

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

Date: 6/10/21

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 6/10/21 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.**

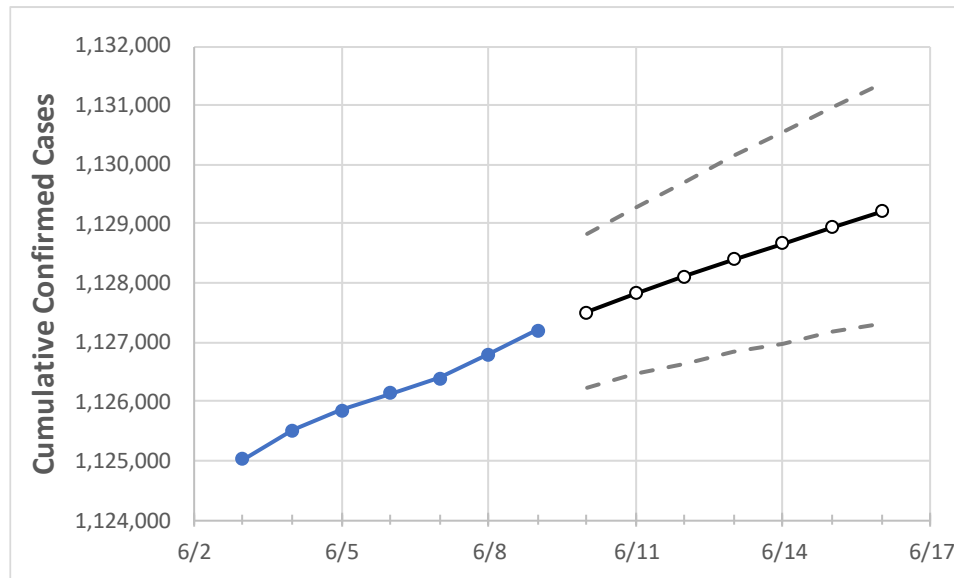
### IEM's Modeling Lead

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:							
	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15	6/16	
Georgia	1,126,134	1,126,397	1,126,789	1,127,200	1,127,510	1,127,818	1,128,113	1,128,401	1,128,668	1,128,938	1,129,206	

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:							
	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15	6/16	
Bartow	14,838	14,847	14,851	14,860	14,865	14,870	14,875	14,880	14,884	14,889	14,894	
Carroll	11,497	11,498	11,505	11,507	11,509	11,512	11,514	11,516	11,518	11,520	11,522	
Cherokee	31,403	31,411	31,414	31,425	31,431	31,438	31,443	31,449	31,454	31,459	31,464	
Clarke	15,155	15,157	15,159	15,163	15,165	15,167	15,168	15,170	15,172	15,173	15,175	
Clayton	27,230	27,242	27,255	27,275	27,288	27,300	27,312	27,324	27,336	27,347	27,358	
Cobb	79,685	79,704	79,724	79,748	79,768	79,788	79,807	79,825	79,843	79,860	79,876	
DeKalb	66,829	66,840	66,863	66,877	66,891	66,904	66,916	66,928	66,939	66,950	66,960	
Dougherty	7,657	7,666	7,670	7,674	7,677	7,680	7,683	7,686	7,689	7,692	7,695	
Douglas	15,496	15,499	15,506	15,509	15,513	15,516	15,520	15,523	15,526	15,528	15,531	
Fulton	98,613	98,629	98,666	98,703	98,726	98,747	98,767	98,787	98,805	98,823	98,841	
Gwinnett	102,781	102,795	102,832	102,866	102,896	102,923	102,951	102,977	103,005	103,030	103,056	
Hall	27,552	27,556	27,643	27,663	27,670	27,678	27,685	27,692	27,699	27,705	27,712	
Henry	25,723	25,729	25,741	25,746	25,753	25,760	25,766	25,772	25,778	25,783	25,789	
Lee	2,758	2,762	2,761	2,763	2,764	2,765	2,767	2,768	2,769	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:											
	6/6	6/7	6/8	6/9	6/11				6/13				6/15			
Bartow	14,838	14,847	14,851	14,860	14,870	(2,974)	[714]	{357}	14,880	(2,976)	[714]	{357}	14,889	(2,978)	[715]	{357}
Carroll	11,497	11,498	11,505	11,507	11,512	(2,302)	[553]	{276}	11,516	(2,303)	[553]	{276}	11,520	(2,304)	[553]	{276}
Cherokee	31,403	31,411	31,414	31,425	31,438	(6,288)	[1,509]	{755}	31,449	(6,290)	[1,510]	{755}	31,459	(6,292)	[1,510]	{755}
Clarke	15,155	15,157	15,159	15,163	15,167	(3,033)	[728]	{364}	15,170	(3,034)	[728]	{364}	15,173	(3,035)	[728]	{364}
Clayton	27,230	27,242	27,255	27,275	27,300	(5,460)	[1,310]	{655}	27,324	(5,465)	[1,312]	{656}	27,347	(5,469)	[1,313]	{656}
Cobb	79,685	79,704	79,724	79,748	79,788	(15,958)	[3,830]	{1,915}	79,825	(15,965)	[3,832]	{1,916}	79,860	(15,972)	[3,833]	{1,917}
DeKalb	66,829	66,840	66,863	66,877	66,904	(13,381)	[3,211]	{1,606}	66,928	(13,386)	[3,213]	{1,606}	66,950	(13,390)	[3,214]	{1,607}
Dougherty	7,657	7,666	7,670	7,674	7,680	(1,536)	[369]	{184}	7,686	(1,537)	[369]	{184}	7,692	(1,538)	[369]	{185}
Douglas	15,496	15,499	15,506	15,509	15,516	(3,103)	[745]	{372}	15,523	(3,105)	[745]	{373}	15,528	(3,106)	[745]	{373}
Fulton	98,613	98,629	98,666	98,703	98,747	(19,749)	[4,740]	{2,370}	98,787	(19,757)	[4,742]	{2,371}	98,823	(19,765)	[4,744]	{2,372}
Gwinnett	102,781	102,795	102,832	102,866	102,923	(20,585)	[4,940]	{2,470}	102,977	(20,595)	[4,943]	{2,471}	103,030	(20,606)	[4,945]	{2,473}
Hall	27,552	27,556	27,643	27,663	27,678	(5,536)	[1,329]	{664}	27,692	(5,538)	[1,329]	{665}	27,705	(5,541)	[1,330]	{665}
Henry	25,723	25,729	25,741	25,746	25,760	(5,152)	[1,236]	{618}	25,772	(5,154)	[1,237]	{619}	25,783	(5,157)	[1,238]	{619}
Lee	2,758	2,762	2,761	2,763	2,765	(553)	[133]	{66}	2,768	(554)	[133]	{66}	2,771	(554)	[133]	{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.