

Sg2 COVID-19 Surge Demand Calculator Overview and Methodologies

About the Calculator

The Sg2 COVID-19 Surge Demand Calculator provides a data-driven scenario planning tool for COVID-19 non-ICU bed, ICU bed and ventilator demand. The calculator design allows users to model COVID-19 surge impact across local populations and to apply capacity considerations for regional market, health system or hospital planning.

In response to the increases in COVID-19 cases across the nation, Sg2 updated the Surge Demand Calculator, which incorporates additional opportunities to change the reproductive rate (R_0) and adjustable variables to model multiple viral spread scenarios in order to better model local market change. This updated calculator version now also allows for additional inputs for scenario modeling of resurgence of COVID-19 based on changes in social distancing measures. In addition, the updated calculator version allows users to model for multiple scenarios across the additional reproductive rate changes related to changing social distancing behaviors.

Use this calculator to:

- Identify where the market is on the timeline of the COVID-19 infection outbreak based on first-known community-acquired COVID-19 hospitalization date. Organizational COVID-19 average daily census (ADC) trends and patterns of increase can also be used to validate/adjust timing on the surge curve.
- Understand the impact of varying rates of disease spread, including scenarios that consider various social distancing efforts.
- Localize impact to reflect service area demographics via age-adjusted, COVID-19-infected, population-based hospitalization rates.
- Calculate and evaluate projected COVID-19 surge bed, ICU and ventilator shortage/surplus at the regional market, health system or organizational level.
- Assess multiple scenarios of resurgence based on changes in social distancing initiatives.
- Track shortage/surplus projections over time as disease transmission and market response progress.

What Input Data Are Required

- Market demographics by age cohort
- Organizational market share
- Date of first-known local COVID-19 community-acquired hospitalization
- Local social distancing practice(s), date(s) enacted and date(s) rescinded
- Number of non-ICU beds, ICU beds and ventilators
- Non-ICU and ICU occupancy rates, ventilator availability

What Data Selections Are Requested

- Local initial infection rate (R_0) using suggested range
- Estimated social distancing adherence using suggested range
- COVID-19 hospitalization rate using suggested range

Sg2 COVID-19 Surge Demand Calculator Overview and Methodologies

- COVID non-ICU, ICU and ventilator ALOS using suggested values
- COVID-19 ventilator/ICU ratio using suggested values

Additional Considerations

- This calculator assesses non-ICU, ICU and ventilator shortage/surplus based on user inputs of bed and ventilator counts and occupancy rates. Entering information that reflects traditional supply and occupancy will project total COVID-19 surge shortage/surplus. Changing inputs to reflect added capacity from disaster preparedness initiatives, such as the opening of flex space and the decanting of elective and non-COVID-19 cases, will adjust projections to reflect evolving shortage/surplus metrics.
- This calculator models COVID-19 surge impact for inpatient non-ICU, ICU and ventilator demand only. Impact on other inpatient-related services, such as extracorporeal membrane oxygenation, and impact on outpatient services are not calculated at this time.

Understanding Modeling Considerations for COVID-19 Surge Demand

There are many complex influences on COVID-19 impact modeling. However, understanding and accounting for key unknowns that affect COVID-19-related demand result in informed scenario planning.

What are these important unknowns, and why do they matter?

COVID-19 Reproductive Rates

How fast a disease moves through a population is an important consideration for how many related hospitalizations will occur and when. COVID-19 is a novel disease, and much is yet to be learned about its specific behaviors. However, early international data provide reference R values, or reproduction numbers, which help shed light on the speed and strength with which COVID-19 spreads. Using these reference R values and other emerging disease benchmarks, established epidemiologic models known as susceptible-infected-recovered (SIR) models can be used to project how many people become infected and how rapidly these infections move through a population. Knowing these infected population details is the starting point for calculating how COVID-19 hospital demand will change over time.

Especially in the early stages of a novel disease, R values can change across geographies and time, making real-time modeling difficult. National and regional population density and factors such as multigenerational living behaviors can produce different R values for the same disease across different populations—making international R values difficult to apply universally. Adoption of transmission mitigation and containment strategies, accelerated disease surveillance and testing programs, and active contact tracing and quarantine processes can all influence how an R value changes in the same population over time, which makes the use of the same R value across the full span of a pandemic response period questionable.

To account for these complexities, the Sg2 COVID-19 Surge Demand Calculator provides the opportunity to select from a range of initial reproduction rates to account for changes in initial viral infection spread due to local factors. Sg2 has performed robust testing of R_0 inputs to this calculator using COVID-19 hospitalization trend data from early US COVID-19 market experience. This testing points to a limited range of R_0 values that produce the growth rates of COVID-19 hospital demand observed in both urban and rural US epicenters. This recommended range has been updated using the latest available hospitalization trend data and is detailed below.

Sg2 COVID-19 Surge Demand Calculator Overview and Methodologies

Table 1. Sg2 COVID-19 Surge Demand Calculator Starting Infection Rate (Reproduction Rate, R_0) for Local Community Viral Spread: Reproduction Rates and Suggested Uses

R_0	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7
Total Infection Rate (%)	91%	90%	89%	87%	85%	83%	80%	77%	73%	70%
Relative Population Density	High urban density			Moderate urban density (urban/suburban mix)			Low urban density (rural)			
Relative Use of Public Transportation	High reliance on public transportation			Increased reliance on automobile transportation			No real public transportation use			

Note: R = reproduction number, a mathematical term that indicates how contagious an infectious disease is (R_0 or R naught).

This calculator also allows for the modeled application of social distancing practices and their impact on reducing the rate of this disease spread. It is yet unknown how much disease transmission mitigation strategies can effectively reduce an R value. Specific disease suppression and containment strategies (eg, travel restrictions, large gathering bans, hospitality industry closures, school closures, enforced shelter-in-place directives) are demonstrating the potential to reduce the strength and speed of COVID-19 spread in early outbreak communities. Aggressive testing, contact tracing and select isolation programs are also showing promise internationally.

The calculator provides the opportunity to model the impact of introductory social distancing measures such as large gathering bans, school closures and nonessential business closures under a separate timeline from more aggressive strategies such as stay-at-home orders. These varying mitigation approaches are thought to have different rates and magnitudes of impact on disease spread reduction.

The latest updates to the calculator also include options to scenario model changes within social distancing practices with the option of follow-on reintroduction strategies. Such scenarios allow for the ability to test hypotheses regarding ongoing or a secondary emergence of COVID-19 infection growth and resulting hospital demand.

It should be noted that epidemiologic modeling demonstrates that, as you reduce an R value—thus reducing the strength of disease transmission—you also elongate the transmission period. As data from the COVID-19 pandemic continue to be gathered, updates to this calculator will reflect the best available epidemiologic data.

When translating disease transmission patterns to health care utilization, it is important to note that there is a lagging effect in terms of when a population becomes infected with disease and when they seek care because of that disease. In the case of COVID-19, it is estimated that new infections can take anywhere from 1 to 2 weeks or more to “wash through” the health care system. Similarly, it should be noted that social distancing practices typically take ~10–12 days to reduce novel coronavirus infection rates, and another ~4–7 days to begin to reduce hospital demand. In total, Sg2 has assessed that social distancing measures are not expected to “bend” local hospitalization demand curves for the first 14 days or more that they are in place. Sg2 has also run scenario modeling tests with early COVID-19 US market data and found that markets that enact social distancing within 14 days of their first community-acquired COVID-19 hospitalization have the best chance of containing true COVID-19 demand surge. The rate at which social distancing measures are gradually relaxed will be highly market-dependent, and little empirical evidence

Sg2 COVID-19 Surge Demand Calculator Overview and Methodologies

is currently available in terms of leading practice. It is assumed that if relaxation of social distancing measures produces untenable rates of growth in local infections, social distancing policies would be reinstated and would follow the same delayed impact patterns described above. Graphical elements in the Sg2 COVID-19 Surge Demand Calculator have been provided to help visualize the delay between infected population growth and resulting growth in hospital demand. For scenario planning, it is critical to remember that you must plan ahead for the future hospital demand that will be needed by the infected population already existing in your population.

COVID-19 Hospitalization Rates

The most currently available data on COVID-19 hospitalization rates apply positive COVID-19 test case rates. These rates use the number of COVID-19 admissions as the numerator and the number of positively tested COVID-19 cases as the denominator. Because of a lack of COVID-19 testing in the total underlying population, these positive test case rates are the only hospitalization data available early in the COVID-19 pandemic outbreak. These positive-case-based rates are an important metric in understanding the impact of COVID-19, but they should NOT be confused with population-based COVID-19 hospitalization rates. Population-based COVID-19 hospitalization rates use the number of COVID-19 admissions as the numerator and the number of total population infections as the denominator. Because of a lack of testing, the challenge has been in having a reliable denominator that represents the true infected population.

To solve for these challenges, Sg2 used international data to calculate a reasonable population-based COVID-19 admission rate. Using data from Lombardy, Italy, that detail the COVID-19 experience (including local population numbers, reported ICU rates for COVID-19 hospitalizations, reported ICU COVID-19 surge capacity by date and reported first COVID-19 ICU admissions by date) and that apply an assumed disease transmission rate of R 2.4, Sg2 calculated a population-based COVID-19 admission rate of 1.2%. This calculated population-based admission rate was then rechecked against COVID-19 case volumes and bed surge numbers reported out of the Lombardy region, verifying that calculated COVID-19 admission rates hold true to observed patterns seen in Italy in early data. Sg2 has also tested the model against early data from New York City, NY; Chicago, IL; San Francisco, CA; and Albany, GA. In all cases, hospitalization rates ranging from 1.2% to 0.5% have coincided with observed COVID-19 hospitalization volumes.

Additionally, it is important to consider that COVID-19 appears to have varying impacts on hospitalization rates by age and possibly by specific comorbidities. To account for this, Sg2 has applied age adjustments to hospitalization rates and critical care (ICU) utilization rates per age-adjusted COVID-19 data reported out of Italy. As reliable age-adjusted data are published in the US, calculator modeling will be updated.

COVID-19 ALOS

Planning for COVID-19 surge capacity involves not only an understanding of disease spread and a realistic evaluation of hospitalization rate but also a reasonable reference for COVID-19 average length of stay. Sg2's COVID-19 Surge Demand Calculator provides a range of selectable ALOS values for modeling purposes, anchored around published COVID-19 ALOS from international experience. As US practice patterns evolve for the care of COVID-19 patients, these reference ranges will be updated as necessary. Through selection of varying ALOS inputs, users can model how practice pattern shifts would impact capacity shortage/surplus projections. As organizational experience with treatment of a COVID-19 population grows, this local experiential evidence should drive calculator ALOS selections.

Methodology Details and Data Sources

The Sg2 COVID-19 Surge Demand Calculator's methodologies have been vetted by hospital systems, Vizient biostatisticians, and outside epidemiologic and pandemic experts. The following methodologic details are critical to understanding the calculator's approach. These methodologies will be updated as necessary, with forthcoming US data points and additional emerging COVID-19 information. Subsequent versions of this calculator will be released as COVID-19 understanding advances.

SIR Modeling Inputs

The calculator parameters allow for the incorporation of SIR models of COVID-19 disease spread, driven by reproduction rates available in a selectable range. Parameters driving modeling within the calculator are noted below.

Initial, selectable R_0 values: 3.0, 2.9, 2.8, 2.7, 2.6, 2.5, 2.4, 2.3, 2.2, 2.1, 2.0, 1.9, 1.8, 1.7, 1.6, 1.5

Time step: 1

Pre-infectious period (days): 5

Infectious period (days): 8

Sources: Ferguson NM et al. Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand. Imperial College COVID-19 Response Team. March 16, 2020; McIntosh K et al. *Coronavirus Disease 2019 (COVID-19)*. UpToDate. March 27, 2020.

When testing calculator outputs against the most recently available international and national COVID-19 hospital surge experience, Sg2 found that R_0 values between 2.6 and 1.7 are most indicative of the rates of growth of COVID-19 hospitalizations seen across urban, suburban and rural markets to date.

SIR modeling used in this calculator calculates beta as $R_0 * \text{Time step} / (\text{Infectious period} * \text{Total population})$. This beta is defined as the rate at which 2 individuals come into effective contact per time step—or as the rate of transmissibility of disease. The beta is modified each time a social distancing category is documented as being enacted at the local market level. This modification reduces the beta by the mitigation magnitude input by the user, effectively reducing the infection rate by reducing the transmissibility of disease. Beta reduction for initial social distancing practices such as large gathering bans, school closures and nonessential business closures is set to -20% of beta. Beta reductions for more elevated social distancing practices such as stay-at-home bans are set to a total reduction of -50% of beta. In all instances of the reduction in beta, the number of days before this reduction takes effect is equal to the user input of "Time between social distancing practices enacted and impact on health system demand (days)" minus the days estimated between social distancing impact and hospitalization impact (set as a default of 5 days in this model). The "Time between social distancing practices enacted and impact on health system demand (days)" input parameters for this model allow for user entry of 13 to 17 days.

Many resources on US social distancing policies, timing and adherence are publicly available. Sg2 recommends:

<https://www.kff.org/health-costs/issue-brief/state-data-and-policy-actions-to-address-coronavirus/>

<https://www.google.com/covid19/mobility/>

Increasingly, publicly available resources are available that calculate a changing R_0 relative to COVID-19. Sg2 recommends:

<https://rt.live/>

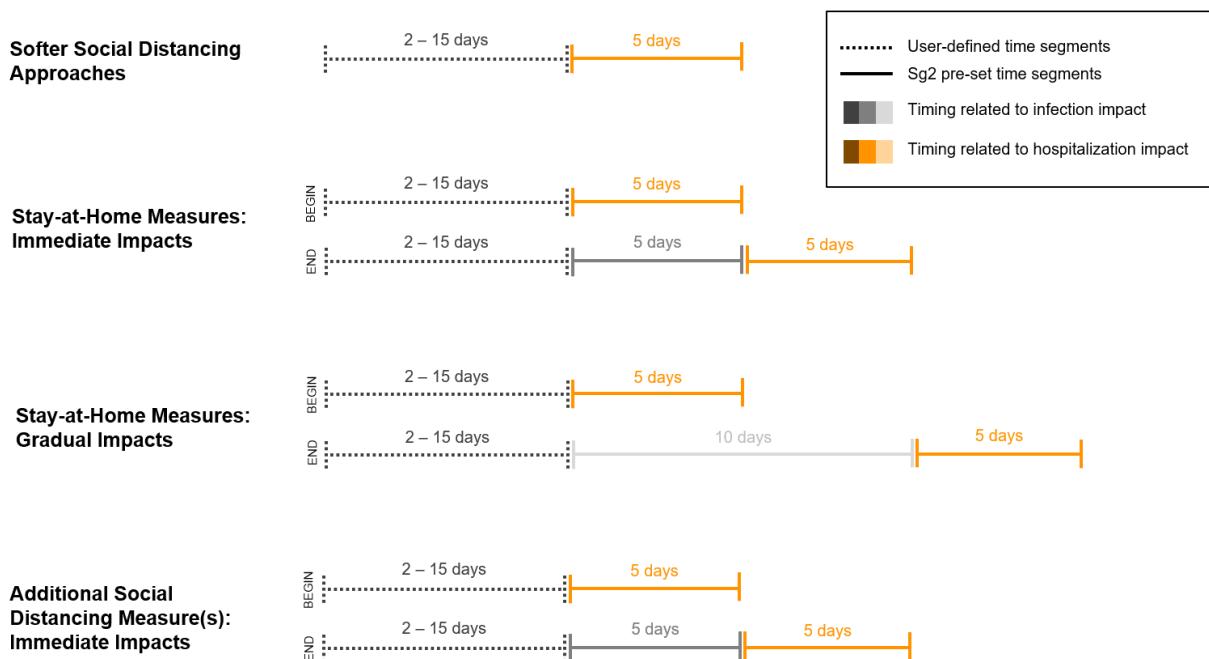
Sg2 COVID-19 Surge Demand Calculator Overview and Methodologies

SIR modeling used in this calculator does not account for the potential reinfection of a recovered population by the same or a different strain of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is assumed that multiple strains of SARS-CoV-2 are currently involved in today's COVID-19 pandemic.

Social Distancing Impacts and Calculated Timing

Sequential social distancing impacts found within this calculator are now formulated as an additive sum. Previously, sequential social distancing impacts resulted in a total impact equal to the magnitude of the last social distancing impact input (previously the impact of stay-at-home order).

This calculator allows for the scenario modeling of various approaches to social distancing initiatives assumed to impact infection transmission rate. The timing of how social distancing inputs affect model outputs relates to both a social distancing initiative's impact on infection rate and the delayed impact on hospitalizations. Across the various social distancing scenarios allowed for in the calculator is a range of user-defined and Sg2 preset timing elements, described in the diagram below.



Sg2 COVID-19 Surge Demand Calculator Overview and Methodologies

The above timing patterns, including the referenced “begin” and “end” dates, are put into context in the working model within the Scenario Dates tables included in the output tabs. These reference tables are useful guides for understanding the timing intervals described above at work in the active scenario model. Impact on the ADC will occur within 3 days of the R_0 being fully realized on the active infected population. For social distancing steps with overlapping dates, the impact of the later social distancing step will not begin until the impact of the prior social distancing step is fully realized.

SCENARIO DATES	Date R_0 Change Begins		Date R_0 Change is Fully Realized on Active Infected Population		
	Date	Running % of Total Population Infected	Date	Running % of Total Population Infected	Resulting Reproductive Rate (R_0)
First COVID-19 hospitalization	February 27, 2020	0.1%	March 18, 2020	2.3%	$R_0 = 2.5$
Initial social distances measures put into place	March 7, 2020	0.4%	April 7, 2020	18.0%	$R_0 = 2$
Stay-At-Home Order: initial impact	March 22, 2020	3.8%	April 17, 2020	22.3%	$R_0 = 0.9$
Stay-At-Home Order: additional gradual impact	March 27, 2020	6.9%			$R_0 = 0.6$
SCENARIO 1					
	Date R_0 Change Begins	Running % of Total Population Infected	Date R_0 Change is Fully Realized on Active Infected Population	Running % of Total Population Infected	Resulting Reproductive Rate (R_0)
First additional change in R_0	April 1, 2020	11.9%	April 17, 2020	22.3%	$R_0 = 0.9$
Second additional change in R_0	April 15, 2020	21.6%	May 1, 2020	26.2%	$R_0 = 1.1$
Third additional change in R_0	May 1, 2020	26.2%	May 17, 2020	29.7%	$R_0 = 1.4$
Fourth additional change in R_0	May 15, 2020	29.3%	May 31, 2020	32.7%	$R_0 = 1.6$
Fifth additional change in R_0	June 1, 2020	32.9%	June 17, 2020	37.0%	$R_0 = 1.9$
Sixth additional change in R_0	June 15, 2020	36.4%	July 1, 2020	41.6%	$R_0 = 1.6$
Seventh additional change in R_0					
Eighth additional change in R_0					
Ninth additional change in R_0					
Tenth additional change in R_0					
BEGIN			END		

These social distancing timing patterns were constructed based on observed, actual COVID-19 data trends from both Italy and New York, both of which have demonstrated an approximate 3-week delay from stay-at-home measure enactment to visible reduction in hospitalization demand. The timing patterns described above also allow for end-user flexibility in modeling the various local approaches to social distancing rollout, with the understanding that local market observed behaviors may be different than epicenter behaviors.

While the combination of social distancing impacts noted above are sequentially additive, the calculator does not allow for a calculated R_0 below 0.

Additionally, error messaging has been built into the calculator to guide users in appropriate input ranges for social distancing impacts within the input tab:

- If dates of social distancing measures are not in sequential order (eg, if additional change in social distancing measure is made prior to enactment of stay-at-home order), error message prompts correction.
- If social distancing measures populate an R_0 of below 0, error message prompts correction.

Hospitalization Rates

This calculator allows for entry of user-defined infected population hospitalization rates, with an acceptable range of 5% to 0.5% for scenario modeling purposes.

Sg2 recommends a hospitalization rate of 1% to 1.2% based on analysis of data and experience from Lombardy, Italy’s, COVID-19 experience. Data utilized by Sg2 for COVID-19 infected population hospitalization rate calculations include:

- February 20, 2020: first COVID-19 ICU admission
 - March 11, 2020: 1,028 COVID-19 ICU beds in use
 - Percentage of hospitalizations needing ICU care: 16%
- Source:** Grasselli G et al. Critical care utilization for the COVID-19 outbreak in Lombardy, Italy: early experience and forecast during an emergency response. JAMA Network. March 13, 2020.
- $R = 2.4$ = rate of disease spread in Lombardy, Italy

Sg2 COVID-19 Surge Demand Calculator Methodology v5.1

Sg2 COVID-19 Surge Demand Calculator Overview and Methodologies

- Assumed based on reported R values from early disease spread in Wuhan, China
- 10,400,000 = conservative total population of Lombardy, Italy

Source: Lombardia. City population. Accessed March 2020.

Note: Modeling assumes March 11, 2020, equals Day 20 of disease transmission in Lombardy, Italy, as calculated from time of first ICU admission to time of ICU bed data reported. This assumption intentionally underestimates the pace of disease transmission—it is likely that disease transmission would have been occurring in the population before the first ICU admission, thus making the true date of first ICU admission Day 1+x. This intentional underestimate of disease burden calculates a slightly higher COVID-19 admission rate, ensuring that derived hospitalization rates do not underestimate hospital demand based on observed experience.

This calculator also includes age-adjusted hospitalization rates specific to COVID-19 experience from Italy. The following hospitalization data are used as a baseline for hospitalization rate multipliers at the age cohorts listed in Table 3 and requested in the calculator demographic inputs. The table interprets “symptomatic cases requiring hospitalization” to indicate COVID-19-positive hospitalized cases.

Table 3. Age-Adjusted Hospitalization Rate Reference Values Applied as Multipliers to Sg2 Overall Hospitalization Rate Selections

Age Group	% Symptomatic Cases Requiring Hospitalization	% Hospitalized Cases Requiring Critical Care
0 to 9	0.1%	5.0%
10 to 19	0.3%	5.0%
20 to 29	1.2%	5.0%
30 to 39	3.2%	5.0%
40 to 49	4.9%	6.3%
50 to 59	10.2%	12.2%
60 to 69	16.6%	27.4%
70 to 79	24.3%	43.2%
80+	27.3%	70.9%

Source: Ferguson NM et al. Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand. Imperial College COVID-19 Response Team. March 16, 2020.

ICU Rates

This calculator allows for a user-defined rate of critical care (ICU) need in a COVID-19 hospitalized population. The following reference value can assist a user in their input selection to the model.

- 30% = the conservative estimate recommended by the CDC.
- 25% = Sg2's recommended selection, as observed in early hospitalization data of US epicenters, with the understanding that disease severity and practice patterns are yet unknown in the US.
- 16% = published rate of critical care (ICU) need in a COVID-19 population, Lombardy, Italy. It should be noted that data from the Lombardy region show that COVID-19 ICU rate ranged from 27% in the early outbreak to 11% near peak demand and was likely influenced by a lack of local ICU bed availability.

Source: Grasselli G et al. Critical care utilization for the COVID-19 outbreak in Lombardy, Italy: early experience and forecast during an emergency response. JAMA Network. March 13, 2020.

Ventilator Rates

This calculator allows for a user-defined rate of mechanical ventilation in the critical care (ICU) COVID-19 hospitalized population. The following reference values can assist a user in their input selection to the model.

- Current data from New York City's COVID-19 experience indicate that 80% to 90% of COVID-19 ICU patients require ventilator care.
- Reports from Seattle, WA, indicate that ~75% of COVID-19 ICU patients were placed on mechanical ventilation.
- Early reports from US hospitals along the West Coast indicate that approximately 2 out of 3 COVID-19 ICU patients require ventilator care.

Average Length of Stay

Reference data from Lombardy, Italy:

- 8 days non-ICU: ALOS reference value
- 6 days non-ICU, 10 days ICU: ICU ALOS reference values

Source: Ferguson NM et al. Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand. Imperial College COVID-19 Response Team. March 16, 2020.

- Reports from Seattle, WA, indicate that COVID-19 ALOS for critical patients is 9 days in the ICU.

Source: UCSF School of Medicine. The epidemiology, science & clinical manifestations of COVID-19. A UCSF update [video]. April 2, 2020.

Calculator Output Visualizations

Outputs of SIR modeling include daily time-step data aggregated to weekly summaries for the Calculator Outputs (Weekly) tab display. Current versions of this calculator have removed the timeline of first modeled infection to prevent confusion in the lagging timeline of hospitalization. All time references in the calculator relate to COVID-19 hospitalization demand.

The timing of modeled weeks/days since first hospitalization and the placement of calendar dates within the tool are anchored in the assignment of the user-input “date of first community-acquired COVID-19 hospitalization” to the first calculated full-integer COVID-19 hospitalization, seen as a product of underlying SIR modeling of infected population and user-selected COVID-19 hospitalization rate. In this way, the date assignment in the model is dependent on when modeling mechanics predict the first COVID-19 hospitalization to occur based on calculated growth in an underlying infected population and selected hospitalization rate. In this way, the placement of the user input date of first COVID-19 community-acquired hospitalization along the model trajectory is a function of both the selected COVID-19 hospitalization rate and the selected R_0 .

Because of increased flexibility in user selection of R_0 values, this calculator no longer highlights the Output Week peak range by visual header (this will change with R_0 selection) and no longer provides an estimated range of COVID-19 ADC doubling rate by week interval in the Output Daily tab (this will also change with R_0 selection).

A single row of “free text” entry per output data set has been made available in the calculator design to accommodate user entry of actual organizational values for easy comparison to scenario model projections.

SIR model outputs connect directly to calculations of age-adjusted COVID-19 hospital admissions, ICU admissions and ventilator use, as well as ADC calculations for these categories. In these calculations, the appropriate age-adjusted hospitalization/use rate is applied to a calculated, age-distributed, infected

Sg2 COVID-19 Surge Demand Calculator Overview and Methodologies

population from 5 days prior to account for the delay in symptomatic presentation at the hospital.

In the Output Weekly tab, Week 1 is represented by identified first hospitalization date, divided by 7, rounded down, plus 1. The addition of 1 ensures that the round-down function always returns a positive integer value for Week count, and it creates alignment between Week 1 and Day 1 assignments in both output tabs of the calculator.

Weekly Output values represent the maximum weekly projected value of that week, not the average of the week. This methodological selection ensures alignment of data points between weekly and daily outputs.

In general, rounding has been applied to all values displayed for non-ICU average daily census, ICU ADC and ventilator ADC, as well as all related displayed values for shortage/surplus estimates. Rounding logic is as follows:

- If <100, no rounding.
- If <500, round to nearest 10.
- If <1,000, round to nearest 50—otherwise, round to nearest 100.

Rounding logic has been applied to give the user a projected target range for ADC and capacity shortage/surplus planning. In cases of small projected values, particularly for ventilator projections in small markets, rounding logic may produce the same week-over-week projected values. This is because the rounding function is applied at the age-specific ADC level, which can be a small value. Rounding of these small values and then summing across age groups can produce little projected growth/variation. This is an expected behavior of the model.

The “scenarios parameters” reference found within weekly and daily output tabs has been expanded to include a “scenario dates” section. This section includes reference values for the start and completion of modeled impacts and effective R_0 values across dates related to: first COVID-19 hospitalization; initial social distancing measures put into place; stay-at-home order: initial impact; stay-at-home order: additional, gradual impact; relaxation of social distancing measures; and reinstatement of social distancing measures.

Estimated day-over-day percentage of total population infected calculations based on underlying SIR modeling has been added along the running timeline in the daily output tab.

Output graphs have been reformatted to use projected calendar dates vs numbered days or weeks for better trend context.

The daily and weekly outputs have been updated to show projected trends out to 400 days; related tables and graphs have also been updated to show projections out to 400 days. Related graphs formatted to show tick marks every 2 weeks.

DISCLAIMER: Output from the Sg2 Surge Demand Calculator is not a final answer, but users should see it as a data point to incorporate into their broader planning process. Users must also remain committed to updating their inputs and regularly running scenarios. As organizations pursue scenario planning and consider options for combating bed shortages, Sg2 is prepared to help. Inputs and outputs for this tool are complex, and we have the resources to support careful use and results interpretation. Final prioritization and decisions, however, are solely the users’.