How can hospitals make the most of time and drugs to battle COVID-19?

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acqueline Griffin, an assistant professor of engineering at Northeastern, specializes in healthcare optimization. Credit: Matthew Modoono/Northeastern University

The number of cases of COVID-19 in the United States is expected to

reach far beyond the nation's hospital capacity. To cope with the anticipated surge of patients, healthcare workers will need to adopt new strategies to maximize efficiency while still ensuring that patients receive appropriate care.

In a study co-authored by Jacqueline Griffin, an assistant professor who studies healthcare optimization, researchers found that even marginal increases in the time spent treating individual patients means dramatic increases in wait times at healthcare facilities in the U.S.

Long wait times were already a problem for hospitals in the U.S. without the added strain of the COVID-19 pandemic.

"If you talk to the average American who's gone to an emergency department, they've already seen long wait times and lack of beds. And that's just for standard flu seasons," Griffin says. "Now if we see an exponential increase in the number of patients coming into the system, that will be an even more drastic increase in the wait times and the demand."

Increased wait times also pose a threat to healthcare facilities because COVID-19 spreads easily between people in close proximity.

"Especially when we're looking at a virus that's transmitted between individuals, we obviously want to minimize the amount of people waiting in a common area," she says.

To shave time off visits and shorten waiting room times, hospitals need to have impeccable management.

"You need a traffic manager" to guide the flow of patients, Griffin says.

"A lot of hospitals have moved to bed management boards where they

can visualize which beds are open, which beds need to be cleaned, and which patients are checking out soon," she says. "Having a full view of the system is often a good way to manage that."

To further prevent hospitals from becoming overwhelmed, some healthcare workers are opting for virtual care.

"This is really making us reconsider telehealth, where people remain at home but still receive care that's equivalent or close to what they would get in a hospital with nurses remotely monitoring patients," she says.

"This is especially important when you think about bed capacity," she says. Not to mention the protection it provides healthcare workers who must remain healthy to continue working.

Many hospitals are already canceling elective procedures to free up space and time. This could also help them maintain vital supplies during the outbreak, Griffin says. But these measures alone won't be enough to keep things running smoothly.

Griffin, who also studies pharmaceutical supply chains, says that nurses need to work closely with their pharmacists when making decisions about which patients will receive the limited drugs that are currently available.

This is important now more than ever as major drug-manufacturing countries like India are restricting exports of certain pharmaceuticals such as antibiotics, medications that are useless at treating viral diseases like COVID-19 but essential for treating any secondary bacterial infections.

"Medical professionals should work closely with their head of supply chain and look for opportunities to make substitutions," she says.

For example, right now the antibiotics tinidazole and erythromycin are in short supply. Are there alternative antibiotics to prescribe, such as penicillin? What happens when a patient is allergic to penicillin or their infection is resistant to it?

"It's really important to forecast what you expect to have in the future and make strategic decisions based on that," she says. The only problem is that accurate decisions can only be made when people act predictably.

"We're trying to model behaviors of individuals throughout the supply chain so that we can better predict the trends," she says. A lot of those behaviors are traced back to buyers' trust in the supply chain.

"From a human perspective, it makes sense that if you don't receive what you ordered, you try a different strategy," she says. "But in the long run, that can actually cause more challenges when we think of the system as a whole."

In other words, unpredictable buying causes unpredictable manufacturing.

"Oscillations at one part of the supply chain oftentimes will get larger and trickle back up through the supply chain," she says. "It's panic behavior," and it only makes a healthcare worker's difficult job harder.

More information: Vahab Vahdat et al. Improving patient timeliness of care through efficient outpatient clinic layout design using data-driven simulation and optimisation, *Health Systems* (2019). DOI: 10.1080/20476965.2018.1561160

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