



WHITE PAPER

Lessons of COVID-19: Three Actions for a More Resilient Supply Chain

Timothy Browne, Executive Director, Supply Guide – Supply Chain Services



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On March 11, 2020, the World Health Organization declared the Novel Coronavirus Disease (COVID-19) [a pandemic](#). Businesses closed, schools shuttered, and the reality of facing a highly contagious, sometimes deadly illness without a cure or vaccine took root among Americans. Those responsible for healthcare supply chains – and the frontline providers who depend on them – faced new challenges. As we continue to navigate this international crisis, we have an opportunity to apply what we have learned about preparedness, the supply chain, and institutional resilience. This paper outlines three sets of actions to help strengthen healthcare supply chains and, ultimately, improve resilience across all areas of healthcare.

A Quick Look Back

Early in the pandemic response, clinical providers and hospitals were overwhelmed by the number and severity of COVID-19 patients. Demand for personal protective equipment (PPE), ventilators, and other supplies escalated quickly, resulting in shortages. Frontline staff and supply chain professionals found themselves scrambling for lifesaving PPE.

Exacerbating the problem was the supply chain’s reliance on China. Many of the needed products were manufactured, wholly or partly, in China, where the virus originated. With Chinese residents sickened, a dearth of workers contributed to slowdowns and stoppages in production and fulfillment of critical medical supplies. In response, China and other countries restricted PPE exports to conserve inventory for their own citizens.

These conditions created an opportunity for non-traditional manufacturers and suppliers – companies with no track record of producing quality products – to enter the market. Non-traditional suppliers met demand for shoe covers, safety eyewear, examination/treatment gloves, KN95 and N95 masks, surgical masks, and splash face shields, among other categories. The quality of these domestically and internationally sourced supplies was often questionable. In some cases, supplies were substandard; in others, they were labeled as “non-medical grade” (a tactic for circumventing restrictions on PPE exports). ECRI also saw a dramatic increase in prices paid for PPE from non-traditional suppliers, as illustrated in the table below.

Price Variability Increased as Non-Traditional Suppliers Entered the Market

| Category Name | Low Price EA | Median Price EA | High Price EA |
|--|--------------|-----------------|---------------|
| Covers Shoe | \$0.07 | \$0.32 | \$0.65 |
| Eyewear Safety | \$0.90 | \$1.86 | \$18.97 |
| Gloves Chemo | \$0.97 | \$1.02 | \$1.02 |
| Gloves Examination/Treatment | \$0.01 | \$0.14 | \$1.02 |
| Gloves Surgical | \$0.33 | \$0.33 | \$0.33 |
| Gloves Vinyl | \$0.02 | \$0.03 | \$1.19 |
| Gowns Isolation | \$0.42 | \$3.02 | \$9.50 |
| Gowns Isolation Reusable | \$15.00 | \$29.29 | \$29.94 |
| Respirators Air-Purifying KN95 | \$1.89 | \$2.90 | \$5.00 |
| Respirators Air-Purifying N95 | \$0.11 | \$2.00 | \$15.00 |
| Respirators Air-Supplying Self-Contained | \$29.14 | \$29.14 | \$29.14 |
| Shields Splash Face | \$1.50 | \$2.95 | \$22.59 |
| Surgical Masks | \$2.50 | \$2.50 | \$2.60 |



While some providers had existing relationships with brokers to help source products from non-traditional suppliers, most supply chain decision-makers were left to fend for themselves – often vetting hundreds of suppliers for a single product category only to find a handful of viable options.

These factors contributed to the supply chain crisis within the crisis – and prompted two important questions.

100%

Increase in PPE suppliers and unique PPE items tracked in ECRI's Supply Guide since the start of the pandemic

900

Number of new PPE suppliers that providers have purchased from since January 2020

450

Number of new unique PPE SKUs providers have purchased since January 2020

Why were healthcare providers not adequately prepared?

Most organizations prepare vigorously for the unknown, but many of these efforts fell short during COVID-19. The pandemic fueled a “perfect storm”: a crisis of international scale with multiple product lines affected and high demand for those products, all supported by a supply chain designed around lean inventory models.

Downward cost pressures had driven the healthcare industry to source product from offshore manufacturers and to support providers' requests for lean inventories with just-in-time (JIT) deliveries. Ongoing standardization among providers had resulted in access to fewer available functional equivalents products. Streamlined inventories and supply chains left little room to navigate the crisis.

Couple this with a blind spot to overreliance on offshore manufacturers, supply chain professionals soon realized they were in over their heads.

How can providers *proactively* prepare before the next crisis?

It is reasonable to conclude that disaster will strike again – and that the next crisis could bring the scope and scale of challenges experienced with the COVID-19 pandemic. Healthcare supply chain leaders have an opportunity to apply the lessons learned during COVID-19 to improve the resilience of their supply chains and to serve as leaders in fueling greater resilience throughout their organizations.

Based on ECRI research, experience, and expertise, we recommend that every supply chain leader undertake three sets of actions – starting today.

Action 1: Start demanding transparency

Distributors, manufacturers and government agencies need to be more transparent. Going into the global pandemic, providers had strong “contracts” with distributors and GPOs, but few had mapped the complete supply chain of critical items and were blind to the fact there was heavy dependency on manufacturing in countries like China. And while everyone considered country of origin, it was being viewed in terms of U.S. federal import laws – not through the lens of supply chain risk.

Distributors and manufacturers. Ensure distributors will secure primary and secondary suppliers for critical product categories. Insist both distributors and manufacturers provide ongoing transparency with respect to minimum inventory levels and country of origin. Historically both have been reluctant to share this information with customers for fear of being circumvented; however the COVID pandemic has highlighted a need for greater transparency to meet critical supply needs.

Map the supply chain of key products – down to raw materials. Identify manufacturing locations, as well as country of origin for raw material suppliers.

Inquire about distributor/manufacturing capacity. Find out how each manufacturer delivers surge capacity. Also inquire about how much stock they maintain to address demand surge.

Regularly connect with government agencies. Require transparency from government agencies at the local, state, and federal levels. Ascertain what stockpiles providers can count on during a crisis.

Re-examine sole source agreements. If there was disruption with supply related to these agreements, re-evaluate the partnership, insist on specific improvements, and terminate relationships if necessary. Dual source or multi source should also be examined with a focus on committed inventory levels and protocols to address future disruption.

Can you spot counterfeit products?



The N95 masks on the left are legitimate; the one on the right is counterfeit. Authentic N95 masks have elastic head bands rather than ear loop straps. The counterfeit mask only has elastic loops. [View ECRI video to learn more.](#)

Action 2: Properly vet and gain assurance when purchasing from non-traditional suppliers

Although ECRI is seeing traditional PPE suppliers slowly returning to meeting current demand levels, non-traditional suppliers will still be required to meet spot demand and offer supply line alternatives, at least for the next 18 months. Therefore, it is imperative to take the necessary steps now to vet and gain assurance that these suppliers are delivering product that meets stated specifications.

Carefully vet non-traditional suppliers pre-contract. Most importantly, request product samples to gain assurance with the product quality.

How to vet non-traditional suppliers

1. Website
2. History of manufacturing PPE
3. Product specifications
4. Accreditations – i.e., N95 masks
 - Ask whether the manufacturer is a NIOSH-approved holder, and confirm by checking the [Certified Equipment List](#) (CEL).
 - Ask for ISO/IEC 17025 accredited laboratory test reports demonstrating the filtration efficiency for the FFR
5. FDA registration
6. Reference list – US providers
7. Product photos
8. Tax ID – domestic only
9. Delivery terms
10. Buying options
11. Sample product for evaluation

Test your products. Whether you use in-house resources or engage a third party, product from non-traditional suppliers should be tested. For example, N95 style masks should be tested using a process and test equipment that is equivalent to the NIOSH N95 certification process. This testing helps ensure the masks perform at the level claimed. Similarly, when testing gowns, use the water repellency standards described by [AAMI PB70](#).

ECRI's testing has revealed some alarming levels of performance. Testing of nearly 200 masks, reflecting 15 different manufacturer models purchased by some of the largest health systems revealed that 60 to 70 percent of imported KN95 masks do not filter 95 percent of aerosol particulates, contrary to what their name suggests.

Testing of 34 models of disposable gowns has revealed that 52% with an unknown level of protection fail to even meet the AAMI standards of Level 1 protection, and 50% of disposable gowns with a claimed AAMI level of protection did not meet the standards described by AAMI.

Dozens of healthcare providers have asked ECRI to test PPE from non-traditional suppliers to provide a level of assurance to their staff that they are protected. The table below provides an illustration of ECRI testing results. Please visit [COVID-19 Resources for Supply Chain](#) to review additional information on PPE test results and supply equivalents.

Recent ECRI N95-Style Testing Data

| Manufacturer | Model/ Product Line | International Standard | Filtration Efficiency (%) | | Meets or Exceeds 95% Particle Filtration Efficiency |
|--|------------------------------------|------------------------|---------------------------|------|---|
| | | | Max | Min | |
| Putian Puxin City Medical Technology Co. | KN95 Mask | EN149, GB2626 | 56.8 | 26.9 | FAIL |
| Hangzhou Hitron Medical Equipment Co. | HT01 KN95 Mask | GB2626 | 75.4 | 44.1 | FAIL |
| Pujiang Hemei Medical Supplies | HM-K95 Mask | GB2626 | 88 | 69 | FAIL |
| Hangzhou Gang Yu Health Products | KN95 Protective Mask, Folding Type | GB2626 | 99.3 | 97.9 | PASS |
| MidSci | KN95 Protective Mask, Folding Type | EN149, GB2626 | 99.5 | 95.9 | PASS |



Action 3: Leverage unbiased expertise to drive continual improvement

COVID-19 has taught us that supply chain resilience is about more than obtaining product. It also requires a commitment to continual improvement. For help, turn to experts that are not affiliated with a GPO or distributor and can provide visibility to functional equivalents, clinical evidence, safety information and pricing on all products available in the nationwide marketplace – not just those on GPO and distributor contracts.

Engage an objective third party to help you:

- Identify critical supply chain areas and augment internal results with unbiased analysis.
- Evaluate how you will obtain real-time guidance to update Policies and Procedures during an emergency.
- Establish an ongoing testing routine for product quality, either internally or externally, especially those procured from non-traditional suppliers.

Conclusion

COVID-19 has vividly affirmed the criticality of the supply chain function and your role in enabling providers to fulfill clinical missions. With all healthcare providers caught off guard by the scope and scale of the pandemic, the public has been sympathetic. However, the public will expect more from healthcare when the next crisis occurs. Seize this opportunity to integrate the most recent lessons of COVID-19 into your institution's practices. Refine them to meet your organization's specific needs. Above all, remember to continually assess, update, and improve your process with the end goal of using supply chain to enable excellence in clinical care and patient and staff safety.

For More Information

When you need a trusted partner, ECRI is here. The depth and breadth of ECRI's medical technology databases enables us to benchmark pricing on nearly 2 million supplies and more than 100,000 capital equipment items. We expanded access to our exclusive content to help you respond to COVID-19 with free resources, and additional comprehensive content is available on our membership websites. Through these programs and customized consulting services, we assure smart purchasing choices and safe patient care.

Learn more: www.ecri.org/covid-19-resources-supply-chain

Contact us: clientservices@ecri.org | +1 (610) 825-6000, ext. 5891



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clientservices@ecri.org | +1 (610) 825 6000 ext 5891

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