

A National COVID-19 Alert-Level Framework

INTRODUCTION

Alert-level systems should form a core component of effective COVID-19 preparedness, response and risk communication. We propose that the United States introduce a national framework for a COVID-19 alert-level system that can be adapted and implemented locally.

An alert-level system can inform the public about the local risk of COVID-19 and empower communities to stay safe. An alert-level system can also help avoid a false “open” versus “closed” dichotomy for social and economic activity by implementing targeted interventions appropriate for different levels of disease transmission. If designed and implemented effectively, an alert-level system can reduce COVID-19 transmission, save lives and prevent a scenario where the burden of COVID-19 is so high that the most socially and economically disruptive public health and social measures are needed to relieve an overwhelmed health care system.

Approximately half of U.S. states have implemented color-coded COVID-19 alert-level systems. There is variation across these systems in terms of the indicators of COVID-19 burden that are used to guide level selection. Some systems fail to link alert levels to specific guidance on public health and social measures. There is a lack of clear communication around the importance of implementing alert-level systems in a way that takes local economic, political and social context into account.



This patchwork approach limits the effectiveness of what could be a powerful tool to reduce the spread of COVID-19 in the U.S. while keeping society as open as possible.

This document is designed to encourage and assist the development of a national COVID-19 alert-level system. This alert-level system will be broadly applicable across the U.S. and preserve jurisdictions’ abilities to adapt the framework to unique epidemiologic, demographic, political and economic conditions.

PROPOSED ALERT-LEVEL SYSTEM

Existing COVID-19 alert-level systems typically include between four and six levels. We propose a five-level alert system. This number of levels allows adequate targeting of public health and social measures to epidemic conditions and avoids overly complex messaging.

A jurisdiction's place within the lower four levels ("low" levels are those associated with less disease transmission and less restrictive measures) of the alert system should be determined by core indicators of disease spread. We propose core indicators that, within the current reality of COVID-19 testing and case reporting in the U.S., most accurately inform on the burden of COVID-19 within a jurisdiction. The fifth, and highest, alert level will be triggered only if hospital capacity is overwhelmed. This fifth level contains the most restrictive public health and social measures.

Core indicators and thresholds

We propose that jurisdictions use the following two core indicators to determine their place within Levels 1-4:

1. New cases/1 million people/day
2. PCR test positivity

If the two indicators suggest that a jurisdiction should be in two different alert levels, the higher alert level suggestion should be used. The number of new cases/1 million people/day is a measure of COVID-19 disease spread within a community. We propose thresholds such that this indicator determines the alert level within jurisdictions most of the time. However, if COVID-19 testing capacity becomes overwhelmed, an increasing proportion of infections will be undiagnosed. In this scenario, new cases/1 million people/day can become a poor estimate of disease burden. When there is insufficient COVID-19 testing capacity, the testing of symptomatic individuals is prioritized and percent positivity increases. For this reason, we propose using PCR test positivity as the second core indicator. This indicator may trigger alert level movement in some jurisdictions, serving as a back-stop when testing capacity is overwhelmed.

We propose a fifth alert level termed the "Circuit Breaker." This highest alert level is associated with the most stringent public health and social measures as it is designed to avoid health care rationing and increased mortality rates.

The Circuit Breaker is triggered by either of two indicators that assess hospital capacity:

1. The proportion of all intensive care unit (ICU) beds that are occupied
2. The proportion of inpatient beds that are occupied by COVID-19 patients

It can be difficult to reliably estimate existing health care capacity using these quantitative indicators, since hospitals can add ICU beds and the number of available health care staff can be fluid. Thus, any jurisdiction can invoke the Circuit Breaker level if there are other indications that the health care system is or will soon be overwhelmed.

COVID-19 alert-level system indicators, triggers and thresholds

Indicator	LEVEL 1 New Normal	LEVEL 2 Low Alert	LEVEL 3 Moderate Alert	LEVEL 4 High Alert	LEVEL 5 Circuit Breaker
Case incidence (new cases per 1M people per day)	<7	7 - <29	29 - <107	≥107	N/A
Diagnostic test result positivity rate	<3%	3% - <5%	5% - <7%	≥7%	N/A
The proportion of all ICU beds that are occupied	N/A	N/A	N/A	N/A	≥85%
The proportion of inpatients beds that are occupied by COVID-19 patients	N/A	N/A	N/A	N/A	≥20%

Geographic granularity of alert-level system implementation

Alert levels should be implemented in a geographically granular fashion to permit precise targeting of public health and social measures to the areas facing high levels of COVID-19 transmission. However, overly granular implementation should be avoided because of unstable estimates of COVID-19 disease spread when testing numbers are small and because of routine population movement across smaller areas. Because the size and population of counties varies dramatically across states, and because reduced hospital capacity triggers the highest alert level, implementing an alert-level system at the hospital administrative region level should be considered. To prevent single day outliers from triggering a higher alert level, we also recommend using 7-day or 14-day moving averages for each indicator; a longer moving average provides more stable estimates for regions with small populations.

Transitioning between alert levels

Changes in the risk alert level, whether up or down, should be driven by data. The prompt to change from one alert level to another is a core indicator crossing a pre-specified threshold. Each proposed alert level should link to clear guidance around what activities are permitted and restricted at that level and which public health and social measures should be adopted. A simple, clear infographic is the ideal way to communicate this information (see [Appendix 1](#).) The recommendations at each level must be based on existing scientific evidence around which activities increase risk of COVID-19 transmission and which measures decrease risk (see [Appendix 2](#).)

An evidence-based COVID-19 transmission risk framework and recommendations on mitigation measures can be applied nationally. However, this framework will need to be implemented locally. The crossing of a threshold should trigger a meeting of a multisectoral advisory group. This group should review the disease situation as well as the economic, political and social context, considering societal elements that may be affected by an alert level

change. Jurisdictions may consider establishing “secondary indicators” that inform the status of these elements. The advisory group can agree to change the alert level or defer the change and provide a revised set of conditions for when a change would occur. Decisions should be made with local community engagement, potentially leading to granular implementation of different mitigation measures. For example, rural and urban counties may implement different restrictions if their primary venues for COVID-19 transmission vary.

To avoid confusing the public and to allow sufficient time for public health and social measures to impact COVID-19 transmission, alert level changes should not occur more than once every four weeks. However, ascending more than one level may be necessary given disease conditions, although alert level thresholds should be sufficiently spaced to make this uncommon. For example, if core indicators suggest that a jurisdiction should be in the third level, but hospitals become overwhelmed, ascension to the fifth level may be necessary.

CONCLUSION

A national alert-level system developed and implemented using the best practices described here can help keep communities healthy and safe during the greatest public health threat of the past century while minimizing social and economic disruption.

This framework will allow local jurisdictions to find a balance. An alert-level system can allow economically and socially important activities to continue while averting the need for a harsh lockdown—if measures are evidence-based, targeted to local context, protective of the health care system and supportive of the most vulnerable among us.



If designed well and implemented successfully, alert-level systems can empower officials to communicate effectively with constituents, guide communities through a cohesive response strategy, build public trust and encourage community support of necessary mitigation measures. This will limit both the economic and health damage of the COVID-19 pandemic.