

We can get vaccines to people faster: A supply chain management perspective

1 February 2021, by Professor Cuihong Li



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Last year, when the number of COVID-19 cases and deaths continued to climb, we put our hopes on the development of vaccines. When the good news came about the efficacy of the Pfizer-BioNTech and Moderna vaccines in November—practically medical miracles developed in record time—we believed we could soon vaccinate our way out of this crisis, and reach the herd immunity needed to get life back to normal.

Now, six weeks into the [vaccination campaign](#) in the U.S., more than 48 million doses have been distributed, yet barely half of them—26 million doses—have been administered. There are more than 20 million doses in the inventory, waiting to get into people's arms.

With the current rate of about 1 million doses administered per day nationwide, it will take three weeks just to exhaust the inventory. In other words, after the vials leave the pharmaceutical factories in the U.S., it will take three weeks on average for them to reach people's arms somewhere in the nation.

Is this three-week delay necessary? No, not these days, when we are so used to next-day delivery after we place an order on Amazon. Is the three weeks of time acceptable? No, not when people are lining up outside clinics overnight or calling hundreds of times with jammed [phone lines](#) to get an appointment, hoping to be vaccinated as soon as possible.

Each vaccination will not only protect the health of a person, but save many potential infections down the line. With the number of cases soaring, and new virus strains putting more pressure on the timeline to reach herd immunity, every hour counts.

From the supply chain management perspective, there are many things we can do to shorten the vaccine distribution time. Here are my recommendations:

- We need good visibility into the supply chain. We need to know where the vaccines are and how long they stay at [different places](#), so that we can better expedite the flow. We need to know how much inventory is available at different vaccination sites so that we can better allocate supply and direct demand to the sites. We need to know how many people are eligible and want to be vaccinated in different phases, and where they are located, so that we can better manage the demand faced by vaccination sites. Currently, there are more than 100 vaccination sites in Connecticut, and they use several different systems to register patients and schedule appointments; it will help to connect the systems to build a central portal for such information as well as future tracking.
- We need speedy transit. The vials should not stay long in distribution centers or warehouses. These facilities are places for dispatch, not for storage. After containers are offloaded from an inbound truck arriving

to one side of the facility, the shipments should be immediately broken into smaller packages then uploaded to outbound trucks waiting on the other side of the facility, ready to be dispatched to vaccination sites. In supply-chain management, this is called 'cross-docking,' and is a practice pioneered by Walmart.

- We need proactive planning. The planning pertains to both demand and resources. In retailing, we put supplies on shelves and wait for customers to arrive. In the vaccination campaign, we have to actively go out to look for "customers" and get them ready before the supply arrives.

To orchestrate that, we need to pre-register people even before they become eligible for a certain phase, in order to collect information on demand. Then, shortly before the supply arrives, we can schedule appointments for people eligible for vaccination. Rather than asking people to make appointments by visiting certain websites or making [phone calls](#)—often frustrating experiences that cause confusion and long delays—it can be done more efficiently by reaching out to "customers" and informing them of their time windows at certain places. This is more important for the second-dose injection, which has to be done within a certain timeframe after the first dose is given.

We not only need to match the demand with supply, we need to also match the resources needed to service the demand. That means setting up vaccination sites and mobilizing human resources for administration, in anticipation of supply. We are expecting an increase of vaccine supply in the coming weeks and months. We have to start the work now, engaging more partners, opening new vaccination sites, and hiring and training more vaccinators, so that we are ready to get vaccines into people's arms as quickly as they arrive.

- We need centralized decision making. The current system has local vaccination sites place weekly orders to the state government, with the state allocating supply among the sites based on the orders received. In Connecticut, the total weekly

request is about 150,000 doses, far surpassing the weekly supply at the 50,000 level. With total supply less than total demand, the doses have to be rationed. The rationing could cause inflation of orders for more allocated supply, hampering efficient allocation, a phenomenon known in supply-chain management as the "bullwhip effect." A better alternative could be for the state to allocate supply centrally, based on the demand, inventory, and capacity at different sites, avoiding information distortion from local orders. The same approach could apply to the federal level supply allocation among states.

- We need an agile system. There are always uncertainties and disruptions. The vaccine doses received may be more or less than expected, due to manufacturing yields and transportation/storage conditions. There may not be enough ancillary supply to administer vaccine. There can be no-shows to appointments, or leftover doses from opened boxes that need to be used before they spoil. Again, to prepare for the uncertainties, the principle would be to eliminate the chance of anything but vaccine supply holding up the process. That means we should overstock the ancillary supply when possible. And we need to overbook people for appointments and alert them to the possibility of being bumped, as airline companies always do in selling tickets.

By building an efficient [supply chain](#) system for COVID-19 [vaccine](#) distribution, we can drastically shorten the time from factories to frontlines to arms, winning this race against the virus.

Provided by University of Connecticut

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