How to use and understand always-evolving COVID-19 data

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In the daily deluge of COVID-19 data, it can be difficult to find answers to key questions: How bad is it, what should you do about it, and when does this all end?

Data collection practices around COVID-19 have evolved, complicating their interpretation. And with those changes, we need to update how we understand the kinds of numbers we've become all-too-familiar with. While the data come with new caveats in the omicron era, they do illuminate a few key takeaways:

• While no one metric can answer all our questions—each on its own is imperfect—they represent puzzle pieces that can come together to inform personal decision making and policy.

• The circulation of COVID-19 in communities and hospitals is only part of the risk calculation for individuals; data have consistently shown that vaccination reduces the risk of infection, hospitalization and death.

• Daily COVID-19 data don't provide clear answers on what going back to "normal" looks like, how we might get there, and when that will be. But that uncertainty doesn't change the end goal: reducing the numbers of deaths and hospital strain.

The COVID-19 data we're used to has changed

Cases and hospitalizations still indicate the status and urgency of the pandemic, but interpreting them today presents new challenges. Here are some things to note about what the data can't tell you.

— Cases don't fully capture community transmission. At the beginning of the pandemic, with limited testing, reported cases didn't fully capture the spread of the virus. Two years in, testing is much more widespread—but with a new version of the same problem.

The United States has made at-home testing far more accessible. The catch? The results of these home tests don't get included in the reported case numbers. It's unknown just how much the numbers undercount

reality, but the problem will likely grow with the rise of home testing.

—There are other ways to measure community transmission. Methods that are "passive," or don't rely on people reporting results, can fill in some gaps, said George Anesi, a Penn professor of medicine.

One such method that the CDC is using is measuring COVID-19 levels in sewage. Wastewater data can independently confirm trends seen in reported cases and serve as an early warning signal before reported cases take off, though the data must be interpreted with caution.

—Hospitalizations can reflect increased transmission, not necessarily severity. Given the uncertainty with case numbers, it's tempting to look to hospitalizations because virtually everyone admitted to a hospital is tested for COVID-19.

But those hospitalization numbers can suggest an inflated view of the number of severe COVID-19 cases.

The data don't distinguish between people who are hospitalized because of COVID-19 from those who are admitted and happen to test positive for it. For example, "incidental positives" made up more than 60% of COVID-positive patients in the Jefferson Health system in January.

Still, while the virus may not be the cause of a hospitalization, it can worsen or complicate other conditions. So it's difficult to make a clear distinction between incidental positives and severe outcomes. In both cases, hospitalization numbers still reflect hospital strain.

Even though omicron is less likely to cause severe disease requiring hospitalization, especially among the vaccinated, hospitals were overrun because so many people contracted it. And every COVID-positive patient increases the exposure risk to staff and takes up precious bed

space.

—Don't look at population-level numbers to keep track of vaccine effectiveness or the effects of new variants. Partly because of the messiness of the data, population-level numbers aren't ideal for understanding how vaccine effectiveness is changing over time, especially as new variants emerge.

For much of that analysis, the U.S. relies on other countries that have better data reporting systems, often with national health systems, said Michael LeVasseur, professor of epidemiology and biostatistics at Drexel's School of Public Health. "Our data in the United States is so siloed, and it's so hidden behind all sorts of barriers, that it's really hard to paint a big picture."

The numbers can still be useful

Everyone's risk is different, based on factors such as age, health history, and vaccination status.

In addition to personal risk, consider the societal impact of possibly spreading a disease that endangers the most vulnerable.

But while that might sound daunting, the interventions to mitigate COVID-19 risk remain unchanged: "Wear a mask, stay home if you're sick, wash your hands, social distancing," LeVasseur said. And most effective of all: vaccination.

Here are some guiding principles experts widely agree on.

—Get vaccinated, but know it's not bulletproof. Vaccines continue to be effective at preventing severe disease and hospitalization. And booster shots help shield people from the worst outcomes, particularly those who

are older.

It's important to remember that vaccines don't make you invincible. They reduce the relative risk of contracting the virus. When community transmission is high—increasing the baseline level of risk— even highly effective vaccines can't eliminate risk entirely. Vaccines work best when we reduce the amount of work they they have to do as much as possible.

Public health experts recommend a multi-layered approach: measures like getting vaccinated, wearing masks and social distancing don't substitute for one another but can be used together to maximize individual and community protection.

—Add layers of protection as risk increases. Deciding exactly how cautious to be—particularly when socializing—is challenging. Data show the virus is often contracted in social settings. Beyond limiting interactions, people have other tools at their disposal: rapid-testing, masking, increasing ventilation, and gathering outdoors as the weather gets warmer. The CDC has a county case rate threshold beyond which it recommends indoor masking.

Anesi recommends paying attention to both the number of reported cases and how they're changing, saying "trajectories can be very, very helpful." Both still have flaws: Reported numbers are difficult to compare over time because of how testing has changed, and trajectories don't account for the level of community spread at any given moment.

For instance, in February 2022, with omicron on the decline after a swift peak, "we're still at a much higher level than we've been at [during] other points in the pandemic," he said.

—Data frequently lag, so be proactive. Data represent a picture of the past, even when reporting systems operate perfectly. Test results can

take days to identify cases. Hospitalization numbers spike after case numbers because the virus takes time to cause severe disease. And deaths lag even further behind.

Reporting delays can engender a false sense of security in people trying to make sense of COVID-19 in the moment. Whatever the daily numbers show, the virus rewards being proactive.

"I don't want people to use a dashboard like a weather forecast," LeVasseur said. People should take precautions without waiting for the numbers to spike, but those precautions become even more necessary when transmission is high.

Data won't tell us when it will be 'over'

The data can provide glimpses of the status of the pandemic and indications of how individuals and policymakers should respond. But don't focus on cases, hospitalizations, or deaths to know when exactly this all ends.

Public health officials generally agree that the eradication of COVID-19 is off the table.

—Sure, there's a mathematical definition of when a pandemic becomes endemic instead, like the flu. But that won't tell you when you don't have to think about COVID-19 as much.Technically, the virus is considered endemic when every infected person goes on to infect about one other person. In practice, even the flu hasn't reached that definition as it can spread quickly depending on the season.

What people may actually want to know is what our collective sacrifices are trying to achieve, andx when they may no longer be necessary. The answer to that question is unchanged from March 2020, LeVasseur said:

prevent the healthcare system from being overwhelmed.

—We want hospitals to be able to care for all patients. The aim is that most people the world over only get infected after getting vaccinated—saving their lives and a trip to the hospital.

We want to "prevent our hospital system from being overburdened" by not having enough staff, beds, and other resources, LeVasseur said. "No one's moved the goalposts."

—The full toll of the pandemic goes beyond daily numbers. A big worry for experts is how hospital strain led to the cancelation or postponement of so-called elective surgeries. They aren't necessarily optional procedures; many are essential. They are often only elective in that they don't have to happen immediately, but postponement over long periods of time can still cost lives.

COVID-19 cases and deaths also don't capture costs to mental health, educational equity, social mobility, or housing and food security that people have borne for two years. Those damages will reverberate for generations. Pandemic recovery defined more broadly will be a years-long effort—no matter what the numbers say today.