

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

Date: 5/28/21

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 5/28/21 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.**

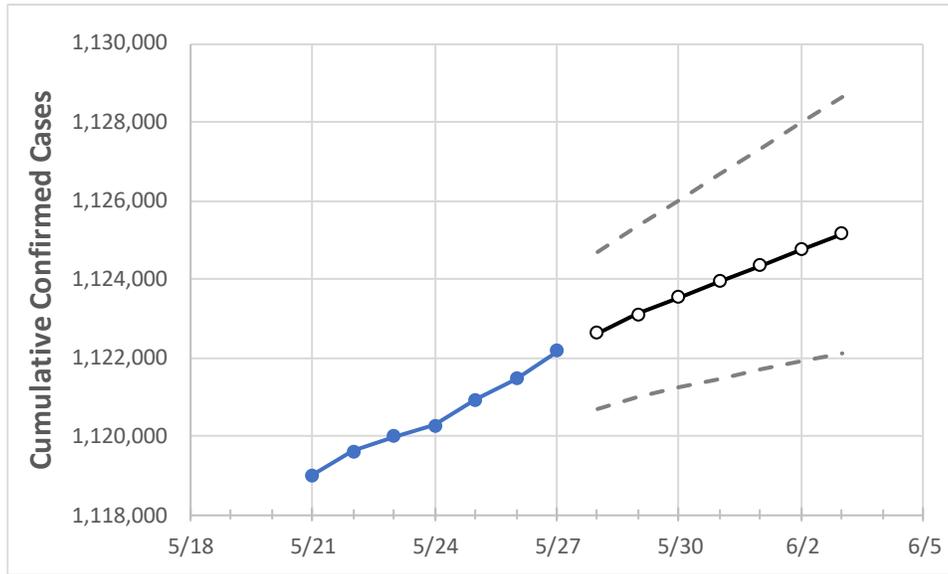
### IEM's Modeling Lead

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:						
	5/24	5/25	5/26	5/27	5/28	5/29	5/30	5/31	6/1	6/2	6/3

Georgia 1,120,272 1,120,923 1,121,472 1,122,166 1,122,631 1,123,096 1,123,529 1,123,947 1,124,357 1,124,756 1,125,156

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:						
	5/24	5/25	5/26	5/27	5/28	5/29	5/30	5/31	6/1	6/2	6/3
Bartow	14,762	14,771	14,784	14,791	14,800	14,809	14,818	14,826	14,835	14,844	14,853
Carroll	11,449	11,454	11,464	11,468	11,473	11,478	11,483	11,488	11,493	11,498	11,503
Cherokee	31,270	31,291	31,293	31,297	31,307	31,316	31,325	31,334	31,342	31,349	31,356
Clarke	15,112	15,124	15,133	15,133	15,137	15,140	15,144	15,148	15,151	15,154	15,157
Clayton	27,022	27,035	27,050	27,084	27,095	27,107	27,117	27,128	27,137	27,146	27,154
Cobb	79,237	79,288	79,320	79,397	79,434	79,469	79,503	79,535	79,566	79,597	79,626
DeKalb	66,499	66,560	66,580	66,622	66,650	66,678	66,702	66,727	66,751	66,774	66,795
Dougherty	7,610	7,615	7,623	7,626	7,629	7,632	7,635	7,637	7,640	7,643	7,645
Douglas	15,404	15,414	15,424	15,435	15,444	15,453	15,461	15,469	15,478	15,485	15,493
Fulton	98,212	98,245	98,300	98,287	98,323	98,360	98,394	98,429	98,461	98,491	98,520
Gwinnett	102,257	102,323	102,359	102,433	102,476	102,518	102,560	102,600	102,640	102,679	102,717
Hall	27,438	27,449	27,454	27,470	27,477	27,485	27,491	27,498	27,505	27,511	27,517
Henry	25,545	25,580	25,596	25,609	25,623	25,636	25,649	25,662	25,674	25,686	25,697
Lee	2,746	2,746	2,750	2,750	2,751	2,752	2,753	2,754	2,755	2,756	2,757

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:											
	5/24	5/25	5/26	5/27	5/29				5/31				6/2			
Bartow	14,762	14,771	14,784	14,791	14,809	(2,962)	[711]	{355}	14,826	(2,965)	[712]	{356}	14,844	(2,969)	[712]	{356}
Carroll	11,449	11,454	11,464	11,468	11,478	(2,296)	[551]	{275}	11,488	(2,298)	[551]	{276}	11,498	(2,300)	[552]	{276}
Cherokee	31,270	31,291	31,293	31,297	31,316	(6,263)	[1,503]	{752}	31,334	(6,267)	[1,504]	{752}	31,349	(6,270)	[1,505]	{752}
Clarke	15,112	15,124	15,133	15,133	15,140	(3,028)	[727]	{363}	15,148	(3,030)	[727]	{364}	15,154	(3,031)	[727]	{364}
Clayton	27,022	27,035	27,050	27,084	27,107	(5,421)	[1,301]	{651}	27,128	(5,426)	[1,302]	{651}	27,146	(5,429)	[1,303]	{652}
Cobb	79,237	79,288	79,320	79,397	79,469	(15,894)	[3,815]	{1,907}	79,535	(15,907)	[3,818]	{1,909}	79,597	(15,919)	[3,821]	{1,910}
DeKalb	66,499	66,560	66,580	66,622	66,678	(13,336)	[3,201]	{1,600}	66,727	(13,345)	[3,203]	{1,601}	66,774	(13,355)	[3,205]	{1,603}
Dougherty	7,610	7,615	7,623	7,626	7,632	(1,526)	[366]	{183}	7,637	(1,527)	[367]	{183}	7,643	(1,529)	[367]	{183}
Douglas	15,404	15,414	15,424	15,435	15,453	(3,091)	[742]	{371}	15,469	(3,094)	[743]	{371}	15,485	(3,097)	[743]	{372}
Fulton	98,212	98,245	98,300	98,287	98,360	(19,672)	[4,721]	{2,361}	98,429	(19,686)	[4,725]	{2,362}	98,491	(19,698)	[4,728]	{2,364}
Gwinnett	102,257	102,323	102,359	102,433	102,518	(20,504)	[4,921]	{2,460}	102,600	(20,520)	[4,925]	{2,462}	102,679	(20,536)	[4,929]	{2,464}
Hall	27,438	27,449	27,454	27,470	27,485	(5,497)	[1,319]	{660}	27,498	(5,500)	[1,320]	{660}	27,511	(5,502)	[1,321]	{660}
Henry	25,545	25,580	25,596	25,609	25,636	(5,127)	[1,231]	{615}	25,662	(5,132)	[1,232]	{616}	25,686	(5,137)	[1,233]	{616}
Lee	2,746	2,746	2,750	2,750	2,752	(550)	[132]	{66}	2,754	(551)	[132]	{66}	2,756	(551)	[132]	{66}

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.