

## **IEM's AI Modeling: Short-term COVID-19 Projections**

**Date: 9/22/21**

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 9/22/21 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.**

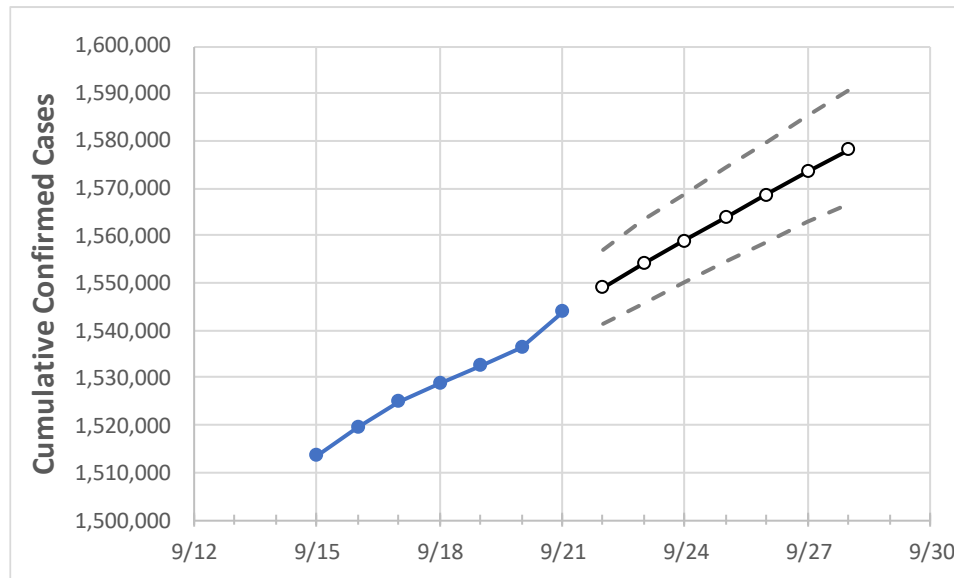
### **IEM's Modeling Lead**

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.

## Georgia State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28
Georgia	1,528,898	1,532,683	1,536,467	1,543,960	1,549,102	1,554,225	1,559,107	1,563,935	1,568,816	1,573,512	1,578,168

*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.*

## Georgia Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28
Bartow	19,183	19,225	19,266	19,331	19,398	19,460	19,522	19,583	19,645	19,705	19,762
Carroll	15,604	15,649	15,694	15,723	15,771	15,817	15,862	15,907	15,950	15,994	16,035
Cherokee	41,113	41,202	41,291	41,391	41,514	41,633	41,753	41,868	41,980	42,095	42,201
Clarke	19,066	19,131	19,196	19,235	19,291	19,349	19,405	19,462	19,517	19,574	19,625
Clayton	36,077	36,183	36,290	36,919	37,085	37,239	37,399	37,561	37,721	37,888	38,064
Cobb	102,436	102,665	102,894	103,324	103,632	103,937	104,243	104,537	104,835	105,124	105,401
DeKalb	84,671	84,843	85,016	85,632	85,927	86,217	86,497	86,796	87,086	87,378	87,655
Dougherty	11,446	11,487	11,529	11,563	11,609	11,654	11,698	11,742	11,783	11,825	11,865
Douglas	20,873	20,940	21,007	21,057	21,124	21,192	21,257	21,321	21,384	21,446	21,505
Fulton	124,325	124,596	124,868	125,829	126,248	126,681	127,111	127,527	127,953	128,390	128,841
Gwinnett	122,654	122,912	123,170	124,389	124,819	125,264	125,664	126,065	126,514	126,967	127,397
Hall	35,149	35,258	35,366	35,478	35,633	35,786	35,937	36,090	36,238	36,392	36,539
Henry	35,572	35,674	35,776	35,940	36,050	36,166	36,273	36,383	36,487	36,593	36,696
Lee	4,405	4,412	4,419	4,427	4,440	4,452	4,463	4,475	4,486	4,497	4,507

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.

### Georgia Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	9/18	9/19	9/20	9/21	9/23				9/25				9/27			
Bartow	19,183	19,225	19,266	19,331	19,460	(3,892)	[934]	{467}	19,583	(3,917)	[940]	{470}	19,705	(3,941)	[946]	{473}
Carroll	15,604	15,649	15,694	15,723	15,817	(3,163)	[759]	{380}	15,907	(3,181)	[764]	{382}	15,994	(3,199)	[768]	{384}
Cherokee	41,113	41,202	41,291	41,391	41,633	(8,327)	[1,998]	{999}	41,868	(8,374)	[2,010]	{1,005}	42,095	(8,419)	[2,021]	{1,010}
Clarke	19,066	19,131	19,196	19,235	19,349	(3,870)	[929]	{464}	19,462	(3,892)	[934]	{467}	19,574	(3,915)	[940]	{470}
Clayton	36,077	36,183	36,290	36,919	37,239	(7,448)	[1,787]	{894}	37,561	(7,512)	[1,803]	{901}	37,888	(7,578)	[1,819]	{909}
Cobb	102,436	102,665	102,894	103,324	103,937	(20,787)	[4,989]	{2,494}	104,537	(20,907)	[5,018]	{2,509}	105,124	(21,025)	[5,046]	{2,523}
DeKalb	84,671	84,843	85,016	85,632	86,217	(17,243)	[4,138]	{2,069}	86,796	(17,359)	[4,166]	{2,083}	87,378	(17,476)	[4,194]	{2,097}
Dougherty	11,446	11,487	11,529	11,563	11,654	(2,331)	[559]	{280}	11,742	(2,348)	[564]	{282}	11,825	(2,365)	[568]	{284}
Douglas	20,873	20,940	21,007	21,057	21,192	(4,238)	[1,017]	{509}	21,321	(4,264)	[1,023]	{512}	21,446	(4,289)	[1,029]	{515}
Fulton	124,325	124,596	124,868	125,829	126,681	(25,336)	[6,081]	{3,040}	127,527	(25,505)	[6,121]	{3,061}	128,390	(25,678)	[6,163]	{3,081}
Gwinnett	122,654	122,912	123,170	124,389	125,264	(25,053)	[6,013]	{3,006}	126,065	(25,213)	[6,051]	{3,026}	126,967	(25,393)	[6,094]	{3,047}
Hall	35,149	35,258	35,366	35,478	35,786	(7,157)	[1,718]	{859}	36,090	(7,218)	[1,732]	{866}	36,392	(7,278)	[1,747]	{873}
Henry	35,572	35,674	35,776	35,940	36,166	(7,233)	[1,736]	{868}	36,383	(7,277)	[1,746]	{873}	36,593	(7,319)	[1,756]	{878}
Lee	4,405	4,412	4,419	4,427	4,452	(890)	[214]	{107}	4,475	(895)	[215]	{107}	4,497	(899)	[216]	{108}

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.