

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

Date: 6/17/21

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 6/17/21 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.**

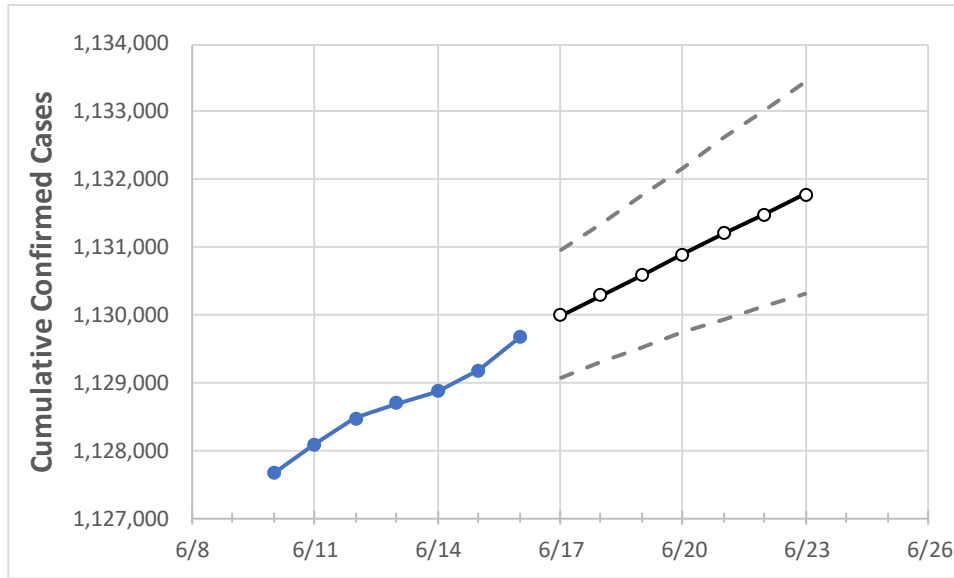
### IEM's Modeling Lead

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:						
	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	6/22	6/23

Georgia 1,128,690 1,128,870 1,129,177 1,129,675 1,129,991 1,130,295 1,130,591 1,130,895 1,131,197 1,131,490 1,131,781

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:						
	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	6/22	6/23
Bartow	14,876	14,878	14,879	14,890	14,895	14,900	14,905	14,909	14,914	14,919	14,923
Carroll	11,519	11,520	11,525	11,530	11,533	11,535	11,538	11,541	11,543	11,546	11,548
Cherokee	31,460	31,464	31,479	31,479	31,485	31,491	31,497	31,503	31,508	31,513	31,519
Clarke	15,175	15,177	15,176	15,176	15,178	15,180	15,183	15,185	15,187	15,189	15,191
Clayton	27,329	27,335	27,342	27,356	27,366	27,377	27,387	27,396	27,406	27,416	27,425
Cobb	79,851	79,868	79,886	79,913	79,932	79,950	79,968	79,985	80,002	80,018	80,033
DeKalb	66,967	66,982	67,016	67,025	67,043	67,060	67,077	67,093	67,109	67,124	67,140
Dougherty	7,683	7,683	7,683	7,683	7,685	7,686	7,687	7,689	7,690	7,692	7,693
Douglas	15,528	15,530	15,534	15,537	15,540	15,542	15,545	15,547	15,549	15,551	15,553
Fulton	98,806	98,818	98,869	98,917	98,946	98,975	99,003	99,031	99,058	99,085	99,112
Gwinnett	102,986	103,006	102,984	103,011	103,033	103,054	103,074	103,095	103,114	103,133	103,152
Hall	27,713	27,717	27,723	27,730	27,739	27,747	27,756	27,766	27,775	27,784	27,792
Henry	25,806	25,811	25,817	25,834	25,844	25,854	25,864	25,873	25,883	25,892	25,901
Lee	2,763	2,764	2,764	2,764	2,765	2,766	2,768	2,769	2,770	2,771	2,772

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:											
	6/13	6/14	6/15	6/16	6/18				6/20				6/22			
Bartow	14,876	14,878	14,879	14,890	14,900	(2,980)	[715]	{358}	14,909	(2,982)	[716]	{358}	14,919	(2,984)	[716]	{358}
Carroll	11,519	11,520	11,525	11,530	11,535	(2,307)	[554]	{277}	11,541	(2,308)	[554]	{277}	11,546	(2,309)	[554]	{277}
Cherokee	31,460	31,464	31,479	31,479	31,491	(6,298)	[1,512]	{756}	31,503	(6,301)	[1,512]	{756}	31,513	(6,303)	[1,513]	{756}
Clarke	15,175	15,177	15,176	15,176	15,180	(3,036)	[729]	{364}	15,185	(3,037)	[729]	{364}	15,189	(3,038)	[729]	{365}
Clayton	27,329	27,335	27,342	27,356	27,377	(5,475)	[1,314]	{657}	27,396	(5,479)	[1,315]	{658}	27,416	(5,483)	[1,316]	{658}
Cobb	79,851	79,868	79,886	79,913	79,950	(15,990)	[3,838]	{1,919}	79,985	(15,997)	[3,839]	{1,920}	80,018	(16,004)	[3,841]	{1,920}
DeKalb	66,967	66,982	67,016	67,025	67,060	(13,412)	[3,219]	{1,609}	67,093	(13,419)	[3,220]	{1,610}	67,124	(13,425)	[3,222]	{1,611}
Dougherty	7,683	7,683	7,683	7,683	7,686	(1,537)	[369]	{184}	7,689	(1,538)	[369]	{185}	7,692	(1,538)	[369]	{185}
Douglas	15,528	15,530	15,534	15,537	15,542	(3,108)	[746]	{373}	15,547	(3,109)	[746]	{373}	15,551	(3,110)	[746]	{373}
Fulton	98,806	98,818	98,869	98,917	98,975	(19,795)	[4,751]	{2,375}	99,031	(19,806)	[4,753]	{2,377}	99,085	(19,817)	[4,756]	{2,378}
Gwinnett	102,986	103,006	102,984	103,011	103,054	(20,611)	[4,947]	{2,473}	103,095	(20,619)	[4,949]	{2,474}	103,133	(20,627)	[4,950]	{2,475}
Hall	27,713	27,717	27,723	27,730	27,747	(5,549)	[1,332]	{666}	27,766	(5,553)	[1,333]	{666}	27,784	(5,557)	[1,334]	{667}
Henry	25,806	25,811	25,817	25,834	25,854	(5,171)	[1,241]	{620}	25,873	(5,175)	[1,242]	{621}	25,892	(5,178)	[1,243]	{621}
Lee	2,763	2,764	2,764	2,764	2,766	(553)	[133]	{66}	2,769	(554)	[133]	{66}	2,771	(554)	[133]	{67}

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.