

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 11/24/21**

Leveraging over 15 years of support to HHS for medical consequence modeling and our proprietary artificial intelligence (AI) models, IEM believes that our Coronavirus model outputs can be used to assist localities and their medical facilities to better prepare for an increase in hospitalizations, to better plan for and locate drive-through testing facilities, and to determine where increased levels of transmission may be occurring.

**We have been refining our AI model over the past month and are confident in its ability to provide accurate 7-day projections that can be used for operational and logistical planning.**

**AI-based Model Background**

IEM is currently using an AI model to fit data from various sources and project new cases of COVID-19. We do not assume the average number of secondary infections (R-value) stays the same over time. IEM's AI model finds the best R-value over time to evaluate how it changes over the course of the outbreak. The IEM modeling team is running ~11 million simulations to fit each state's data and using the best fit for the R-value to project new cases over the next 7 days. The AI models are executed on a daily basis to evaluate the changing dynamics of the COVID-19 pandemic. Our projections have typically been within 10%, and are often within 5%, of actual confirmed cases.

The projections shown in this document are based on data pulled in as of 11/24/21 9 a.m.

**Please provide any feedback or send any questions that you might have to us. We are continually updating and improving the model, so your feedback is critical.**

**Also, if you have more current or refined data for your State, Commonwealth or Territory that you would like IEM to factor in, please let us know.**

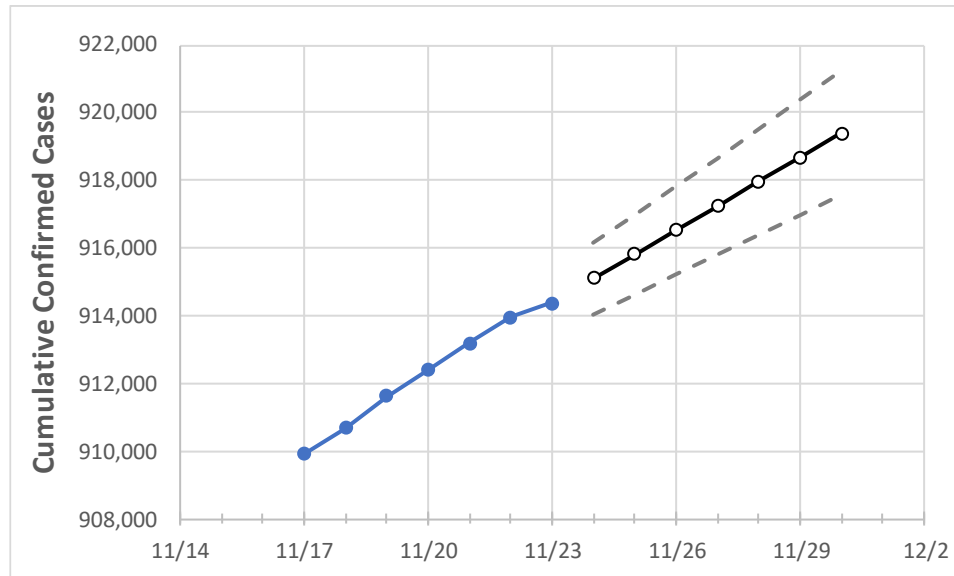
**IEM's Modeling Lead**

Dr. Prasith "Sid" Baccam is a **Computational Epidemiologist expert** at IEM with more than **20 years of experience in medical consequence modeling and simulation of disease outbreaks** and medical consequences following hypothetical attacks with biological agents or emerging infectious diseases. He develops key simulation models and decision support tools at IEM, specializing in public health, disaster response, and medical countermeasures (MCM) to enhance data-driven decision making and improve modeling assumptions.

Upon receiving his **Ph.D. in Applied Mathematics and Immunobiology** at Iowa State University, Dr. Baccam worked as a Postdoctoral Research Associate at Los Alamos National Laboratory where he focused on researching viral and immunological modeling. After his stint at Los Alamos, Dr. Baccam has served as Task Lead in multiple public health projects have allowed him to develop expertise as a mathematical biologist and a leader on high-performance modeling and simulation teams.

He has worked with state and local public health officials as well as Federal agencies, including **HHS**, the Centers for Disease Control and Prevention (**CDC**), and the Department of Homeland Security (**DHS**). Dr. Baccam has published numerous papers on public health response models and implications on policy and has been invited to participate in workshops and symposiums held by the Institute of Medicine (now the National Academy of Health). His modeling results have been briefed to the **Executive Office of the President** and informed two presidential policy actions.

## South Carolina State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30
South Carolina	912,399	913,175	913,950	914,384	915,100	915,817	916,516	917,249	917,965	918,678	919,400

Note: The State's projection shows a "best estimate" curve (the solid line with circles) and the dotted lines are the upper and lower estimates around that best estimate. Our projections have typically been within 10%, and are often within 5%, of actual confirmed cases.

## South Carolina Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30
Beaufort	27,538	27,554	27,570	27,576	27,589	27,602	27,616	27,629	27,643	27,657	27,670
Charleston	66,237	66,289	66,340	66,361	66,408	66,456	66,504	66,553	66,602	66,651	66,702
Greenville	106,983	107,076	107,169	107,241	107,331	107,417	107,505	107,592	107,683	107,770	107,861
Kershaw	12,172	12,183	12,194	12,196	12,205	12,213	12,222	12,231	12,240	12,249	12,258
Lexington	55,099	55,151	55,204	55,238	55,281	55,323	55,365	55,408	55,451	55,496	55,541
Richland	69,915	69,965	70,016	70,038	70,085	70,132	70,177	70,223	70,270	70,321	70,367
Spartanburg	62,781	62,830	62,880	62,916	62,963	63,009	63,056	63,103	63,149	63,197	63,245
York	47,774	47,827	47,880	47,908	47,958	48,008	48,061	48,110	48,161	48,214	48,266

Some recipients of our daily COVID-19 short-term (7 day) projections have requested projections of demand for: hospital bed, intensive care unit (ICU) beds, and mechanical ventilation. We realize that different states and localities will have different characteristics for hospital demand of COVID-19 cases, and we are presenting the best assumptions we could find for those medical demands based on scientific literature and health data reporting. Specifically:

- **Beds:** For hospitalization, we use a range of 10% and 20% of cases require hospitalization based on CDC's report ([MMWR, March 18, 2020](#)) and state reports of COVID-19 cases.
- **ICU:** The CDC report found that 24% of hospitalized cases require ICU care.
- **Ventilators:** Based on clinical data from China and state reports, we assume that 50% of ICU cases require a ventilator.

If you have other estimates for these assumptions, please share them with us as we work to refine our modeling, assumptions, and data on a daily basis.

The medical demands shown in the table assume 20% of **cumulative** confirmed cases require hospitalization. To get the medical demand for the assumption that 10% of confirmed cases require hospitalization, simply divide the demand by 2.

### South Carolina Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	11/20	11/21	11/22	11/23	11/25				11/27				11/29			
Beaufort	27,538	27,554	27,570	27,576	27,602	(5,520)	[1,325]	{662}	27,629	(5,526)	[1,326]	{663}	27,657	(5,531)	[1,328]	{664}
Charleston	66,237	66,289	66,340	66,361	66,456	(13,291)	[3,190]	{1,595}	66,553	(13,311)	[3,195]	{1,597}	66,651	(13,330)	[3,199]	{1,600}
Greenville	106,983	107,076	107,169	107,241	107,417	(21,483)	[5,156]	{2,578}	107,592	(21,518)	[5,164]	{2,582}	107,770	(21,554)	[5,173]	{2,586}
Kershaw	12,172	12,183	12,194	12,196	12,213	(2,443)	[586]	{293}	12,231	(2,446)	[587]	{294}	12,249	(2,450)	[588]	{294}
Lexington	55,099	55,151	55,204	55,238	55,323	(11,065)	[2,655]	{1,328}	55,408	(11,082)	[2,660]	{1,330}	55,496	(11,099)	[2,664]	{1,332}
Richland	69,915	69,965	70,016	70,038	70,132	(14,026)	[3,366]	{1,683}	70,223	(14,045)	[3,371]	{1,685}	70,321	(14,064)	[3,375]	{1,688}
Spartanburg	62,781	62,830	62,880	62,916	63,009	(12,602)	[3,024]	{1,512}	63,103	(12,621)	[3,029]	{1,514}	63,197	(12,639)	[3,033]	{1,517}
York	47,774	47,827	47,880	47,908	48,008	(9,602)	[2,304]	{1,152}	48,110	(9,622)	[2,309]	{1,155}	48,214	(9,643)	[2,314]	{1,157}

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966 or Stephanie Tennyson at [stephanie.tennyson@iem.com](mailto:stephanie.tennyson@iem.com) or 202-309-4257.