

Healthcare Systems and Services

“Getting shots into arms”: How US states are addressing the vaccine distribution challenge

COVID-19 vaccine administration represents a significant challenge: States can accelerate progress through five lessons including establishing, enabling, and managing administration capacity.

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In the United States, more than 456,000 people have died from COVID-19. While the COVID-19 vaccines offer promise, the early weeks of the vaccine rollout fell over the US holiday season and reflected several challenges for patients, providers, states, and other healthcare stakeholders.^{1,2,3}

As we noted in [“The risks and challenges of the global COVID-19 vaccine rollout,”](#) global risks for the vaccine rollout reflect production scaling and manufacturing concerns, along with increased labor and IT challenges. Raw material constraints, as well as production scaling and manufacturing issues, led to limited supply at the jurisdiction level. Logistics, labor requirements, wastages at point of care, and IT challenges all influence jurisdictional ability to administer these vaccines to the public.

As we look across countries and populations, four phases may exist in COVID-19 vaccine deployment:

A) Lack of vaccine supply, because of a delay in the approval process or the wait for initial delivery

B) Planning, logistics, and systems

C) Ongoing supply constraints to meet throughput

D) Demand constraints

Despite meaningful progress in administration of the vaccine from the end of December through January, the number of doses administered in the United States still lags the number of doses delivered, although reporting delays may be a contributing factor (Exhibit 1). The challenge is stark: Over the roughly 50 days since mid-December, almost 60 million doses have been distributed while around 42 million have been administered. The United States is currently experiencing a combination of the B and C phases above: Overall, planning, logistics,

systems constraints are limiting vaccination progress while some communities, providers, and jurisdictions are supply constrained.

When the system-level throughput capacity exceeds daily supply, the United States may shift into either a fully supply- or demand-constrained environment, instead of a planning, logistics, and systems-constrained one. As states proceed with vaccine implementation, they are left to manage vaccine deployment while facing meaningful barriers.

In a review of rollout progress across diverse US states, five lessons emerged that, if addressed, might allow states to better execute COVID-19 vaccine deployment:

1. Define the state's role in vaccine deployment as it relates to local stakeholders and clearly establish supporting governance and a decision-making structure.
2. Establish and maintain a statewide view of vaccine throughput and consumer demand across the delivery network.
3. Promote access to vaccinations by matching consumers to administration sites and enabling smooth registration, scheduling, and follow-up.
4. Create population-specific approaches or tailored measures to reach groups with particular needs, especially populations such as the historically underserved or at high risk.
5. Engage and manage providers across delivery channels to achieve maximum throughput.

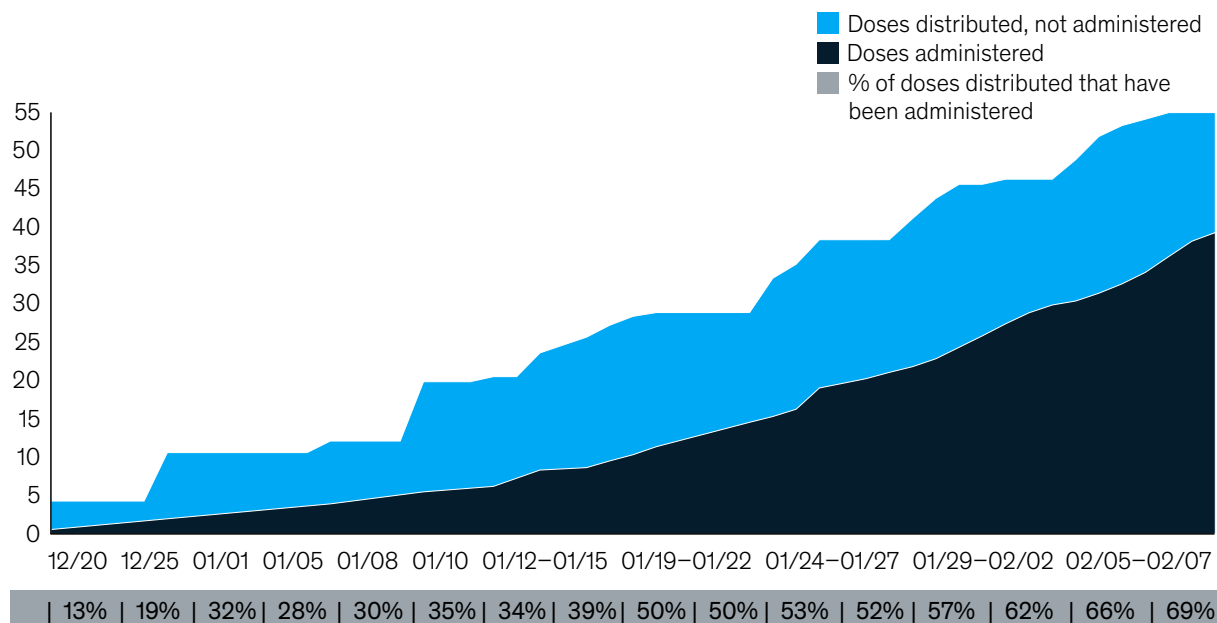
The administration challenge

Across the United States, the COVID-19 vaccine administration rate is slightly over a million doses per day.⁴ Of the projected

Exhibit 1

US COVID-19 vaccine administration has lagged distributed supply in the initial weeks.

Administered COVID-19 vaccine doses compared to distributed doses in the United States from December 20, 2020 to February 8, 2021 (millions of doses)



Note: Dates at the bottom of chart represent reported data by CDC; lines in between datapoints were smoothed.
Source: CDC COVID-19 Vaccination Tracker; WayBack Machine Internet Archive

available supply of vaccines by the end of the first quarter, the United States can expect roughly an additional 160 million of doses supplied by March 31, which equates to a little over 3 million COVID-19 vaccines available each day on an average basis.

To use this supply, the United States would need to increase administration by more than 2x. This number—3 million vaccines in arms per day—is several multiples of the daily administration rate of previous flu vaccine campaigns (Exhibit 2).⁵

Some jurisdictions have experienced more success than others in the vaccine rollout. Some smaller states with larger delivery systems and strong established networks of hospitals, clinics,

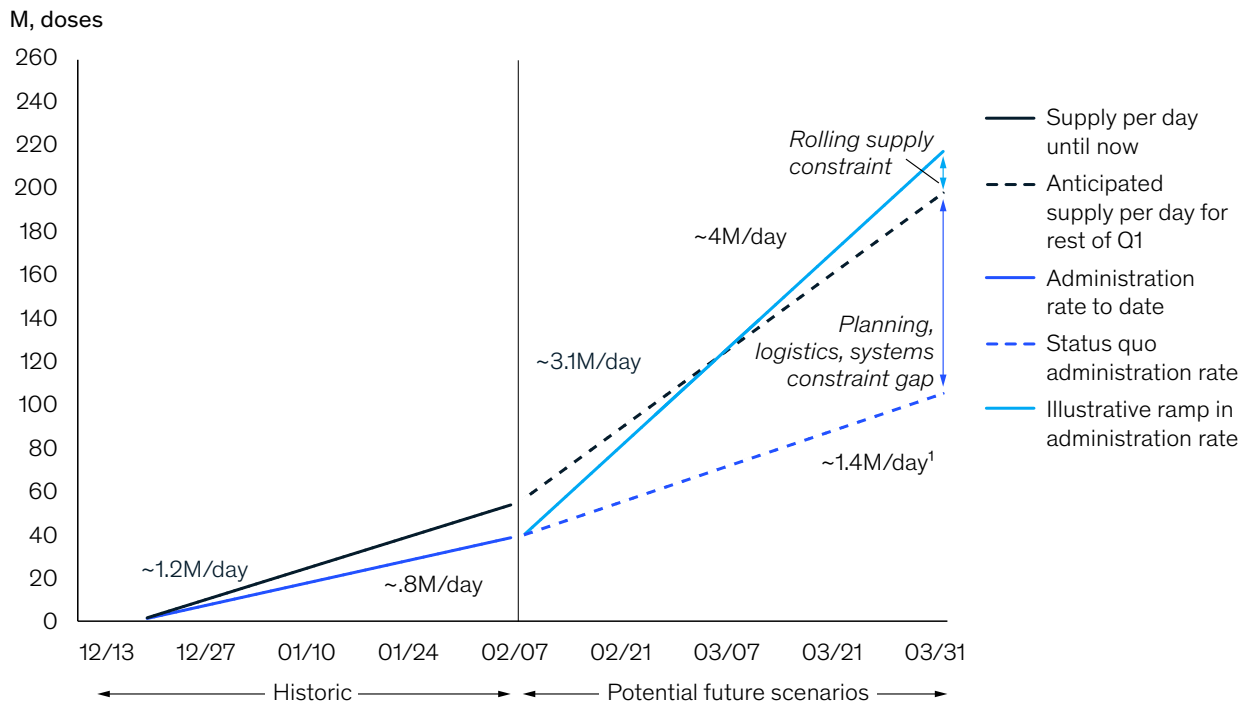
and pharmacies have been able to leverage the delivery system more quickly.⁶ Additionally, jurisdictions with clear strategy and guidelines have often encountered less confusion, such as who is eligible to receive the vaccine, and when they can receive it. Indeed, several states that have experienced higher throughput have opted for broader eligibility than states with narrower, more prescriptive eligibility.^{7,8} These broader strategies also may help with reaching the “cautious adopters” and “unlikely adopters” groups in the United States, as discussed in [“COVID-19 vaccine: Are US consumers ready?”](#)

While overall the United States is experiencing a planning, logistics, and systems constraint, true supply constraints exist for many stakeholders.

Exhibit 2

The US is currently, as of February 8, 2021, experiencing planning, logistics, and systems constraints.

Comparison of historic and projected administration rate in the United States and rate of supply of new doses to the United States



¹Based on average daily administration rate from last seven days.
Source: CDC COVID-19 Vaccination Tracker; Pfizer and Moderna Public Announcements of supply committed to the United States

These challenges include providers struggling to receive enough doses, leading some to cancel vaccination appointments⁹ or turn down patient and employee requests for vaccination. Given the importance of the system-level coordination of getting the supply to the right location to vaccinate individuals in the phased approach, the role of the state leaders is viewed as increasingly critical. Additionally, constraints can be results of 1) policy decisions or 2) communication confusion. For example, many providers are trying to interpret policy guidance at the federal, state, and local level as to whether to hold supply in reserve for second doses based on concerns around upcoming shortages, or whether to give first doses to as many people as possible.¹⁰

Five critical lessons for states to consider to improve COVID-19 vaccine deployment

Lesson 1

Define the state's role in vaccine administration (for example, administrator, convener) as it relates to local stakeholders (for example, counties, cities local health jurisdictions) and clearly establish supporting governance and a decision-making structure.

Each state is now faced with a choice of how to best serve its citizens and rebuild public health within its jurisdiction. State leaders may consider asking if the state should play

Checklist: Activities states are pursuing in COVID-19 vaccine roll-out.

Specific population planning

- ☐ Robust population segmentation and analytics
- ☐ End-to-end population-specific vaccine plans including channel alignment for select populations (eg, for homebound, nursing homes, other hard-to-reach populations)
- ☐ Proactive planning for transitions between phases and at-scale vaccine availability
- ☐ Robust plan for second dose administration

Logistics and supply chain of vaccine delivery to providers

- ☐ Inventory/cold-chain/storage management processes in place and plans developed for at-scale requirements
- ☐ Effective site delivery logistics, including allocation and delivery tracking

Provider/site operations

- ☐ Swift and effective provider activation, including sufficient participation in public-facing sites (eg, regional, pop-up, mobile sites)
- ☐ Proactive provider training to address common provider questions and misconceptions
- ☐ Clearly defined provider expectations through streamlined strategic communications
- ☐ Successful provider engagement and follow-through on state expectations (eg, on specific vaccination rate targets)
- ☐ Effective state-led site selection and launch, including right-sizing to meet target vaccination rate
- ☐ Defined plans to promote equitable access at provider-led and state-led sites (eg, reserved timeslots for specific population tiers, multilingual enrollment platforms)
- ☐ Dynamic site operations responsive to evolving context (eg, broadening hours if increased availability of vaccine allows for additional daily throughput)
- ☐ Providers and site systems linked to support consumer awareness, access, scheduling, and follow up
- ☐ Effective site infrastructure and processes for tracking and reporting of vaccination progress

Consumer engagement

- ☐ Public sentiment surveys and analysis proactively conducted on a regular basis
- ☐ Cross-functional teams in place (eg, operations, communications, analytics) that translate insights to rapidly adjust consumer engagement and administration approach
- ☐ Industry/business/faith/community organizations activated
- ☐ Proactive outreach to underserved populations (eg, non-English speaking)
- ☐ Information campaigns that span beyond traditional platforms and partners (eg, social media)
- ☐ Public-facing website that serves as a central educational repository (eg, vaccination dashboards), informs consumers on eligibility, and connects to provider directory and scheduling system
- ☐ Public call center with sufficient scale to meet caller demand, linked to scheduling system

IT and data

- ☐ Established registration portals for providers and consumers
- ☐ Effective tech interfaces with providers and consumers
- ☐ Implemented systematic prevention, detection, and correction mechanisms to ensure data quality
- ☐ Identified and remediated information system vulnerabilities (eg, to protect unauthorized access, misuse/modification of data)

Analytics and reporting

- ☐ Establishing and maintaining a real-time view of vaccine supply and consumer demand across the state's delivery network
- ☐ Defined data reporting requirements and processes for providers and sites to report vaccination progress
- ☐ Comprehensive surveillance of vaccine rollout including internal executive dashboards to guide strategic decision making (eg, dashboards covering administration progress, critical population monitoring)
- ☐ Robust analytics to inform adjustments to implementation approach
- ☐ Established support mechanisms/call centers (eg, to address data collection technical issues)

Administration

- ☐ Contracting needs anticipated and triggered as needed (eg, contracting for additional labor, IT system, and/or ancillary supplies)
- ☐ Used funding sources available to state and localities with clear line of sight on securing additional funding

Enabling policy

- ☐ Activated executive directives or other regulatory/policy tools to support mass vaccination needs (eg, expansion of clinical scope)

Nerve Center

- ☐ Effective program management and organization
- ☐ Activated coordination with key rollout stakeholders
- ☐ Regular pressure testing of overall plan robustness

the role of administrator, adviser, or convener for optimal vaccine implementation. While approaches to supporting public health and the vaccine deployment differ, it is critical that states make design choices that best match their infrastructure, resource capacity, and jurisdictions' needs.

In the *state-as-administrator* role, states have typically offered a state-hosted vaccination website to identify vaccine providers, provide updates on the vaccine rollout, and possibly support pre-registration and the scheduling of appointments. In this approach, a state could consider the demand and likely participation of its citizens, such as whether the sites would be trusted, managed, and used. A state may want to consider how to communicate where, when, and how consumers could visit these sites to receive the COVID-19 vaccine.

In the *state-as-adviser* role, states have centralized strategic decision making, such as selecting "preferred site locations," but are delegating operations to localities (cities, counties, etc.). State leaders may view this strategy as allowing each county or locality to adapt based on specific needs, such as whether non-traditional hours, a mobile unit, or rotating sites to administer vaccines would be most appropriate. In this role, states may consider being prepared to provide robust guidance and communications to all stakeholders, potentially serving as a conductor, to ensure partners understand the states' strategic plans and their implications, including where doses are being sent and the timing of the decision to move to the next phase.

Finally, states may choose to delegate much of decision-making and operational authority to localities and instead function in the role of *state-as-convener*, facilitating connections across public and private organizations that are essentially leading the vaccination implementation. With this approach, states are still typically seeking to have a centralized, statewide data infrastructure, but are engaging with federal and national partners as part of a coalition of entities supporting the vaccination effort.

In order to deploy any role strategy, states may consider engaging in several actions, including the following:

1. Determine state capabilities, resources, data flows, IT and data infrastructure, and needs (for example, staffing, skill sets, systems capabilities, degree of geographical variability, diverse populations, and where decision rights and responsibilities sit throughout the state).
2. Identify key stakeholders and define roles and decision-making authority for each.
3. Establish clear, consistent, and proactive communications about how the state will support vaccine implementation, including clarity on which aspects of the effort states will "host" and which will be administered via partners, such as pharmacies and primary care practices.

Lesson 2

Establish and maintain a view of vaccine throughput and consumer demand across the state's delivery network.

One of the most critical parts of effectively managing the rollout is achieving an accurate, up-to-date, and ideally daily end-to-end view of vaccine throughput. This view requires a record of doses received, on hand, administered, and wasted or lost (for example, due to temperature irregularity), and consumer demand at each point of vaccine dispensing. Regardless of its selected role, states face several challenges in attaining this view at a statewide and consistent level, including a tension between adhering to a rigid reporting structure and allowing flexibility to facilitate agile decision making that could maximize the number of shots administered. States are finding they have to contend with blind spots in parts of the distribution system and creatively support registration/scheduling across vaccination sites. Most states are finding themselves in the position of needing to urgently integrate disparate data sources and multiple systems in order to build a data-backed view sufficient to guide decisions.

To achieve and maintain an end-to-end view of vaccine throughput and consumer scheduling demand, states may want to consider several steps:

1. Prioritize efforts to improve visibility of consumer scheduling for mass vaccination sites, given that these sites require the most scheduling support and are most likely to be supported by the state.
2. Consider segmenting IT and data requirements by site type and vaccination strategy to ensure that the consumer experience is optimized and most critical data are appropriately prioritized. Allow for approaches that do not rely on tech-heavy expertise (for example, partnerships with community organizations for scheduling populations with special needs).
3. Centralize data and visualization capabilities that enable rapid decision making, support monitoring of equity and efficiency, and promote leadership transparency.

Many states are enabling data necessary for decision making. For example, states are creating consumer-facing websites and launching central scheduling resources, though not all providers may choose to use them.¹¹ Many are relying on the immunization information systems to track site-by-site administration progress and may be choosing to supplement this information with surveys regarding transfers, throughput, and capacity.¹²

Lesson 3

Promote access by matching consumers to administration sites and enabling smooth registration, scheduling, and follow-up.

Vaccine administration sites may be state-led, local-government-led, or privately operated, or a combination of all three, depending on state strategy, provider capacity and throughput, and the presence of private-public partnerships. To promote broad vaccine access, states can consider multichannel engagement efforts leveraging stakeholders across private and public sectors (for example, payers, primary care providers, National Guard, employers, community organizations) as

either direct administration points, facilitators/navigators, or educators in the vaccination journey. States face several barriers in achieving successful consumer–site matching, including minimal lead time on allocation, potential shifts in policy impacting eligibility criteria, consumer education and clarity on eligibility, consumer compliance, provider/site systems interoperability, scheduling/appointment challenges, and the need for clear governance for coordinating with non-state-led sites.

While several barriers are beyond states' influence or control, states can consider steps to try to promote improved consumer–site matching:

1. Develop centralized resources, including digital and analytics capabilities (for example, consumer-facing portals), and other operational tools (for example, pre-registration/registration and scheduling systems) that state-led and non-state-led sites may utilize to facilitate consumer–site matching.
2. Dynamically measure consumer demand and behaviors (for example, phone/scheduling traffic by site type) to inform/change operational decisions (for example, allocation to site types, suggested site hours, locations and design of new sites).

Lesson 4

Create population-specific measures or tailored approaches to reach groups with particular needs, especially large populations at high risk such as those who are historically underserved and the homebound elderly.

As the rollout unfolds, it is increasingly clear that a one-size-fits-all approach to administration will not successfully meet access needs across diverse populations. Instead, subsets of populations may require dedicated approaches to overcome barriers to getting vaccinated. Diversified channels or related measures can promote efficiency

and equity in reaching especially underserved populations that may experience access barriers, such as transportation, mobility, and health information or literacy challenges. Tailored approaches will likely be important in the near term, in particular for individuals who are homebound and may require a home health visit; those who may not be able to get to an alternate site due to work and transport challenges, and may benefit from an at-work opportunity to be vaccinated; and those who are historically underserved (for example, homeless populations, undocumented workers, or those living in congregate care) who may benefit from alternate options due to logistical concerns or fear/mistrust of government or healthcare providers. States can face considerable challenges to promoting access among these groups, including lack of transportation, language barriers, and risk of loss of wages or employment.

To engage these populations, states need to take tailored approaches that require several steps:

1. Clearly define and identify the members belonging to these populations.
2. Proactively reach out to these members via current healthcare access points, payers, or trusted community organizations with multilingual communications.
3. Understand granular sentiment and address concerns.
4. Create scheduling or administration sites where these populations are located.
5. Deploy nontraditional approaches as needed and permissible under applicable regulations (for example, mobile vaccination sites,^{13,14} home visits, and transportation¹⁵ support).

Lesson 5

Engage and manage providers across delivery channels to achieve maximum throughput.

States may consider activating providers to support vaccine administration beyond traditional

channels, and beyond their own employees or patients. Given the challenges that healthcare providers have faced over the last year, states can consider ways to support providers in the goal of maximizing reach, equity, and vaccination throughput. Indeed, quickly increasing access to and deployment of the vaccines requires public and private partners alike to work together to offer shots to all. Besides the critical role that providers play in administering the vaccine, healthcare providers are the most trusted source of information about the COVID-19 vaccine, according to recent McKinsey Consumer Health Insights data.¹⁶ States may consider ways to engage providers to administer the vaccine beyond their existing patients or employees.

Given the already strained workforce, states also could consider allowing providers to participate in open administration and provide communication and support (logistical, tactical) on how they can help states reach immunization targets. Effectively collaborating with providers requires enrolling and training them to participate in public (open) sites of administration, providing guidance/communications on state expectations/targets, understanding what type of support would be most helpful to them, delivering on those supports, and developing mechanisms for performance management and contingency plans when targets are not met. Barriers exist across each of these options, potentially fueled by some providers already being overburdened in a strained healthcare system. Still, states may take several actions to mitigate barriers, including exploring policy actions that may increase the pool of vaccine providers, for example, by expanding the scope of non-physician healthcare providers and/or other personnel. Several states rapidly increased the number of potential vaccinators by expanding policy of who is able to administer the vaccine. Pennsylvania expanded its network of administrators to include pharmacists.¹⁷

States can mitigate barriers by offering custom support to providers who need it, including staffing and logistics concerns. States can send clear communications on expectations and targets, coupled with performance management

processes, to ensure doses are reaching localities efficiently and meeting their needs.

Conclusion

While the road is still uphill for states at the moment, we have observed actions that may be helpful in accelerating vaccine implementation, which in turn could help mitigate the pandemic.

As we have noted earlier, swift vaccine administration in the United States can help reduce mortality, protect those at the greatest risk, and play an important role in preventing further viral mutations. States have a critical role in helping as many members of the public have access to vaccination, protect against COVID-19, and return to their normal lives and livelihoods.

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