Lincoln-Lancaster County Health Department

COVID-19 Risk Dial Metrics

Updated: May 7, 2021

INTRODUCTION

The COVID-19 Risk Dial was developed by the Lincoln-Lancaster County Health Department (LLCHD) to help communicate to the public the risk of spread and impact of COVID-19 in the community. Since its inception in May 2020, LLCHD used five primary metrics based on local data to communicate the risk to the public: Positivity Rate, Cases, Testing, Contact Tracing, and Health Care System Capacity. LLCHD is now adding two additional metrics - Vaccination Rates and Deaths.

These metrics are commonly cited by numerous reputable public health agencies and research organizations as important public health indicators for COVID-19. Over the course of the pandemic, public health agencies such as the World Health Organization (WHO), the U.S. Centers for Disease Control and Prevention (CDC), State Health Departments, national public health associations, schools of public health, research foundations, and many other organizations have proposed specific metrics to measure the progress and setting goals for controlling the COVID-19 pandemic. Not surprisingly, measures and metrics have evolved, and multiple iterations of similar metrics have been offered by different organizations. Some metrics thought to be very important early on, such as the availability of ventilators and access to testing, have become less important as therapeutics were developed, and testing capacity grew.

The most important change in fighting this global pandemic has been the approval of vaccines by various health entities across the globe. In the U.S., on December 11, 2020, the U.S. Food and Drug Administration (FDA) issued Emergency Use Authorization (EUA) for Pfizer-BioNTech COVID-19 vaccine in persons aged 16 years and older for prevention of COVID-19. This was quickly followed by FDA issuing an EUA for the Moderna COVID-19 Vaccine on December 18, 2020. Then on February 27, 2021, FDA issued an EUA for a third vaccine for the prevention of COVID-19 produced by Janssen Biotech, Inc. (aka Johnson & Johnson).

The LLCHD monitored this evolution and selected measures and metrics which can be practically applied to our local jurisdiction. The LLCHD initially modeled the metrics used for the COVID-19 Risk Dial on recommendations found in the following three resources:

- Johns Hopkins Bloomberg School of Public Health Coronavirus Resource Center (https://coronavirus.jhu.edu/) with special emphasis on their "Testing Hub" (https://coronavirus.jhu.edu/testing) and their June 2020 report "COVID-19 Management Metrics for Cities" (https://coronavirus.jhu.edu/from-our-experts/management-metrics-for-cities-in-the-covid-19-crisis)

- U.S. Centers for Disease Control and Prevention (CDC) "CDC Activities and Initiatives Supporting the COVID-19 Response and the President's Plan for Opening America Up Again" (https://www.cdc.gov/coronavirus/2019-ncov/downloads/php/CDC-Activities-Initiatives-for-COVID-19-Response.pdf)

- Resolve to Save Lives & Vital Strategies "Essential Information for States and Counties to Publicly Report", led by former CDC Director Dr. Tom Frieden and endorsed by the American Public Health Association, the Association of Schools of Public Health, Trust for America's Health, and Johns Hopkins Bloomberg School of Public Health. (https://preventepidemics.org/wp-content/uploads/2020/07/Tracking-COVID-19-in-the-United-States-Report.pdf)

Throughout this document these three resources will be noted as JH, CDC, and RTSL, respectively.

In February 2021, RTSL released a Comprehensive Review of COVID-19 Vaccine Data and suggested metrics to be considered. https://resolvetosavelives.org/about/press/comprehensive-review-of-covid-19-vaccine-data-provides-roadmap-to-improve-us-rollout

The RTSL provided recommendations for metrics such as the phase of vaccination, vaccine eligibility, vaccine distribution, percentage of the population that have begun vaccination, and the percentage of the population fully vaccinated. Local data on vaccinations is publicly available on the City of Lincoln COVID-19 dashboard.
https://lincolnne.maps.arcgis.com/apps/opsdashboard/index.html#/79eb4e7acdce4c9aa368c39604abe0cd

The CDC website on Reporting COVID-19 Vaccinations in the United States includes specific data that they are tracing across the U.S. Several of the metrics are quite similar to the RTSL proposed metrics. Reporting COVID-19 Vaccinations in the United States | CDC

In addition, the CDC includes the number and percent of population (total, 18+, and 65+) with at least one dose and who are fully vaccinated.

The following is a list of the measures and metrics LLCHD uses and a description how they relate to the position of the LLCHD COVID-19 Risk Dial.

1. **TEST POSITIVITY RATE**

   Positivity rates from virus testing can be measured in several ways and each way provides different insight into the risk of COVID-19 in a community. The positivity rate of tests conducted in the last week is a key metric, along with the trend over several weeks. Positivity rates are a measure of testing capacity and utilization, and while this metric can provide important context about case totals and trends, it is not necessarily a measure of how prevalent the virus is in communities. Policy decisions should not be determined based on test positivity rate alone. Considering confirmed new cases, testing rates, testing strategies (frequency and percent of population tested) and percent positivity together gives us a fuller picture of the risk of spread of COVID-19 in a community.

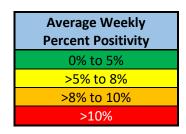   *Previous Metric: 'Cases over People' Positivity Rate*

Average Weekly Percent Positivity
0% to 5%
>5% to 10%
>10% to 15%
>15%

   Since the inception of the LLCHD COVID-19 Risk Dial, positivity rate was measured using a 'cases over people' rate, which compared the number of positive COVID-19 cases to the number of unique individuals tested. LLCHD reviewed recent changes to reporting positivity, epidemiological data, and guidance from CDC, Johns Hopkins University, and the Nebraska Department of Health and Human Services (NDHHS). LLCHD has chosen to update the Test Positivity Rate metric as described in the following paragraph.

   Revised Metric: 'Test over Test' Positivity Rate

   On March 16, 2021, LLCHD announced a change in how we would report the test positivity rate to be congruent with the NDHHS. This change was to move from a 'cases over people' to a 'test over test' calculation. The 'test over test' approach compares the number of positive COVID-19 tests to the total number of tests conducted. Based on a review of historic and current local, State and Federal

Average Weekly Percent Positivity
0% to 5%
>5% to 8%
>8% to 10%
>10%

information on positivity, the LLCHD chose increments for positivity which correlate with the LLCHD COVID-19 Risk Dial as shown in the table above. Johns Hopkins has used the 5% threshold throughout the pandemic to represent a rate at which adequate testing is being conducted in a community. The other increments are based on CDC's "K-12 School Operational Strategy" guidance on reopening schools, released on March 19, 2021 (Operational Strategy for K-12 Schools through Phased Prevention | CDC).

The LLCHD decided to use the "test over test" rate for tests conducted in our community, excluding University of Nebraska – Lincoln's (UNL) testing of non-ill students, faculty, and staff. In January and February of 2021, UNL conducted comprehensive return to school PCR saliva testing of all students, faculty and staff that spend time on campus. This resulted in over 20,000 tests every 10 days for three separate rounds of testing. The positivity rate was less than 1.0% for each round. Since that time, UNL has conducted ongoing random mitigation testing of over 3,000 people each week, as well as offered voluntary testing for others, resulting in more than 1,000 additional tests each week. UNL's testing is unique in size and scope. If this data were combined with our community testing data which is primarily for persons with COVID-19 symptoms, it would skew the average weekly percent positivity lower by several percentage points. For example, the week ending February 13, the community rate was 7.0%, UNL's rate was 0.3% and the combined rate was 2.5%. When spring semester ends, UNL's saliva testing will drop significantly. If we used the combined positivity rate as our metric, the percent positivity for Lancaster County would increase significantly, even though there would be no real change in positivity in persons being tested through testing available to the entire community.

2. **CASE RATE**

The Case Rate is the number of new COVID-19 cases per day divided by a standard number, such as 1,000 or 100,000. We use a weekly case rate and review the trend over the past three weeks. Johns Hopkins Coronavirus Resource Center provides various measures/metrics for COVID-19 (https://coronavirus.jhu.edu/testing/tracker/map). For many months JH used "New Confirmed Cases per 1,000 People" and created a scale with seven ranges from 0.0 to 0.50 cases per 1,000. LLCHD condensed the JH scale from seven ranges to four so it could readily be applied to the LLCHD COVID-19 Risk Dial. JH now uses new confirmed cases per 100,000 and updated the seven ranges. The LLCHD has modified our case rate and scale to reflect the changes in the JH metric.

Previous Metric: 'Number of New Cases per 1,000 People'

Johns Hopkins Rates (per 1,000 people)	LLCHD Rates (per 1,000 people)	Avg. Cases Per Day
0.00	0.00 to 0.08	0 to 26
0.08		
0.17	>>0.08 to 0.17	27 to 54
0.25	>>0.17 to 0.33	55 to 106
0.33		
0.41	>0.33	107 or more
0.50		

Revised Metric: 'Number of New Cases per 100,000 People'

Johns Hopkins Rates (per 100,000 people)	LLCHD Rates (per 100,000 people)	Avg. Cases Per Day
0.00	0 to 7	0 to 23
7.32		
14.64	>7 to 15	24 to 47
21.96	>15 to 29	48 to 93
29.28		
36.60	>29	94 or more
43.92		

3. **TESTING**

Early in the pandemic, COVID-19 testing was limited, and testing availability was considered a vital indicator of the risk of community spread. However, a variety of testing providers and rapid testing options emerged over the past year, so testing availability is no longer used as a metric. The time between sample collection and when the LLCHD receives test results (turnaround time) remains a key metric. LLCHD's goal is to have tests results reported in 1 day or

Current Metric (retained): Turnaround Time from Sample Collection to Report
< 48 hours
> 2 to 4 days
> 4 to 6 days
> 7 days

less. RTSL's July 2020 metric report recommended turnaround time should be a median ≤48 hours with a high proportion <24 hours. This allows public health guidance to be provided quickly to the case and allows quick gathering of information on potential exposures and close contacts. LLCHD believes this metric remains valuable in evaluating the risk of spread of COVID-19 in the community.

4. **CONTACT TRACING**

When a COVID-19 positive case is identified, LLCHD staff work with the individual to identify others who were in close contact, and who are at risk of contracting and further spreading the virus. The length of time it takes to make first contact with the original case and those with whom they have had close contact is key to containing outbreaks. The LLCHD's benchmark is to make initial contact with the case within 48 hours of the positive test result, which is aligned with JH, RTSL, and CDC metrics.

Current Metric (retained): Percent of Cases & Contacts Contacted Within 48 Hours
≥ 80%
60% to 79%
50 to 59%
<50%

A second metric related to contact tracing measures the 'Percent of Cases Connected to Another Positive Case' (cases that are identified to be connected to other cases). Early in the pandemic, it was thought that if cases were connected, then the source of the spread of COVID-19 would be known and it would be easier to contain in the community. However, LLCHD's Surveillance and Epidemiology Team recommended that this metric no longer be used, as the percentage has varied little throughout the pandemic and provides minimal value as a metric.

Previous Metric (removed): Percent of Cases Connected to Another Positive Case
>= 80%
60 to 79%
40 to 59%
<40%

5. **HEALTH CARE SYSTEM IMPACT & CAPACITY**

Early in the pandemic, 'Percentage of ICU Bed Availability' and 'Beds Used by COVID-19 Patients' were considered important measures of the impact of COVID-19 on the local health care system. Data for both these metrics are reported to LLCHD by the local hospital systems. As the pandemic progressed and the number of people hospitalized with COVID-19 increased, local hospitals developed response mechanisms to ensure adequate ICU capacity, even while a significant number of beds were occupied by patients infected with COVID-19 and recovering from COVID-19 infections and complications. During the surge in cases and hospitalizations that occurred in November and December 2020, local hospital systems were stressed and cared for over 100 COVID-19 patients per day. At the height of the surge (November 11 to December 1) over 150 COVID-19 patients were being cared for each day in Lincoln hospitals. Elective surgeries were delayed or canceled, staff-to-patient ratios were modified, and hospitals expressed concern that COVID-19 was straining their ability to continue providing a high quality of care.

Fortunately, new therapeutics (monoclonal antibodies) received FDA Emergency Use Authorization (EUA) in November. As this became available in our community, fewer people required hospitalization, reducing the impact on the health care system. Quickly following the EUA of safe and effective vaccines, vaccination of residents of Long-Term Care facilities began in late December 2020 and continued in January and February. LLCHD mass vaccination clinics and partner vaccination efforts focused on older adults resulted in over 75% of those age 65 and older having their second vaccination by the end of March. The result has been a dramatic reduction in hospitalizations in older adults, beginning in late January and continuing to drop progressively through March.

Previous Metrics: 'Beds Used to Care for COVID-19 Patients' and 'Percent of ICU Beds Available'

Beds Used to Care for COVID-19 Patients
<10
10 to 19
20 to 44
>44

The Douglas County Health Department and established a metric based on the number of local hospital beds in use by COVID-19 patients. LLCHD used this same metric as applied to Lancaster County's local hospital service area ('Beds Used to Care for COVID-19 Patients'). LLCHD has decided to no longer use this metric and will replace it with the percent of medical/surgical beds being used by COVID-19 patients (see below).

Percent of ICU Beds Available
≥50%
30% to 49%
20% to 29%
0% to 19%

The LLCHD has also used the metric of the 'Percent of ICU Beds Available' for much of the pandemic. In areas of the country where COVID-19 became unmanageable, it was preceded by a rapid decrease in ICU bed availability, with 30% often being suggested as a "tipping point" after which health care systems became overwhelmed. As local hospitals moved into "surge" status, they increased the number of ICU beds by converting areas previously devoted to lower level care into ICU areas. Thus, the total number of ICU beds changes. Despite not having a fixed denominator for how many ICU beds are available, this metric continues to provide value regarding the impact on the health care system. This metric has been retained.

Revised Metrics: 'Percent of ICU Beds Available' and 'Percent of Medical/Surgical Beds Used to Care for COVID-19 Patients'

Current Metric (retained): Percent of ICU Beds Available
>50%
>30% to 49%
20% to 29%
0% to 19%

Current Metric (new): Percent of Medical/Surgical Beds Used to Care for COVID-19 Patients
5% or less
>5% to 15%
>15% to 25%
>25%

As discussed on the previous page, the LLCHD will continue using 'Percent of ICU Beds Available' as a metric in the COVID-19 Risk Dial.

LLCHD and the local health care system have worked closely together throughout the pandemic. As we evaluated how COVID-19 impacted the local health care system, it became clear they have a consistent number of medical/surgical beds. Health care system leaders provided useful input and guidance, identifying thresholds of medical/surgical bed use by COVID-19 patients that reflected levels of stress on the local health care system. Thus, we have adopted a metric that measures the percentage of medical/surgical beds occupied by COVID-19 patients. We believe this measure provides a reliable indicator of impact on the health care system and measures the severity of COVID-19 in the community.

6. **VACCINATION**

The FDA gave Emergency Use Authorization (EUA) to two vaccines in December 2020 (Pfizer-BioNTech and Moderna), and a third (Janssen aka Johnson & Johnson) in February 2021. These vaccines were determined to be safe and effective in preventing a high percentage of people from contracting COVID-19, and in preventing serious illness resulting in hospitalization and death. The CDC provided guidance on vaccination priorities and Nebraska developed specific guidance and requirements for local health districts regarding vaccine prioritization (https://dhhs.ne.gov/Pages/COVID-19-Vaccine-Information.aspx). The LLCHD worked closely with medical providers other community partners and pharmacies to quickly vaccinate those eligible. Multiple mass clinics have been held over the past three months.

As of March31, a total of 175,441 doses of vaccine had been administered in Lancaster County. 112,979 people had initiated their vaccination schedule and 62,462 received their second dose. As of March 31, over 75% of all persons aged 65 or older in Lancaster County have received their first and second dose of vaccine. Additionally, 54% of those aged 55 to 64 had initiated their vaccination schedule. With the administration of vaccines in older adults we are already seeing benefits in terms of the public health impact - reduced numbers of cases in older adults, as well as fewer hospitalizations and deaths.

The LLCHD has moved to Phase 2, and is now offering vaccine to the general population, prioritizing by age and underlying health conditions. As of March 26, the following groups have been provided opportunity to be vaccinated by the LLCHD, community medical partners and local pharmacies: health system care providers, long term care staff and residents, person over the age of 60, first responders, utilities, corrections, educators, child care providers, funeral homes, grocery workers, food processing, transportation, postal service, public transit, high risk persons with certain underlying medical conditions (as identified by their medical providers) and those in congregate living. Health Care System partners have included Bryan Health, Bluestem Health, CHI Health St. Elizabeth, Lancaster County Medical Society, Lincoln Surgical Hospital, and Tabitha Nursing & Rehabilitation Center, as well local

pharmacies participating in the Federal Pharmacy program - Community Pharmacy, RelyCare Pharmacy, and Walmart.

On March 26, 2021 Governor Ricketts announced that everyone 18 and older was eligible to receive vaccine through the Federal Pharmacy Program.

New Metric: 'Percent of Eligible Population Vaccinated'

Percent of Eligible Population Vaccinated
>75%
>50% to 75%
>25% to 50%
≤25%

It remains unclear the exact percent of the population that needs to be vaccinated to stop the epidemic spread of COVID-19 in a community. The World Health Organization's Chief Scientist, Dr. Soumya Swaminathan stated that between 60 and 70% of the population needs to be vaccinated to achieve herd immunity. Dr. Anthony Fauci, Director of National Institute of Allergy and Infectious Diseases suggested that 70% to 80% of the population may need to be vaccinated to achieve herd immunity. Resolve to Save Lives, led by former CDC Director Dr. Tom Frieden, has suggested a goal metric of 80% of the population be vaccinated. Based on these highly reputable sources, the LLCHD has set a goal of having 75% of eligible people fully vaccinated. Currently that includes everyone age 16 and older that does not have a contraindication for vaccination. Note: vaccinating 75% of persons 50 years of age and older will be a key milestone in reducing the impact of COVID-19 in our community, since that age group includes the vast majority of persons who are at increased risk of hospitalization or death due to COVID-19.

7. **DEATHS**

Deaths due to COVID-19 are a hard reality and a definable outcome of this pandemic. Deaths are considered a "trailing indicator" since death from COVID-19 often comes after weeks or months of illness. 227 Lancaster County residents have died from COVID-19 as of March 31, 2021.

To date, 47% of the deaths have been in persons 80 years of age or older, and another 40% have been in persons between 60 to 79 years old. Thus, 87% of deaths have been in persons over 60 years of age. We have chosen to use a 3-week rolling average of deaths per week. The table to the right shows the number of deaths in each month.

Month	Total Deaths per Month
September	4
October	21
November	34
December	74
January	45
February	23
March	6
April	5

New Metric: '3-Week Rolling Average of Deaths per Week'

3-Week Rolling Average Deaths per Week
<1
> 1 to 3
> 3 to 7
> 7

The LLCHD has determined that the 3-week rolling average deaths per week is an important metric to include as a measure of the public health impact of COVID-19 in the community.

CONCLUSION

The LLCHD wants to ensure that we are clearly communicating the risk of COVID-19 spread to our community and the public health impact of that spread. These seven metrics were developed by our LLCHD Team based on reputable public health resources. The LLCHD's Team includes staff that have decades of experience in epidemiology, outbreak investigations and biostatistics.   The LLCHD COVID-19 Risk Dial provides the most robust description of the risk of spread and the public health impact in the Lincoln and Lancaster County community. As our knowledge of this pandemic and interventions grows, revisions may be made to these metrics and the thresholds.