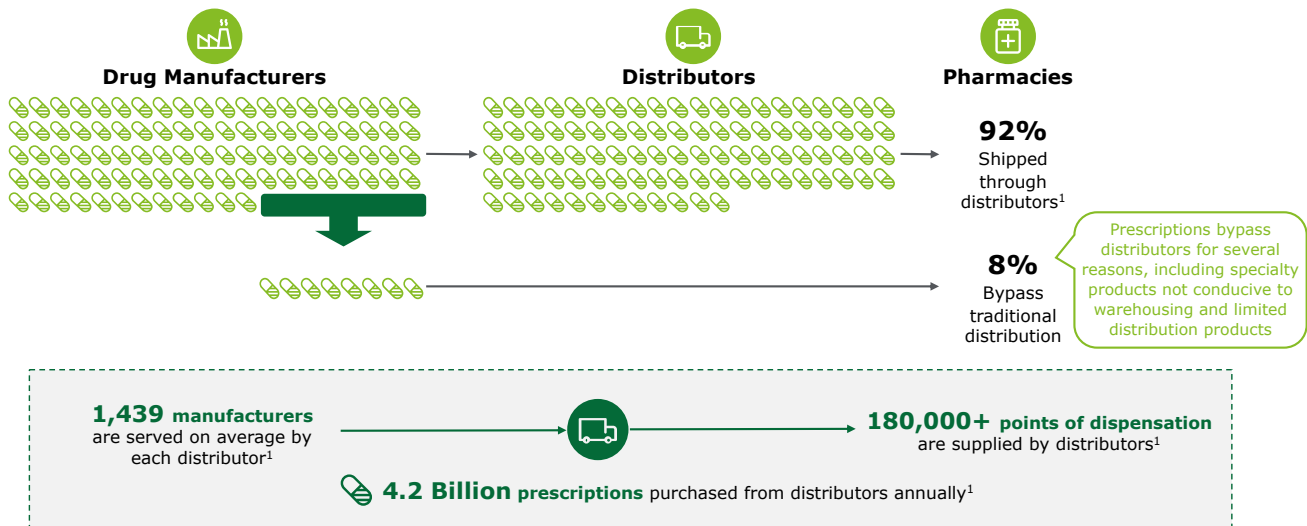
The role of the finished goods supply chain in the context of the COVID-19 pandemic

The biopharmaceutical ecosystem has been at the forefront of the COVID-19 fight from the beginning, coming together in a race to find solutions to curb the immediate and long-term challenges of the pandemic:

- **Biopharmaceutical supply continuity.** The finished goods supply chain played a critical role in protecting the steady supply of medicines to pharmacies, health care providers, and patients and mitigated potential shortages of critical, life-saving medicines.
- **COVID-19 therapies.** Since the outbreak's early days, the pharmaceutical industry worked to identify and speed to market therapeutics that could improve treatment options and, ultimately, save patient lives. The industry collaborated with government agencies and hospitals to distribute the medicines to points of dispensation and, reach those in need.
- **Vaccine development.** Drug manufacturers, their supply chain partners, and federal agencies quickly mobilized and reallocated resources, investing billions of dollars in research and development (R&D) to speed the development of safe and effective COVID-19 vaccine candidates.

As detailed in the 2019 HDA and Deloitte report, [The Role of Distributors in the US Health Care Industry](#), biopharmaceutical distributors play a critical role in maintaining the integrity and continuity of today's supply chain, serving as the primary conduit between manufacturers, pharmacies, and health care providers. Responsible for shipping more than four billion prescriptions in the United States annually (figure 2), distributors consolidate manufacturer orders, deliver products to points of dispensation, and process returns, finding the safest and most efficient ways to deliver medicines to providers and their patients.

Figure 2. The role of U.S. pharmaceutical distributors



Sources: ¹HDA Factbook 90th Edition, Deloitte Analysis

During the tumultuous early months of the COVID-19 outbreak, distributors and other stakeholders in the biopharmaceutical finished goods supply chain responded in five key ways to help ensure that health care providers and their patients had access to the medicines they needed:

1. The industry **enabled the stable supply of lifesaving drugs** by swiftly channeling critical medicines to pharmacies, hospitals, and health care providers across the country.
2. Supply chain stakeholders promptly put in place business continuity plans that adhered to federal, state, and local regulations and **preserved the health and safety of frontline employees** with minimal disruption to their operations.
3. Pharmaceutical distributors **closely collaborated with upstream and downstream stakeholders and federal, state, and local government entities** to anticipate changes in demand, respond to evolving patient needs, and mitigate disruptions.
4. Distributors **ensured efficient distribution of pharmaceuticals by using drug allocation programs** (see figure 5 for details) that balanced historical usage with the urgent, increased needs for treating COVID-19 patients, particularly in “hot zones” identified by the Federal Emergency Management Agency (FEMA).
5. The finished goods supply chain **leveraged prior emergency response** experience to get medicines safely and efficiently to patients in need.

Biopharmaceutical finished goods supply chain response to COVID-19

Based on an analysis of quantitative and qualitative data during the first 90 days of the COVID-19 pandemic, the biopharmaceutical finished goods supply chain faced four key challenges:

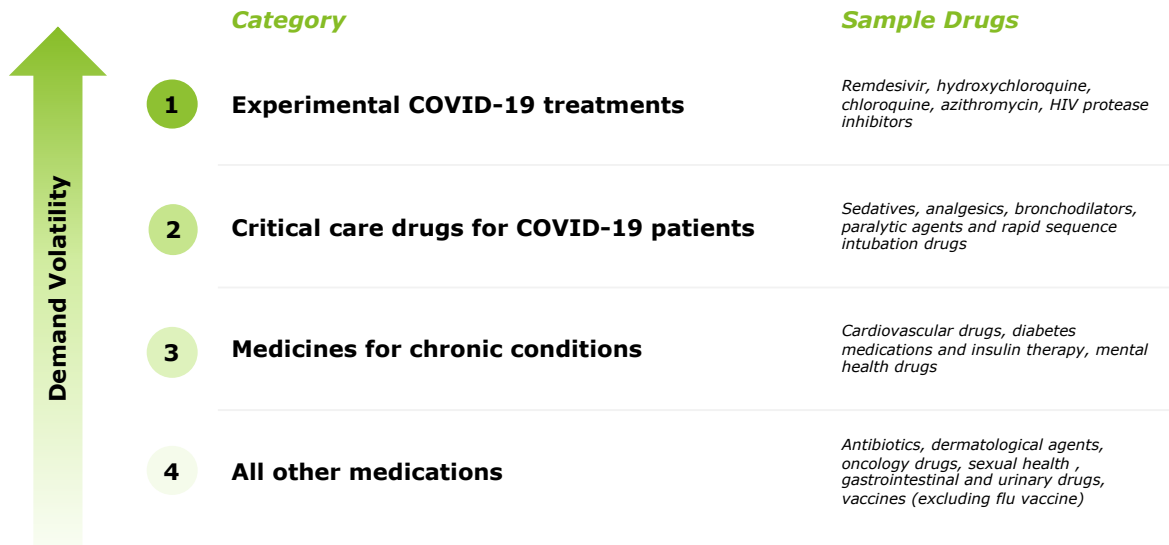
- Handling demand surges for critical medicines
- Minimizing supply disruptions
- Sustaining operations while preserving workforce safety
- Supporting the public health agenda

Handling demand surges for critical medicines

During the early days of the pandemic, distributors received orders at volumes substantially above historic purchase levels. However, demand patterns varied for different medicine types. While demand for COVID-19 experimental treatments and critical care drugs for COVID-19 patients skyrocketed as the number of cases increased, medicines used to treat chronic conditions also presented unexpected demand challenges (figure 3).

The demand for experimental COVID-19 treatments was highly volatile and unpredictable, rendering challenges with demand forecasting and product allocation. Experimental COVID-19 treatment drugs saw an eight-fold increase in demand in hospital settings,⁶ and there were 480,000+ unanticipated prescription fills of hydroxychloroquine and chloroquine between February 16 and April 25, 2020, compared with the same period of 2019.⁷

Figure 3. During the early phases of the pandemic distributors received orders at volumes above historic purchase levels, however not all medicines presented the same demand patterns



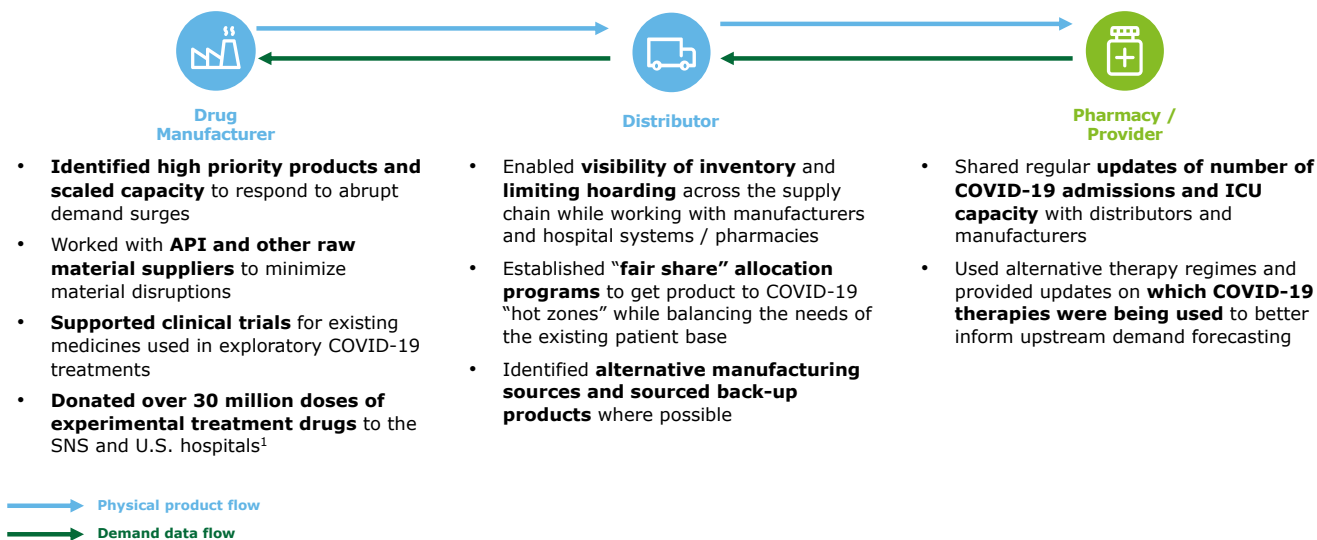
Source: Deloitte Analysis

The demand for critical care drugs surged as hospitals across the country were experiencing an influx of COVID-19 patients. For example, Vizient reported a 51% increase in hospital and health system demand for sedative and anesthetics during March 2020. The same report showed a 67% increase in hospital and health care system demand for analgesics that same month.⁸

The demand for maintenance medications spiked as patients extended prescriptions, calling for the supply chain to respond quickly to an unexpected uptick in non-COVID-19-related drugs. Payor policy changes and patient requests to extend 30-day prescriptions to 90 days drove an uptick in mail order prescriptions, which usually contain a 90-day bulk supply. The Centers for Disease Control and Prevention (CDC), some state governments, and certain large health plans promoted 90-day refills.⁹

The implications of these demand surges for the finished goods supply chain were considerable. Overall, stakeholders responded in an effective, coordinated fashion to the spikes in demand of critical medicines and moved quickly to address gaps in supply availability (figure 4). Distributors leveraged their role as the nexus between manufacturers and pharmacies to enable inventory visibility across the supply chain and used individual allocation programs to manage the inventory of the most in-demand products in an equitable way.

Figure 4. Orchestrating a coordinated supply chain response



Sources: ¹HHS "HHS accepts donations of medicine to Strategic National Stockpile as possible treatments for COVID-19 patients", Deloitte Analysis

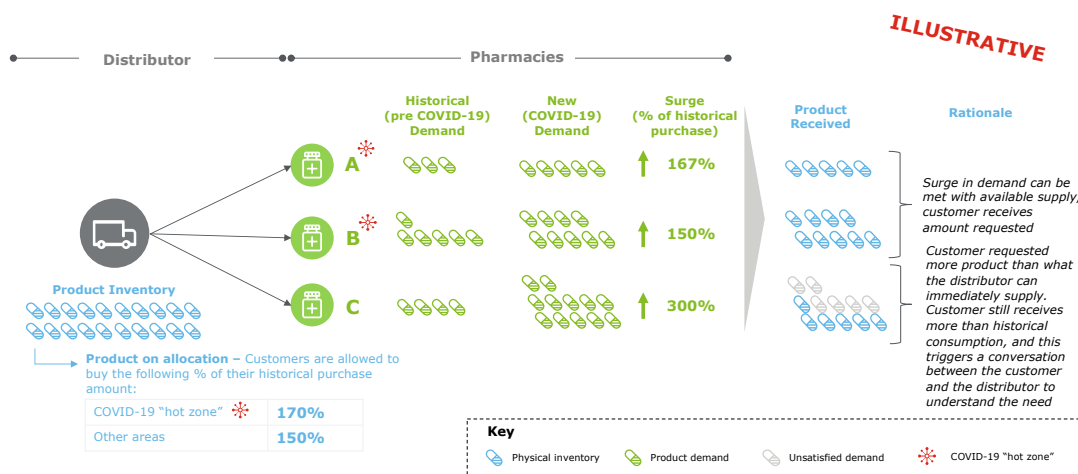


What is a distributor allocation program?

An allocation program is a supply chain tool that a wholesale distributor uses to manage the amount that a single customer can purchase of an in-demand product that is in short supply or at risk of being in short supply. Each "fair share" allocation program is operated individually by a wholesale distributor in cooperation with its own suppliers and customers and is not operated on an industry-wide or coordinated basis.

Allocation programs typically are dynamic and incorporate multiple factors to help distributors make inventory management decisions. During the pandemic, companies have incorporated elements such as historical purchasing behavior, existing and emerging COVID-19 "hot zones" identified by FEMA, hospital admission rates and number of patients in the intensive care unit (ICU), and recent shifts in demand for pharmaceuticals (figure 5).

Figure 5. "Fair share" allocation during COVID-19: An illustrative example



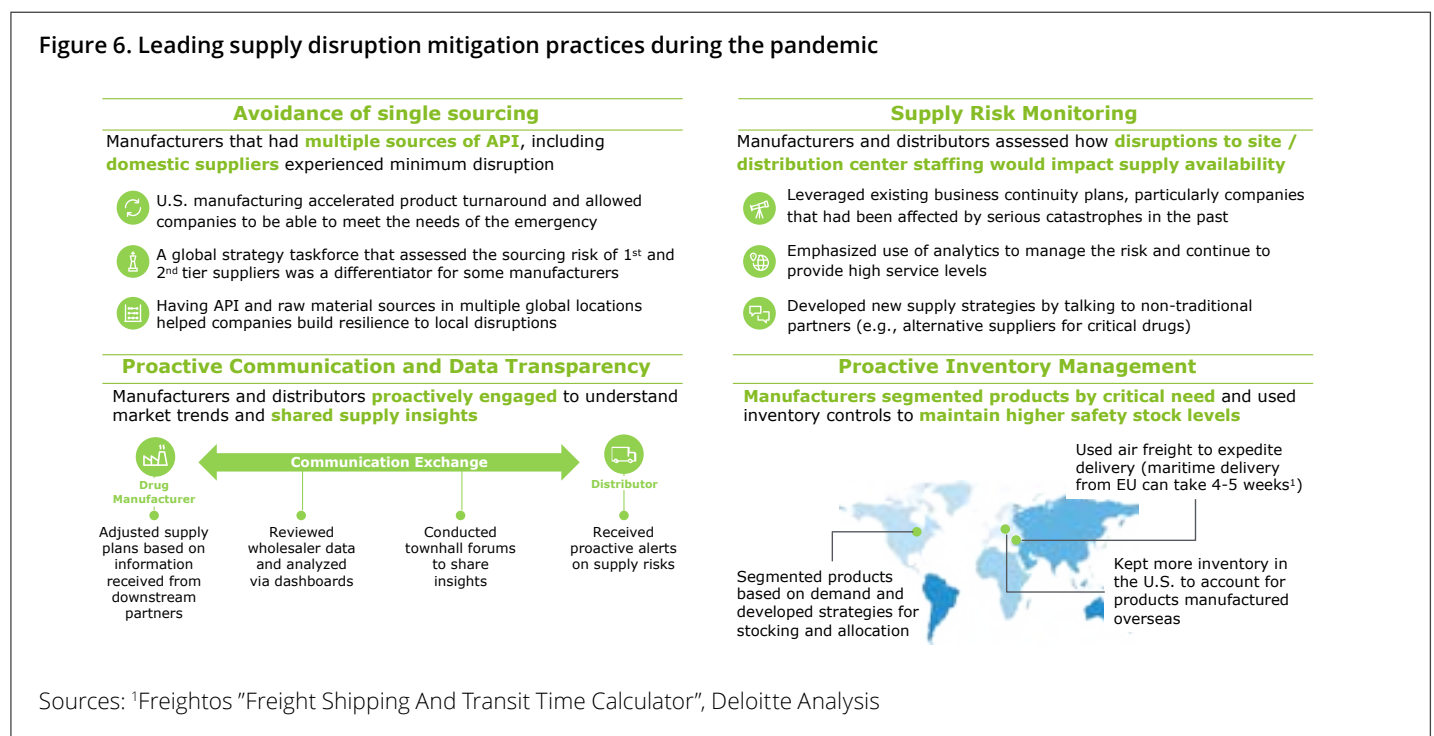
Source: Deloitte Analysis

Minimizing supply disruptions

COVID-19 shook the global pharmaceutical supply chain, creating supply challenges spanning from the sourcing of Active Pharmaceutical Ingredients (APIs) to every other step in the supply chain. As API manufacturing hubs struggled with the pandemic and logistics challenges emerged across the globe, manufacturers partnered with upstream and downstream supply chain stakeholders to identify and contain the emerging supply risks.

Upstream disruptions were primarily driven by two key factors: export restrictions and logistical complications. For example, India's government restricted 26 APIs and medicines for export in March 2020, including several antibiotics.¹⁰ Also, April saw a 42% YoY decrease in air freight capacity.¹¹ Downstream disruptions occurred when customers couldn't source highly demanded drugs and were mitigated through end-to-end collaboration and increased use of secondary supply lines.

Stakeholder practices to manage supply disruptions centered around four themes: avoidance of single sourcing, supply risk monitoring, communication and data transparency, and proactive inventory management (figure 6).



Sustaining operations while preserving workforce safety

Stakeholders across the biopharmaceutical finished goods supply chain promptly put in place business continuity plans that adhered to federal, state, and local regulations and were designed to preserve the health and safety of frontline employees as they kept operations running and critical medicines flowing to patients in need. By leveraging lessons learned from previous disruptions, industry players were able to quickly institute COVID-19 safety protocols at plants and distribution centers in impacted areas. These updated measures included:

- Safety measures to follow CDC and local government guidelines
- Personal protective equipment (PPE), such as masks, gloves and sanitizer, for frontline employees
- Temperature checks when workers arrived on site
- Processes to address positive cases in plants and distribution centers
- Enhanced cleaning protocols with Environmental Protection Agency (EPA)-approved disinfectants and support from third-party cleaners
- Investments in online tools to facilitate and enhance remote working
- Virtual call centers and other virtual support capabilities



Maintaining business continuity: Developing a COVID-19 task force

Many organizations in the biopharmaceutical supply chain have established a COVID-19 task force to protect business continuity during the pandemic. Each task force is headed by supply chain response coordinators who interact daily with internal cross-functional leaders, as well as upstream and downstream external partners, to help manage pandemic-related challenges. The task force serves as the go-to contact to address any kind of disruptions that would threaten business as usual and facilitates fast, centralized decision-making.

Many biopharmaceutical supply chain organizations also expanded other areas of employee support, such as enhancing telehealth medical benefits and augmenting childcare support to include in-home care. They ramped up communication with upstream and downstream partners, notifying all parties as soon as a decision was made to temporarily shut down a site due to potential COVID-19 exposure. In addition, many companies committed resources to support communities impacted by COVID-19, including grants, and PPE and drug product donations for those in need. Moreover some distributors tapped into employees' networks to hire friends and family who had lost their jobs due to COVID-19 to serve as temporary workers in their distribution centers.

Supporting the public health agenda

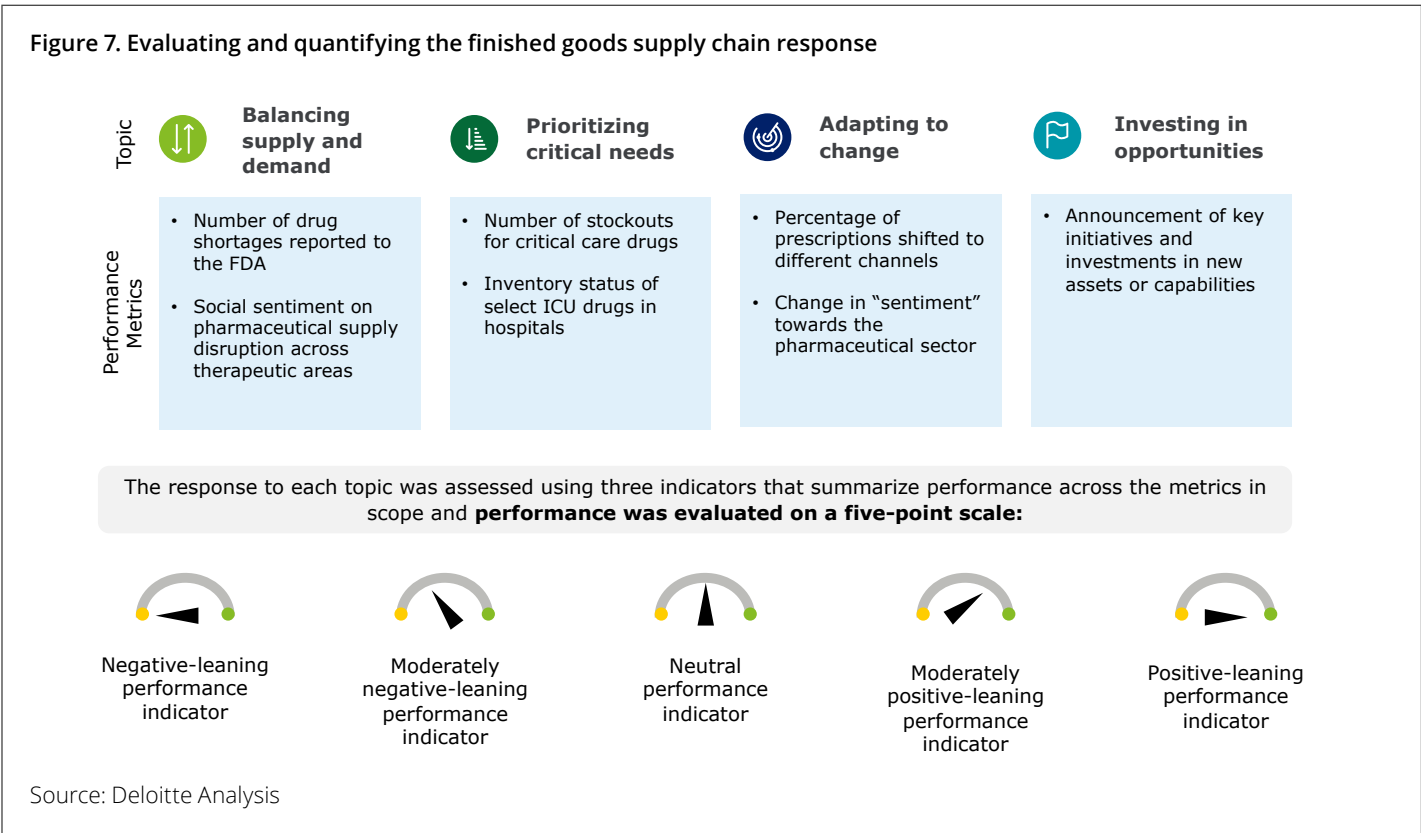
Stakeholders in the biopharmaceutical supply chain collaborated with federal, state and local governments in efforts to keep the US medicine supply secure and efficient throughout the pandemic. As regulatory frameworks shifted and evolved, the supply chain had to be nimble and adapt its own protocols to comply with evolving and emerging regulations and other requirements at all levels of government.

While trade associations helped facilitate feedback and acted as an interface between their members and various government agencies, individual supply chain members also partnered directly with federal, state, and local governments. Efforts to support the public health agenda included the following:

- FEMA conducted calls with the Supply Chain Stabilization Task Force, which included manufacturers, distributors, group purchasing organizations (GPOs) and providers, to discuss urgent supply needs.¹²
- The Drug Enforcement Administration (DEA) increased aggregate production quotas available to manufacturers to produce controlled substance medications in response to increased demand.¹³
- Members of the pharmaceutical supply chain followed posted Centers for Disease Control and Prevention (CDC) guidelines to comply with public health requirements.
- Companies worked closely with state officials to supply them with critical drugs and comply with COVID-19 safety protocols. This included managing state-level licensing restrictions that could require routing of product through intermediate distribution centers.
- Manufacturers and distributors complied with county-specific safety regulations for their factories and distribution centers and worked with local officials to obtain "essential" business status for facilities that were required to maintain pharmaceutical operations.

Impact assessment of biopharmaceutical industry's response

Deloitte's metrics-based impact assessment (see Appendix for methodology) shows that the biopharmaceutical industry's response during the first 90 days of the US COVID-19 outbreak was resilient and effective at getting medicines safely and efficiently to patients, with only minimal disruptions concentrated around shortages of COVID-19-related drugs. The assessment specifically evaluated the biopharmaceutical supply chain's ability to manage four COVID-specific challenges—balancing supply and demand, prioritizing critical needs, adapting to change, and investing in new opportunities—according to the following criteria (figure 7):



In addition, Deloitte’s social sentiment assessment (see Appendix for methodology), which monitored and analyzed consumers’ online comments about perceived supply disruptions during the US pandemic’s first 90 days, show that consumer sentiment for the biopharmaceutical industry improved across the board, indicating that consumers had a positive perception of stakeholders’ performance in managing the early challenges of COVID-19. Social sentiment tracking was performed by scraping popular internet forums for preselected keywords that indicated consumer perception of manufacturer, distributor, and pharmacy supply chain performance for the period March 1 to June 1, 2020, in comparison to a three-month control period.

Balancing supply and demand

Although drug shortages as measured by the FDA increased during the first 90 days, there were few significant disruptions (actual and purported) beyond COVID-19 therapeutics.

- The monthly average number of drug shortages was 186% higher during the first three months of the pandemic than in the prior 26 months.¹⁴
- 64% of shortages during this time can be attributable to either experimental COVID-19 treatments or critical care drugs for COVID-19.¹⁵
- If COVID-19-related drugs were removed, the average number of shortages would be virtually the same as the historical average (32.8 vs. 31.8 monthly shortages).¹⁶

The biopharmaceutical industry was largely effective in balancing drug supply and demand; however, limited shortages and supply disruptions did occur for COVID-19 treatment and supporting drugs (figure 8).

Figure 8. Balancing supply and demand: Performance assessment

Metrics: 1) Number of drug shortages reported to the FDA; 2) Social sentiment on pharmaceutical supply disruption

What it tells us: Provides insight into national drug shortages reported to federal authorities by drug manufacturers (supply-side metric) and how end-customers perceived the associated disruptions in the market (demand-side metric)

Key Insights

The supply chain was responsive

While the total number of reported shortages was higher than the historical average, **patients did not perceive industry-wide supply disruptions**, evidenced by the fact that the majority (over 70%) of the drugs under evaluation did not show significant spikes in disruption signals

Disruption was concentrated in certain areas

Patients perceived **greater supply disruptions**, including localized shortages or temporary disruptions, **on drug categories used to treat COVID-19 or its comorbid conditions**. At the same time, drugs used to treat COVID-19 made 64% of the shortages reported to the FDA¹

Most drugs in short supply had available alternatives

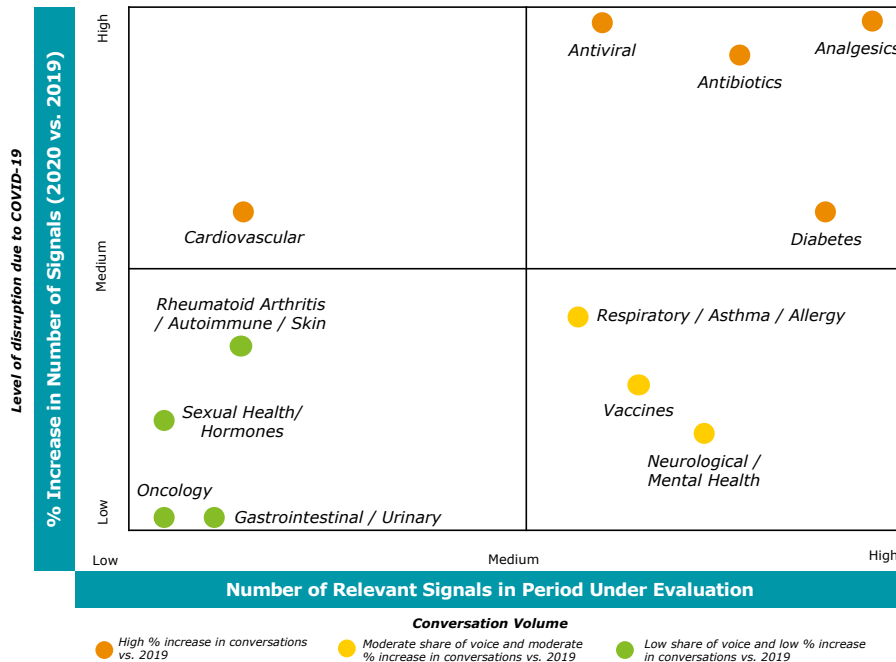
83% of the drugs listed on FDA's shortage list had available second-line or alternative drug treatments in stock during the pandemic (excluding chloroquine, hydroxychloroquine, and azithromycin due to their use as COVID-19 treatments)¹

● Negative-leaning performance indicator ● Positive-leaning performance indicator

Sources: ¹FDA Drug Shortage List, Deloitte Analysis

From a social sentiment perspective, consumer-perceived supply disruptions were highest for analgesics, antivirals, antibiotics, diabetes and cardiovascular drugs, and drove high levels of conversations on digital media. Signals for other drug categories showed either moderate or low perceived disruptions (figure 9).

Figure 9. Social sentiment on pharmaceutical supply disruptions



Source: Deloitte Analysis

Prioritizing critical needs

At the beginning of April, hospital ICUs struggled to maintain enough supply of critical care drugs for COVID-19 patients:

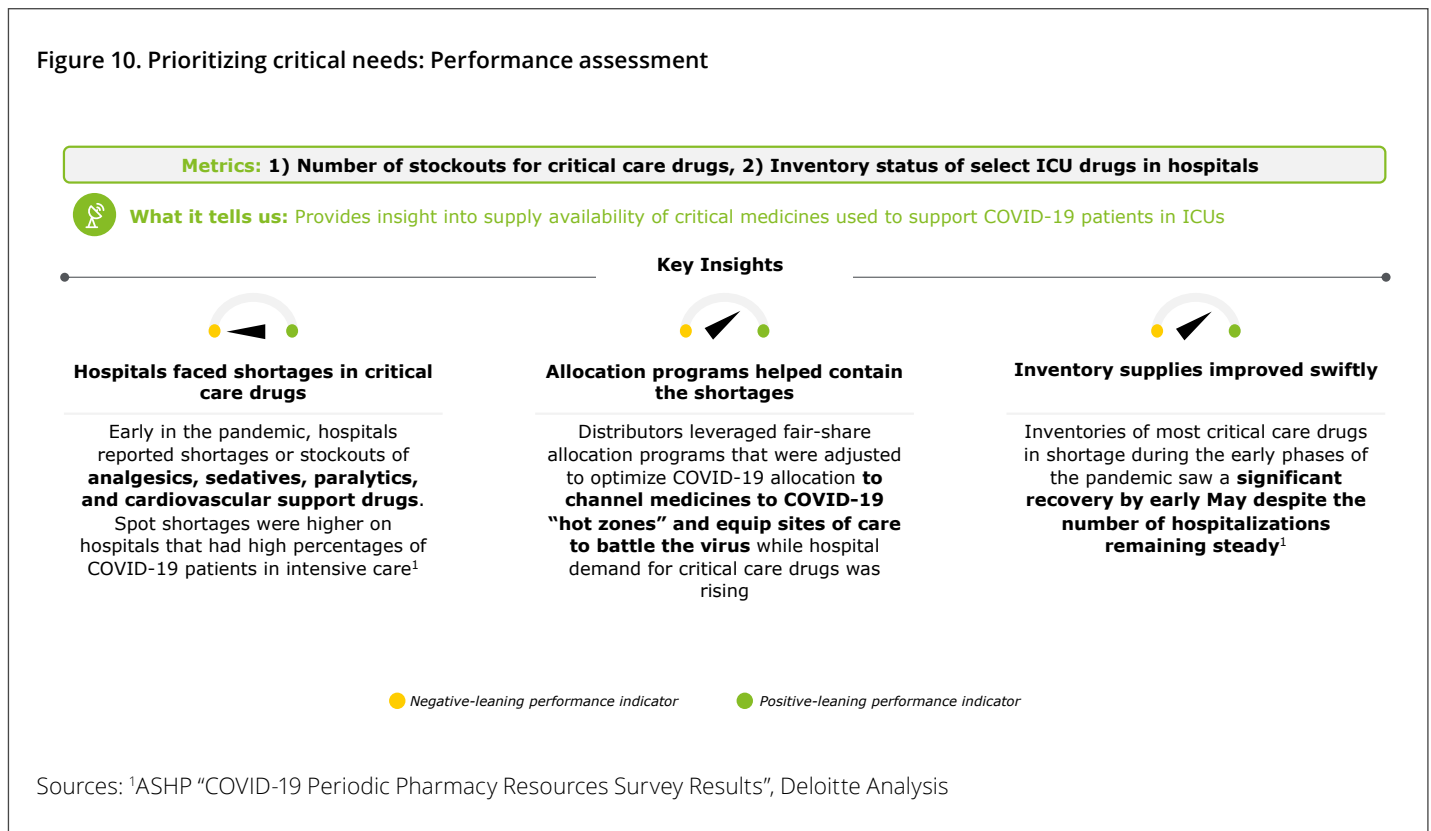
- Cisatracurium, a first-line neuromuscular blocker used on critical COVID-19 patients, had the largest percentage of respondents reporting a stockout, with 20% of the surveyed hospitals reporting having less than a one-day supply the week of April 6. Fentanyl, a first-line analgesic, had the second lowest inventory, with 9% of respondents reporting a stockout the same week.¹⁷
- As supplies of first-line therapies became limited, providers used alternatives. For example, as available supplies of cisatracurium dwindled, some providers shifted to atracurium, an alternative treatment option. This is evidenced by hospitals not discussing atracurium in the survey released the week of April 6, but then 14% and 11% of hospitals reporting stockouts of said neuromuscular blocker the weeks of April 20 and May 11.¹⁸

Most hospital ICUs reported having sufficient drug inventory during April and May; however, hospitals with greater than 50% of ICUs filled with COVID patients saw increased shortages, especially with drugs categorized as paralytics.¹⁹

- Among surveyed hospitals, 3% reported stockouts across five critical ICU drug categories during the week of April 6. Among critical care drugs, paralytics presented the most disruption: 8% of hospitals where ICUs had a majority of COVID-19 patients experienced stockouts of these drugs.²⁰

To reduce the incidence of stockouts, distributors promptly set up allocation programs which helped contain the shortages initially observed of critical care drugs used to treat COVID-19 patients in ICUs (figure 10). The percentage of stockouts for each of the drugs under evaluation declined between April and May 2020, indicating that supply became more readily available after initial challenges.

Figure 10. Prioritizing critical needs: Performance assessment



Adapting to change

The pharmaceutical supply chain was able to adapt to accommodate changes to the channels through which patients acquired their prescriptions:

- In March, the average year-over-year (YoY) increase in mail order channel prescriptions per week was 12%, indicating significant growth in channel usage.²¹
- The average YoY increase in mail order prescriptions per week in June was 10%, indicating greater channel adoption as 90-day scripts were refilled.²²
- In addition to the surge in the mail order channel, retail home delivery also spiked, with a top retail pharmacy chain reporting a 10X increase in home delivery in May 2020.²³

The mail order channel saw greater use during the first 90 days of the pandemic than in previous years and, as indicated by June demand, is showing signs of lasting increased use. Meanwhile, retail channel prescriptions showed a 2% YoY decline in June 2020.²⁴

Increased positive consumer sentiment towards the biopharmaceutical supply chain during this period suggests that the industry was successful in adapting to changes induced by the COVID-19 pandemic (figure 11).

Figure 11. Adapting to change: Performance assessment

Metrics: 1) Percent of prescriptions shifted to different channels, 2) Change in "sentiment" towards the pharmaceutical sector



What it tells us: Highlights changes in consumer purchasing behavior and how the biopharma supply chain's response to the pandemic was perceived by end consumers

Key Insights



The supply chain responded to patients' shifting behaviors

Mail-order and home delivery saw significant spikes in demand, which the supply chain matched by shifting supply to those channels.^{1,2} Although more time is needed to confirm the permanence of these shifts, **the increase in demand for 90 day refills, mail and home delivery of prescriptions** will probably remain post pandemic



Public perception remained positive while the industry adapted

The increase in positive sentiment was driven by consumers' appreciation of the industry's **ability to provide medicines** during the pandemic. Themes with most positive signals included recognition of **essential employees, drug donations, and efforts to provide convenient prescription delivery options**



There were some pockets of dissatisfaction

While overall sentiment was positive, there were some topics that caused dissatisfaction among patients. Chief among them were claims of **localized shortages, particularly for COVID-19 experimental treatments**

● Negative-leaning performance indicator ● Positive-leaning performance indicator

Sources: IQVIA "COVID-19 Market Tracker June 26th 2020", 2 CVS Health "CVS Health reports first quarter results, provides update on COVID-19 response", Deloitte Analysis

Investing in new opportunities

Deloitte conducted primary and secondary research on the amount and type of investments that biopharmaceutical supply chain stakeholders initiated during the first 90 days of the pandemic to assess how the sector is preparing for future challenges. Results showed increased investment activity by drug manufacturers, distributors, and pharmacies across four main categories:

Enhancing existing capabilities

- Some manufacturers reported investing in data mining and data modeling to allow them to better predict downstream supply disruptions.
- One distributor reported setting up an interactive dashboard to increase inventory visibility of over a dozen COVID-19-related products at each of its distribution centers.
- A pharmacy reported ramping up last-mile delivery capabilities to serve a 10X increase in home delivery.²⁵ Pharmacy drive-through services were also quickly scaled up across the country.

COVID-19 testing and treatments

- Eight of the top 10 drug manufacturers announced clinical trials for potential COVID-19 treatments or developed testing capabilities.²⁶
- A distributor enhanced a patient-facing app to provide pharmacy-matching and medication tracking for COVID-19-positive patients.
- Pharmacies set up 1,300 COVID-19 testing sites around the United States in the first 90 days.²⁷

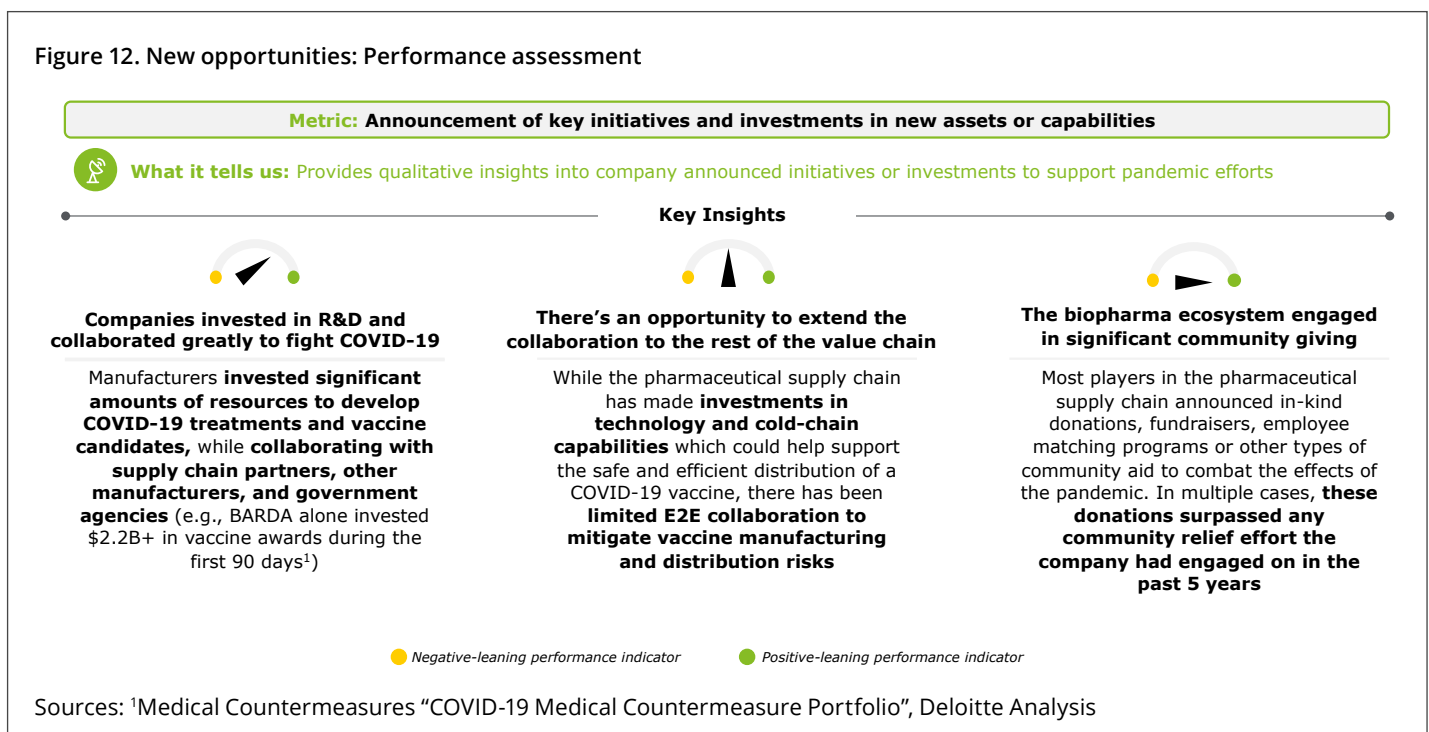
COVID-19 vaccine candidates

- Four of the top 10 drug companies started developing vaccine candidates during the first 90 days of the pandemic.²⁸
- A distributor stood up 25 ultra-cold storage freezers in 2020, which could support efforts to distribute the COVID-19 vaccine.
- 38,000 pharmacy stores could potentially be used to administer COVID-19 vaccines.²⁹

Community support

- Manufacturers donated \$185+ million to support COVID-19 relief efforts, including aid for health care workers and communities hardest hit by the virus.³⁰
- Distributors donated \$16+ million to support communities, individuals and employees impacted by COVID-19.³¹
- Pharmacies contributed \$7.6+ million in response to COVID-19, including charitable donations, fundraising, employee giving, and other efforts to support the community.³²

The biopharmaceutical industry invested substantially in developing capabilities to curb the pandemic's short- and long-term challenges, while also supporting the communities it serves through in-kind donations (figure 12).



Scenarios and path forward

The industry can build upon its effective response and lessons learned during the first 90 days of the pandemic to get ready for four possible future-state scenarios that have the potential to materialize in the next 6 to 12 months and would have a significant impact on distribution and the broader biopharmaceutical ecosystem.



What are the benefits of scenario modeling?

Scenarios are snapshots that show what the near future may be like, based on how the COVID-19 pandemic may trigger business changes that could have a significant impact on the biopharmaceutical finished goods supply chain. Scenarios are tools that:

- Allow companies in the biopharmaceutical supply chain to assess the impact of probable future state challenges to their operations
- Enhance an organization's ability to thrive during uncertainty
- Enable stakeholders to create strategically thought-out plans and mitigation strategies to respond to potential future events
- Protect the stability of the pharmaceutical supply chain

Scenarios are not predictions of what will happen, industry forecasts, or macro-analysis that look at the implications on stakeholders beyond the finished goods supply chain.

Scenario 1—Shift to home delivery

As patients embrace social distancing measures and try to minimize in-person pharmacy visits, mail order and home delivery may become the predominant ways in which patients get their prescription medicines (figure 13).

Figure 13. Scenario 1: Shift to home delivery

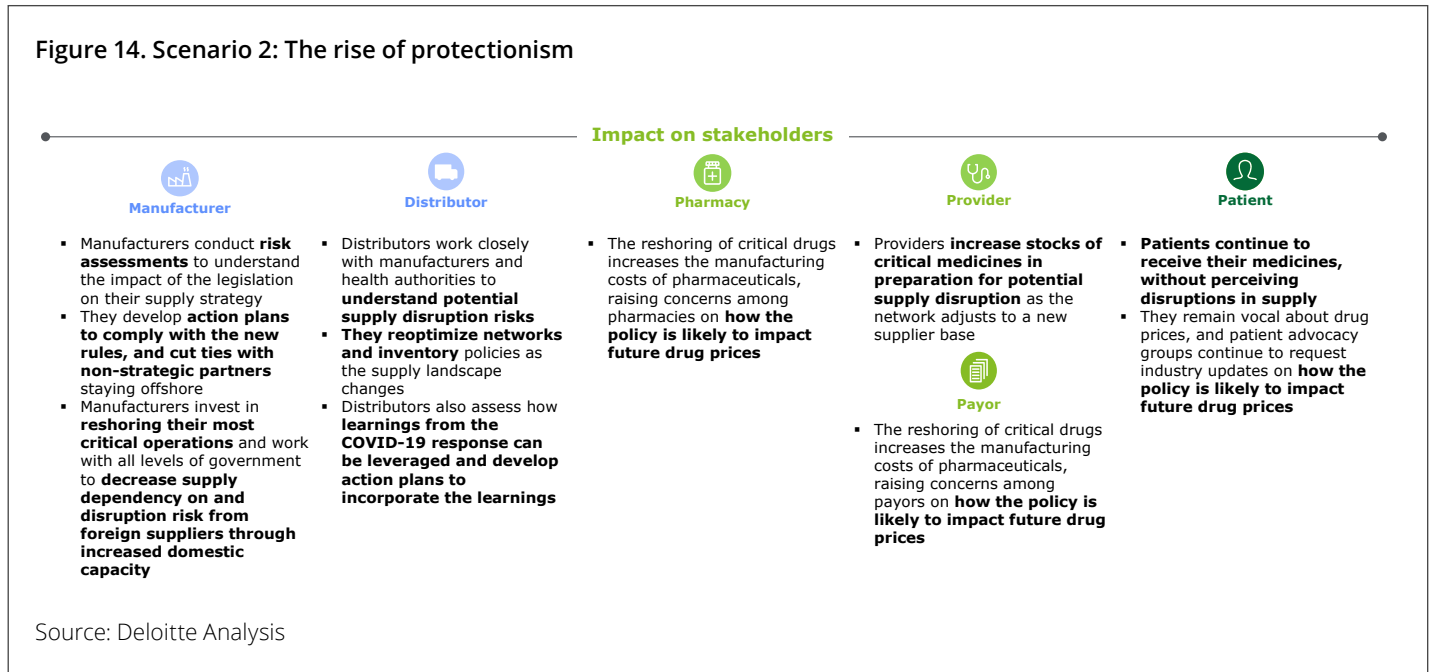


Source: Deloitte Analysis

Scenario 2—Rise of protectionism

A prolonged pandemic could spur governments to adopt nationalistic policies such as mandated local sourcing requirements, export controls and restrictions, and increased supply chain surveillance. Implementation of mandated domestic drug sourcing could alter the structure of the entire biopharmaceutical finished goods supply chain in the United States and dramatically impact stakeholders' business and operating models (figure 14).

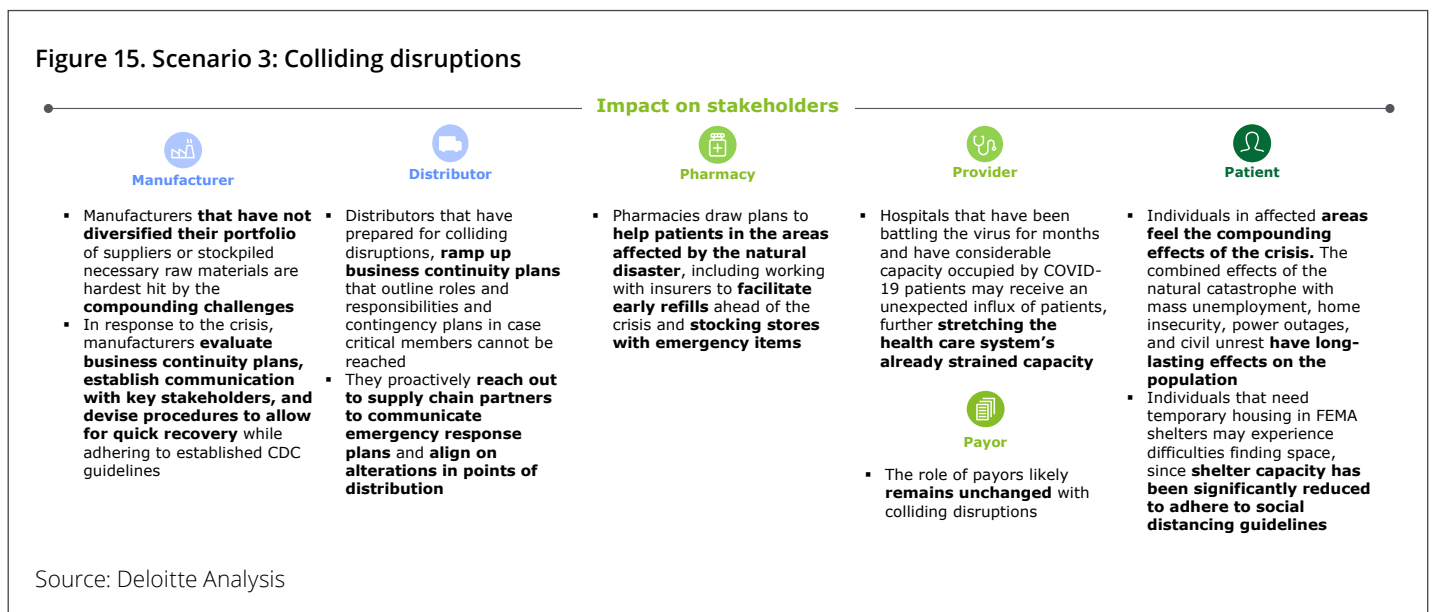
Figure 14. Scenario 2: The rise of protectionism



Scenario 3—Colliding disruptions

The biopharmaceutical ecosystem could experience substantial and prolonged impact as natural disasters (e.g., hurricanes, wildfires) hit the United States while COVID-19 is still a major threat. The potential collision between natural disasters and COVID-19 could have compounding effects on global supply chains, testing the resilience of the biopharmaceutical ecosystem (figure 15).

Figure 15. Scenario 3: Colliding disruptions



Scenario 4—Vaccine distribution

Building on lessons learned from the remdesivir allocation strategy (figure 16), COVID-19 vaccine distribution will require significant coordination among the public and private sectors and should consider leveraging existing distribution networks and logistical expertise rather than trying to replicate or build a new network (figure 17).

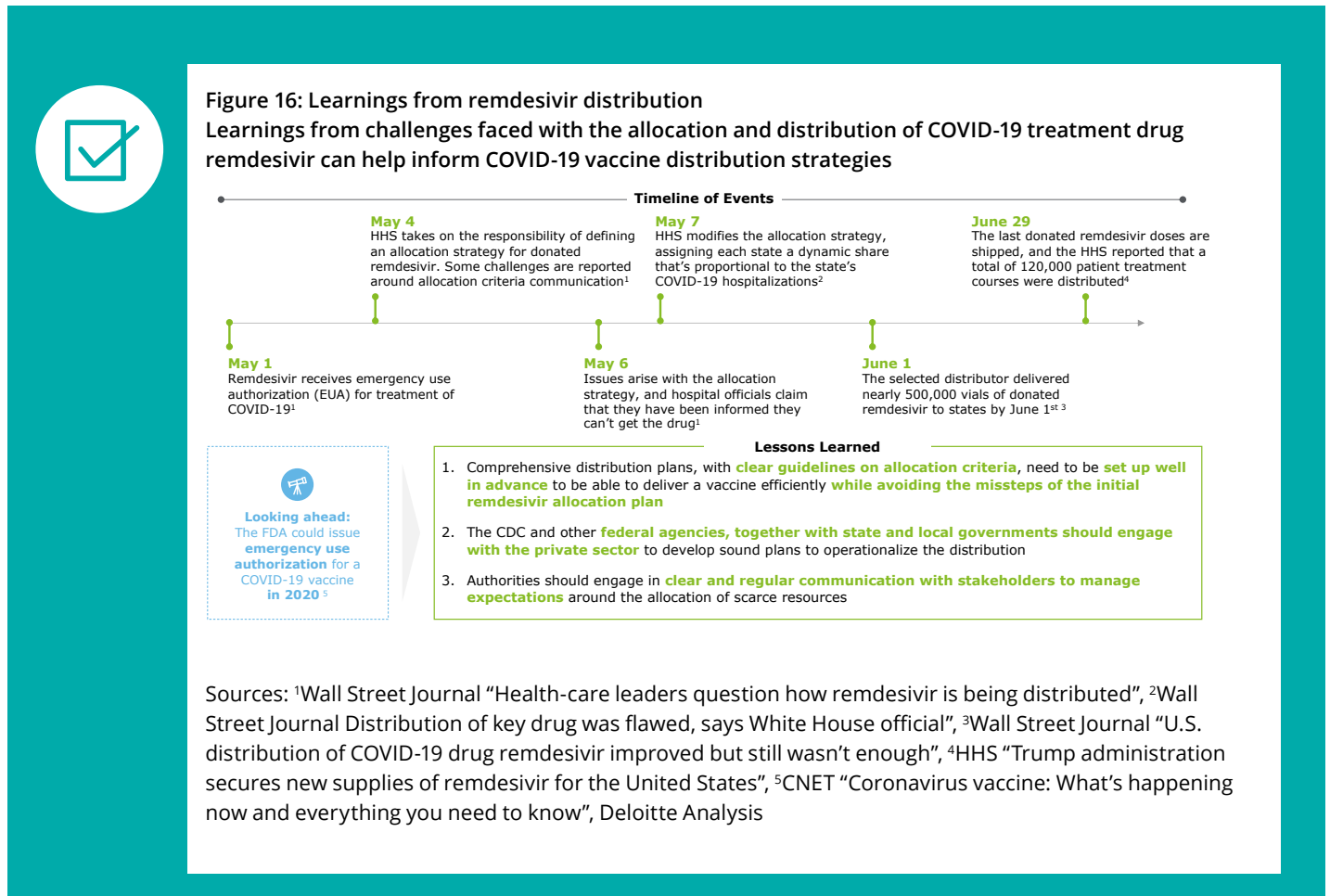
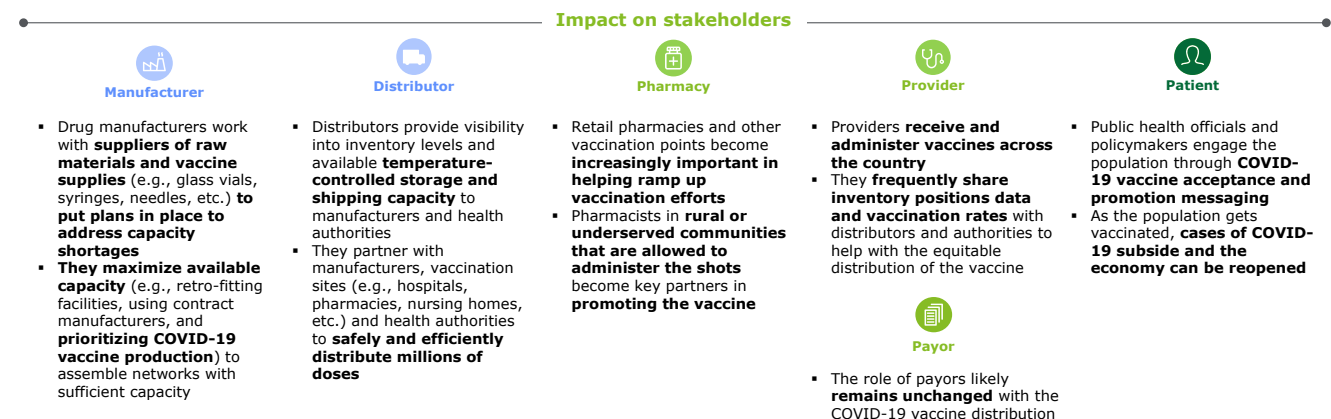


Figure 17. Scenario 4: Vaccine distribution



Source: Deloitte Analysis

The future of resilience

Biopharmaceutical finished goods supply chain organizations have a responsibility to both respond to the immediate challenges of the COVID-19 pandemic and take steps to prepare for the future-state scenarios described in the previous section. Individual organizations can build on an effective response during the first 90 days of the pandemic by using lessons learned to identify and address performance and capabilities gaps and selecting among 16 suggested steps to enhance resilience to future disruptions based on the organization's specific role in the biopharmaceutical ecosystem (figures 18 and 19).

Figure 18. The future of resilience



Source: Deloitte Analysis

Figure 19. The future of resilience – Impact on stakeholders

Category	Consideration	Applies to:
MANAGE SUPPLY RISK	1 Conduct thorough supply and supplier risk assessments	
	2 Increase supply redundancy through multi-source awards	
	3 Increase safety stock of critical materials	
	4 Regionalize the supply of critical materials	
ENHANCE END-TO-END VISIBILITY THROUGH DIGITIZATION	5 Develop forward-sensing abilities to improve demand prediction	
	6 Leverage analytics and establish control towers to gain greater end-to-end visibility	
	7 Increase data sharing and transparency with customers and partners	
BOOST SUPPLY CHAIN AGILITY	8 Explore opportunities to harvest cutting edge technologies	
	9 Stress-test business continuity plans to prepare for the next crisis	
	10 Build redundancy into your operations	
USE A PATIENT-CENTRIC APPROACH	11 Empower teams through increased workforce flexibility	
	12 Build digital capabilities to support changing consumer behaviors	
STRENGTHEN PUBLIC-PRIVATE PARTNERSHIPS	13 Implement risk sensing solutions to gain real time understanding of consumer needs and pain points	
	14 Identify collaboration opportunities with federal, state and local governments	
STRENGTHEN PUBLIC-PRIVATE PARTNERSHIPS	15 Engage with the public sector to solve chronic shortages of critical drugs	
	16 Develop joint plans to distribute COVID-19 vaccines safely and effectively	

Legend:

- Raw Material Supplier
- Manufacturer
- Distributor
- Pharmacy
- Provider
- Government / Health Authorities

Source: Deloitte Analysis

Manage supply risk

Organizations should reassess vulnerabilities in their supply chains and take steps to mitigate sourcing risk, such as dual-sourcing, inventory policy reassessment and regionalization.

1. **Conduct thorough supply and supplier risk assessments.** Classify suppliers according to their strategic value and create visibility into each supplier's suppliers to identify risks further down the supply chain. Amass internal and external data to score suppliers and develop insights on relevant risk domains. Develop scenarios to understand the current macro landscape and how it may evolve over a certain time horizon.
2. **Increase supply redundancy through multi-source awards.** Increase redundant supply capacity and diversify risk by developing additional sources that expand the geographical footprint of direct suppliers and their own suppliers.
3. **Increase safety stock of critical materials.** Reassess the stock policy of critical materials such as critical care drugs and their raw materials, and products with high supply risk (e.g., single-sourced, high geopolitical risk, low supplier reliability).
4. **Regionalize the supply of critical materials.** Increase regionalization of critical materials and store inventory closer to patients to minimize the risk of disruptions (this will likely be encouraged through near-term legal mandates).

Enhance end-to-end visibility through digitization

Organizations can leverage a variety of technologies and capabilities to establish greater control of their supply chains through increased end-to-end visibility.

5. **Develop forward-sensing abilities to improve demand prediction.** Integrate external or proprietary datasets or real-time data streams into forecasting models. Improve near-time forecasts by leveraging artificial intelligence (AI)-based demand prediction solutions that use the right variables and algorithms to enable more accurate predictions. Conduct scenario analysis to understand the impact of potential future events and how demand could change as a result.
6. **Leverage analytics and establish control towers to gain greater end-to-end visibility.** Invest in tools to track key performance indicators in real time. Connect data elements to track the flow of products from manufacturers to dispensation points. Use control towers to understand the cause of exceptions and establish digital protocols to monitor exceptions proactively.
7. **Increase data sharing and transparency with customers and partners.** Increase use of customer portals and analytics dashboards to share data. Continue manufacturer, distributor, and customer town halls as forums for insight-sharing.
8. **Explore opportunities to harvest cutting-edge technologies.** Evaluate blockchain and other digital tools to improve inventory traceability and give players greater visibility into products' supply chains. Explore the use of intelligent automation to complement business-as-usual inventory management and support allocation modeling and inventory balancing during trying times.

Boost supply chain agility

Incorporating learnings from the COVID-19 pandemic can help organizations boost the flexibility of the biopharmaceutical finished goods supply chain by building more redundancy into their operations and empowering teams.

9. **Stress-test business continuity plans to prepare for the next crisis.** Ask COVID-19 task forces and other key employees to reflect on the organization's emergency response and draft prioritized corrective action plans to address opportunities and areas for improvement.
10. **Build redundancy into your operations.** Consider developing interchangeable capabilities among plants or distribution centers to boost supply chain flexibility and minimize disruption.
11. **Empower teams for increased workforce flexibility.** Build small, trusted, multi-disciplinary task forces at the local level to drive efforts in the post-COVID rebound and ramp-up period and enable rapid adaptation to changing local circumstances.

Use a patient-centric approach

Changes in consumer behavior have created opportunities for the biopharmaceutical supply chain industry to address growing needs and anticipate future trends.

12. **Build digital capabilities to support changing consumer behavior.** Expand prescription home delivery capabilities to improve convenience and increase consumer loyalty. Innovate in last-mile delivery by leveraging drones or autonomous vehicles to unlock capacity to deliver pharmaceuticals more safely, efficiently, and securely. Enhance patient interactions by evolving digital patient services to engage with patients in new ways.
13. **Implement risk-sensing solutions to gain real-time understanding of consumer needs and pain points.** Use consumer sentiment monitoring to capture a broad set of signals to intelligently sense and react to demand changes based on consumer feedback. Capture patient apprehensions, behavior changes, and emerging risks to enhance scenario planning capabilities and better predict future shifts in consumer needs.

Strengthen public-private partnerships

Battling COVID-19 brought public and private stakeholders together, creating a unique opportunity to advance collective efforts and address other challenges in the health care ecosystem of the future.

- 14. Identify collaboration opportunities with local, state, and federal governments.** Continue to strengthen collaboration between the public sector—federal, state and local health authorities—and the pharmaceutical supply chain to identify areas for improvement and draw up public-private plans to enhance coordination efforts in the future.
- 15. Engage with the public sector to solve chronic shortages of critical drugs.** Work with policymakers to devise multi-stakeholder strategies to address the lack of incentives to produce less profitable drugs. Minimize drug shortages and strengthen oversight of foreign drug manufacturing processes by improving data sharing with the FDA and enhancing collaboration with international stakeholders.
- 16. Develop joint plans to distribute COVID-19 vaccines safely and effectively.** Leverage learnings from H1N1, flu vaccine, and remdesivir distribution to proactively develop comprehensive distribution plans, with clear guidelines on prioritization criteria, to efficiently deliver a COVID-19 vaccine and avoid earlier missteps.

Even small changes to build resilience have a cost, so organizational leaders should make decisions following detailed cost/benefit analysis. Determining the right level of investment requires understanding how vulnerable the organization is and identifying where opportunities for improvement exist.

Closing thoughts

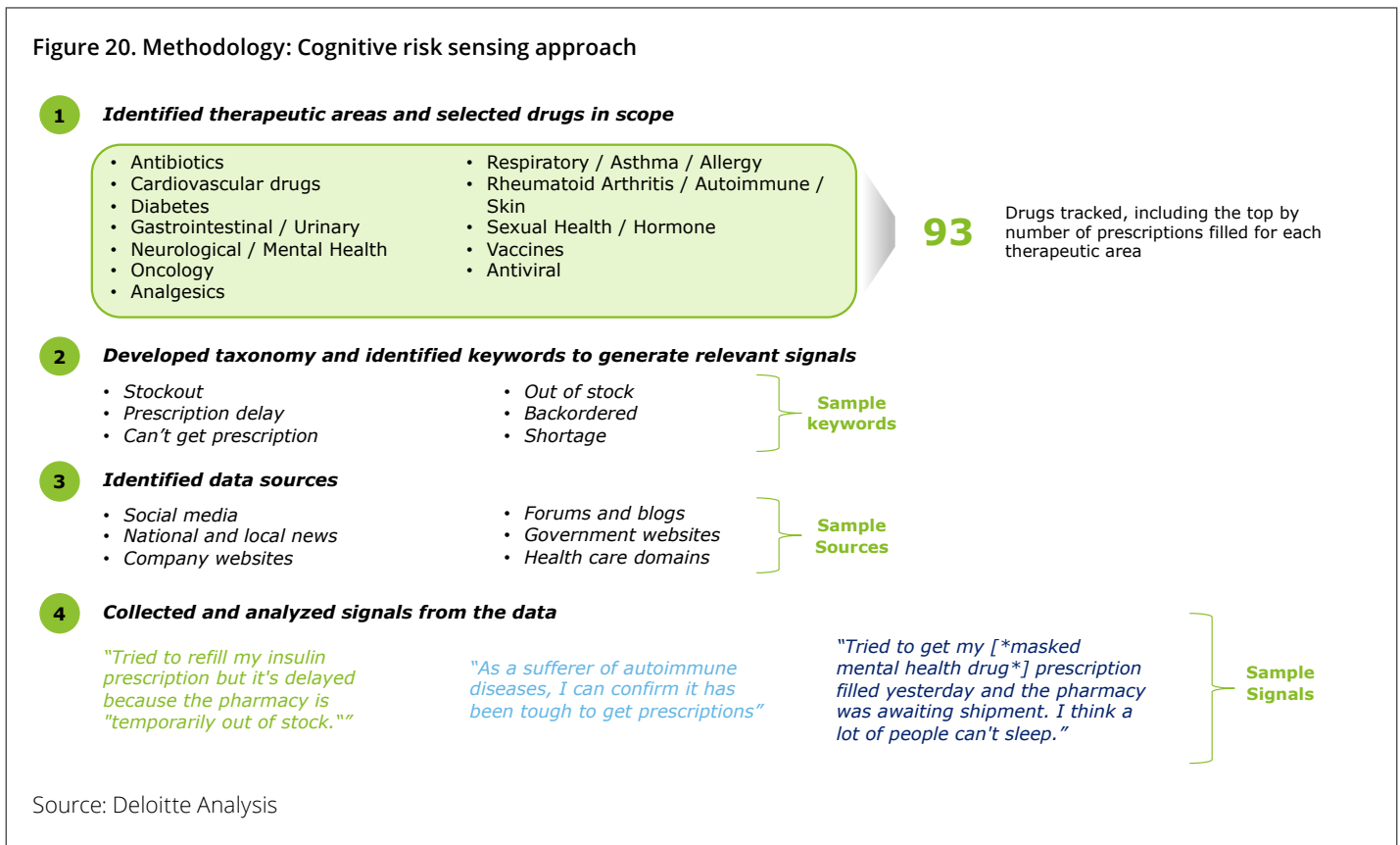
Overall, the response of the biopharmaceutical finished goods supply chain was resilient and effective during the first 90 days of the US COVID-19 outbreak, moving medicines safely and efficiently to patients with limited disruptions beyond some shortages of COVID-19-related drugs – though not without extraordinary efforts by many stakeholders. As the industry pivots to recovering from the initial wave of the pandemic and ultimately looks to a future in which participants can thrive in a new normal, there is an opportunity to improve the risk tolerance, resilience, and digitization of the US and global supply chains.

Appendix:

Cognitive Risk Sensing Methodology

Deloitte’s cognitive risk sensing tool was leveraged to evaluate consumer-perceived supply chain disruptions in the biopharmaceutical supply chain. The sensing tool provided an avenue to gather first-person data on patient-reported experiences and concerns around filling prescriptions during the pandemic, with a focus on shortages and prescription delays

A high-level summary of the methodology can be found on the image below:



The methodology used to track consumer sentiment has the following limitations:

1. News outlets and consumers typically do not comment on a supply chain that works as expected. Therefore, sentiment analysis should be understood as a relative metric (i.e., compare change in sentiment over time or among different types of products/therapeutic areas).
2. Social media sites do not represent the whole population, and not everything that is posted online can be taken at face value. However, with proper context and sizeable amounts of data points, valuable trends and insights can be drawn from online data feeds.

Authors

Rob Jacoby
Principal
Deloitte Consulting LLP
rbjacoby@deloitte.com
+1 415 783 6276

Matt Heim
Senior Manager
Deloitte Consulting LLP
mheim@deloitte.com
+1 862 812 0559

Cintha Fernandez Preda
Manager
Deloitte Consulting LLP
cfernandezpreda@deloitte.com
+1 415 818 6769

Acknowledgements

Many thanks to the Healthcare Distribution Alliance, the HDA Research Foundation, Zachary Springer, Mir Akram Ali Yadullahi, and Terry Hisey for their contributions to this publication.

Thank you to our sponsors:

Gold



Silver



KeySource™

Bronze



Endnotes

- ¹ For the purposes of this report we define the first 90 days of the pandemic as the period between March 1 and June 1, 2020.
- ² Johns Hopkins, [The COVID Tracking Project](#), Deloitte analysis.
- ³ Note that personal protective equipment (PPE) is outside the scope of this report.
- ⁴ FDA drug shortages, Deloitte analysis.
- ⁵ Deloitte analysis.
- ⁶ Shifts in Healthcare Demand, Delivery and Care During the COVID-19 Era, IQVIA Institute, April 29, 2020, <https://www.iqvia.com/insights/the-iqvia-institute/covid-19/shifts-in-healthcare-demand-delivery-and-care-during-the-covid-19-era>.
- ⁷ Prescription Fill Patterns for Commonly Used Drugs During the COVID-19 Pandemic in the United States, Muthiah Vaduganathan, MD, MPH; Jeroen van Meijgaard, PhD; Mandeep R. Mehra, MD, MSc; et al, JAMA Network, May 28, 2020, <https://jamanetwork.com/journals/jama/fullarticle/2766773>.
- ⁸ COVID-19 impact on drugs essential for ventilator use, Vizient, March 2020, https://newsroom.vizientinc.com/sites/vha.newshq.businesswire.com/files/doc_library/file/COVID-19_impact_on_essential_meds_for_ventilator_use_-_FINAL.pdf.
- ⁹ CDC, New York State Department of Health, North Carolina State, CVS, Anthem.
- ¹⁰ Global supplier India curbs drug exports as coronavirus fears grow," Reuters, March 3, 2020, <https://www.reuters.com/article/us-health-coronavirus-india/global-supplier-india-curbs-drug-exports-as-coronavirus-fears-grow-idUSKBN20Q0ZZ>.
- ¹¹ "Air Cargo Capacity Crunch: Demand Plummets but Capacity Disappears Even Faster," IATA, June 1, 2020, <https://www.iata.org/en/pressroom/pr/2020-06-02-01/>.
- ¹² FEMA COVID-19 Supply Chain Task Force: Supply Chain Stabilization, FEMA Advisory, April 7, 2020, <https://www.fema.gov/news-release/20200725/fema-covid-19-supply-chain-task-force-supply-chain-stabilization>.
- ¹³ "DEA takes additional steps to allow increased production of controlled substances used in COVID-19 care," US Drug Enforcement Agency news release, April 7, 2020, <https://www.dea.gov/press-releases/2020/04/07/dea-takes-additional-steps-allow-increased-production-controlled>.
- ¹⁴ FDA, Deloitte analysis.
- ¹⁵ Ibid.
- ¹⁶ Ibid.
- ¹⁷ COVID-19 Periodic Pharmacy Resources Survey Results, American Society of Health-System Pharmacists (ASHP), July 2020, <https://www.ashp.org/COVID-19/Bi-weekly-PPE-Survey-Results-Covid-19?loginreturnUrl=SSOCheckOnly>.
- ¹⁸ ASHP, Deloitte analysis.
- ¹⁹ Ibid.
- ²⁰ Ibid.
- ²¹ Deloitte analysis.
- ²² IQVIA, COVID-19 Market Tracker, June 26, 2020.
- ²³ "CVS Health reports first quarter results, provides update on COVID-19 response," CVS news release, May 6, 2020, <https://cvshealth.com/news-and-insights/press-releases/cvs-health-reports-results-2020-q1>.
- ²⁴ IQVIA.
- ²⁵ <https://cvshealth.com/news-and-insights/press-releases/cvs-health-reports-results-2020-q1>.
- ²⁶ Deloitte analysis.
- ²⁷ "Trump's Plan For Drive-Up COVID-19 Tests At Stores Yields Few Results, National Public Radio (NPR), June 1, 2020, <https://www.npr.org/2020/06/01/865510819/little-progress-made-in-trumps-plan-for-private-retailers-to-test-for-coronaviru>.
- ²⁸ Evaluate 2020 H1 Report.
- ²⁹ Key Insights on the Pharmacy Market, OneKey by IQVIA, 2020, <https://www.skainfo.com/reports/most-powerful-pharmacies>.
- ³⁰ Deloitte analysis of manufacturer press releases and World Health Organization (WHO) figures.
- ³¹ "The AmerisourceBergen Foundation Commits Global Support to Aid Communities, Individuals and Associates Impacted by COVID-19" AmerisourceBergen news release, March 27, 2020, <https://www.amerisourcebergen.com/newsroom/press-releases/the-amerisourcebergen-foundation-commits-global-support-to-aid-communities-individuals>; "Protecting Our Team & Our Customers," McKesson website, <https://www.mckesson.com/About-McKesson/COVID-19/Protecting-Our-Team/>; Cardinal Health on Twitter, <https://twitter.com/CardinalHealth/status/1245789921601822727>.
- ³² "CVS Health, foundations pledge \$1M in employee, community relief," Drug Store News, March 30, 2020, <https://drugstorenews.com/cvs-health-foundations-pledge-1m-employee-community-relief>; "CVS Health supports COVID-19 relief efforts with nearly \$1.5 million in grants to California nonprofits," CVS Health news release, April 30, 2020, <https://cvshealth.com/news-and-insights/press-releases/cvs-health-supports-covid-19-relief-efforts-with-nearly-15-million>; "Walgreens Donation Helps Extend Emergency Response to COVID-19," CDC Foundation, March 12, 2020, <https://www.cdcfoundation.org/blog/walgreens-donation-helps-extend-emergency-response-covid-19>; "The Rite Aid Foundation Donates \$5MM to Address COVID-19 Pandemic, Rite Aid news release, April 7, 2020, https://www.riteaid.com/corporate/news/-/pressreleases/news-room/2020/the-rite-aid-foundation-donates-5mm-to-address-covid-19-pandemic?utm_source=twitter&utm_medium=social&utm_campaign=Foundation&utm_term=BR&utm_content=3253789308&linkId=85991078.



About the HDA Research Foundation

The HDA Research Foundation is the 501(c)(3) non-profit charitable organization of the Healthcare Distribution Alliance (HDA). The Foundation serves the healthcare industry by providing research and education focused on healthcare supply chain issues. The Foundation's mission is to conduct research and disseminate information that will enhance the knowledge base, efficiency and effectiveness of the total healthcare supply chain; and to provide thought leadership to further enhance the safety and security of the healthcare supply chain through future-focused study and programming.

Deloitte.

As used in this document, "Deloitte" means Deloitte Consulting LLP, a subsidiary of Deloitte LLP. Please see www.deloitte.com/us/about for a detailed description of our legal structure. Certain services may not be available to attest clients under the rules and regulations of public accounting.

This publication contains general information only and Deloitte is not, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your business. Before making any decision or taking any action that may affect your business, you should consult a qualified professional advisor. Deloitte shall not be responsible for any loss sustained by any person who relies on this publication.