

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 6/21/21**

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 6/21/21 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.

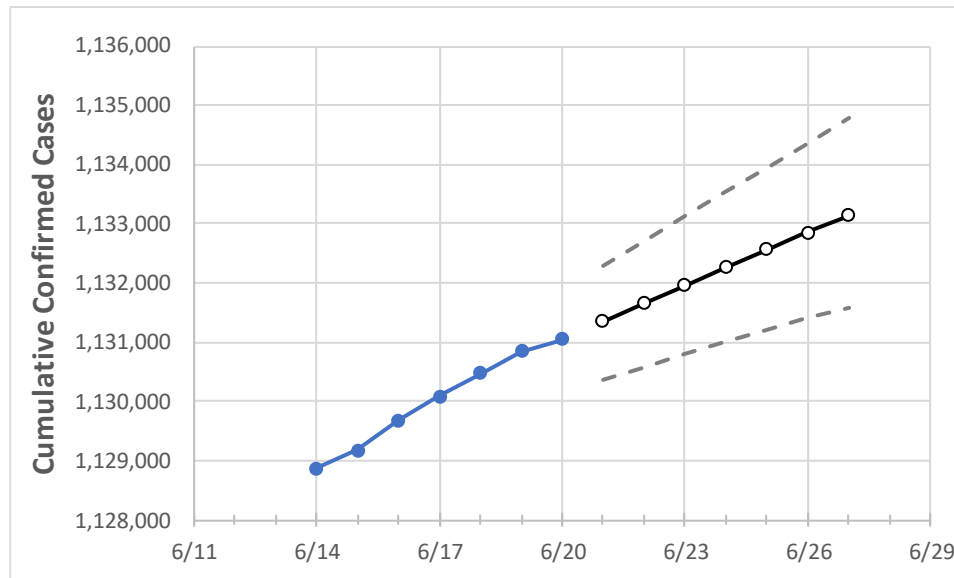
IEM's Modeling Lead

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:						
	6/17	6/18	6/19	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27
Georgia	1,130,083	1,130,468	1,130,845	1,131,048	1,131,356	1,131,654	1,131,955	1,132,262	1,132,564	1,132,860	1,133,147

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:						
	6/17	6/18	6/19	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27
Bartow	14,896	14,897	14,898	14,903	14,907	14,910	14,914	14,918	14,921	14,925	14,928
Carroll	11,535	11,542	11,544	11,546	11,549	11,553	11,556	11,559	11,563	11,566	11,570
Cherokee	31,489	31,495	31,499	31,502	31,507	31,512	31,517	31,522	31,526	31,530	31,534
Clarke	15,179	15,181	15,187	15,188	15,190	15,192	15,195	15,197	15,199	15,201	15,203
Clayton	27,373	27,391	27,398	27,400	27,410	27,420	27,429	27,438	27,447	27,456	27,465
Cobb	79,953	79,989	80,009	80,024	80,045	80,066	80,087	80,107	80,127	80,147	80,166
DeKalb	67,059	67,071	67,095	67,111	67,129	67,147	67,164	67,181	67,199	67,215	67,232
Dougherty	7,692	7,693	7,692	7,693	7,695	7,697	7,699	7,701	7,702	7,704	7,706
Douglas	15,541	15,553	15,563	15,564	15,568	15,571	15,575	15,578	15,581	15,585	15,588
Fulton	98,964	99,000	99,052	99,082	99,118	99,154	99,190	99,226	99,263	99,301	99,338
Gwinnett	103,020	103,048	103,068	103,090	103,109	103,127	103,146	103,163	103,180	103,196	103,213
Hall	27,737	27,739	27,740	27,741	27,747	27,753	27,759	27,764	27,770	27,775	27,781
Henry	25,848	25,866	25,879	25,883	25,893	25,903	25,913	25,923	25,933	25,943	25,952
Lee	2,764	2,764	2,764	2,764	2,765	2,765	2,766	2,767	2,767	2,768	2,769

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:											
	6/17	6/18	6/19	6/20	6/22				6/24				6/26			
Bartow	14,896	14,897	14,898	14,903	14,910	(2,982)	[716]	{358}	14,918	(2,984)	[716]	{358}	14,925	(2,985)	[716]	{358}
Carroll	11,535	11,542	11,544	11,546	11,553	(2,311)	[555]	{277}	11,559	(2,312)	[555]	{277}	11,566	(2,313)	[555]	{278}
Cherokee	31,489	31,495	31,499	31,502	31,512	(6,302)	[1,513]	{756}	31,522	(6,304)	[1,513]	{757}	31,530	(6,306)	[1,513]	{757}
Clarke	15,179	15,181	15,187	15,188	15,192	(3,038)	[729]	{365}	15,197	(3,039)	[729]	{365}	15,201	(3,040)	[730]	{365}
Clayton	27,373	27,391	27,398	27,400	27,420	(5,484)	[1,316]	{658}	27,438	(5,488)	[1,317]	{659}	27,456	(5,491)	[1,318]	{659}
Cobb	79,953	79,989	80,009	80,024	80,066	(16,013)	[3,843]	{1,922}	80,107	(16,021)	[3,845]	{1,923}	80,147	(16,029)	[3,847]	{1,924}
DeKalb	67,059	67,071	67,095	67,111	67,147	(13,429)	[3,223]	{1,612}	67,181	(13,436)	[3,225]	{1,612}	67,215	(13,443)	[3,226]	{1,613}
Dougherty	7,692	7,693	7,692	7,693	7,697	(1,539)	[369]	{185}	7,701	(1,540)	[370]	{185}	7,704	(1,541)	[370]	{185}
Douglas	15,541	15,553	15,563	15,564	15,571	(3,114)	[747]	{374}	15,578	(3,116)	[748]	{374}	15,585	(3,117)	[748]	{374}
Fulton	98,964	99,000	99,052	99,082	99,154	(19,831)	[4,759]	{2,380}	99,226	(19,845)	[4,763]	{2,381}	99,301	(19,860)	[4,766]	{2,383}
Gwinnett	103,020	103,048	103,068	103,090	103,127	(20,625)	[4,950]	{2,475}	103,163	(20,633)	[4,952]	{2,476}	103,196	(20,639)	[4,953]	{2,477}
Hall	27,737	27,739	27,740	27,741	27,753	(5,551)	[1,332]	{666}	27,764	(5,553)	[1,333]	{666}	27,775	(5,555)	[1,333]	{667}
Henry	25,848	25,866	25,879	25,883	25,903	(5,181)	[1,243]	{622}	25,923	(5,185)	[1,244]	{622}	25,943	(5,189)	[1,245]	{623}
Lee	2,764	2,764	2,764	2,764	2,765	(553)	[133]	{66}	2,767	(553)	[133]	{66}	2,768	(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 or 850-519-7966 or Stephanie Tennyson at stephanie.tennyson@iem.com or 202-309-4257.