

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 7/19/21**

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 7/19/21 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.

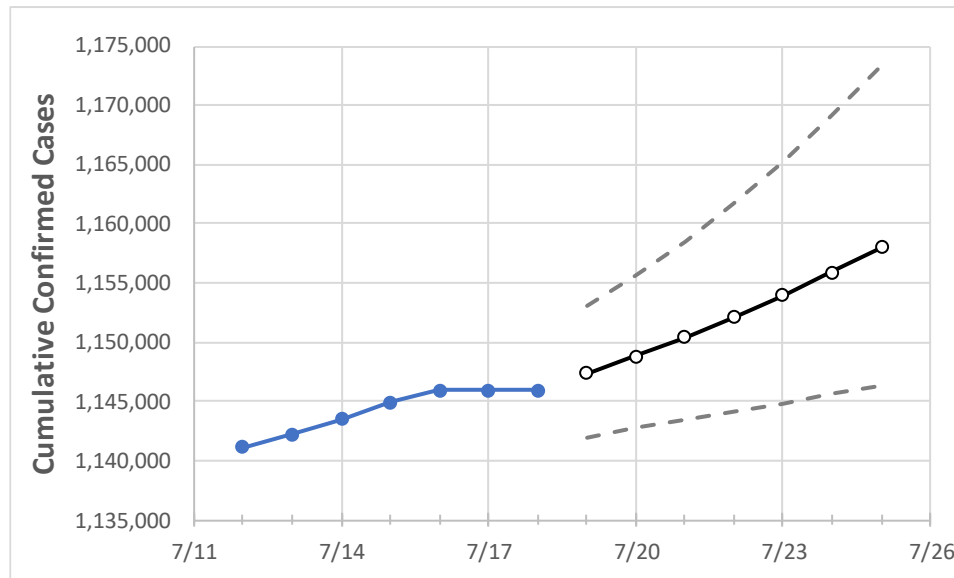
IEM's Modeling Lead

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:						
	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25
Georgia	1,144,890	1,145,976	1,145,976	1,145,976	1,147,355	1,148,834	1,150,441	1,152,144	1,153,949	1,155,883	1,157,974

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:						
	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25
Bartow	15,088	15,104	15,104	15,104	15,120	15,137	15,155	15,175	15,196	15,218	15,241
Carroll	11,683	11,691	11,691	11,691	11,704	11,718	11,733	11,748	11,765	11,782	11,800
Cherokee	31,756	31,776	31,776	31,776	31,797	31,818	31,842	31,867	31,892	31,919	31,947
Clarke	15,315	15,320	15,320	15,320	15,332	15,345	15,359	15,374	15,390	15,408	15,426
Clayton	27,779	27,795	27,795	27,795	27,824	27,853	27,885	27,919	27,954	27,991	28,029
Cobb	80,978	81,045	81,045	81,045	81,135	81,233	81,334	81,442	81,563	81,688	81,818
DeKalb	67,765	67,828	67,828	67,828	67,899	67,976	68,060	68,152	68,249	68,354	68,470
Dougherty	7,762	7,763	7,763	7,763	7,766	7,769	7,772	7,775	7,779	7,782	7,785
Douglas	15,736	15,766	15,766	15,766	15,787	15,809	15,834	15,860	15,889	15,920	15,954
Fulton	100,260	100,349	100,349	100,349	100,464	100,586	100,713	100,852	100,998	101,154	101,320
Gwinnett	104,059	104,137	104,137	104,137	104,240	104,351	104,474	104,602	104,737	104,889	105,048
Hall	27,984	27,998	27,998	27,998	28,016	28,035	28,054	28,075	28,095	28,117	28,140
Henry	26,231	26,258	26,258	26,258	26,299	26,345	26,393	26,446	26,503	26,566	26,633
Lee	2,817	2,820	2,820	2,820	2,827	2,835	2,843	2,852	2,863	2,874	2,886

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:											
	7/15	7/16	7/17	7/18	7/20				7/22				7/24			
Bartow	15,088	15,104	15,104	15,104	15,137	(3,027)	[727]	{363}	15,175	(3,035)	[728]	{364}	15,218	(3,044)	[730]	{365}
Carroll	11,683	11,691	11,691	11,691	11,718	(2,344)	[562]	{281}	11,748	(2,350)	[564]	{282}	11,782	(2,356)	[566]	{283}
Cherokee	31,756	31,776	31,776	31,776	31,818	(6,364)	[1,527]	{764}	31,867	(6,373)	[1,530]	{765}	31,919	(6,384)	[1,532]	{766}
Clarke	15,315	15,320	15,320	15,320	15,345	(3,069)	[737]	{368}	15,374	(3,075)	[738]	{369}	15,408	(3,082)	[740]	{370}
Clayton	27,779	27,795	27,795	27,795	27,853	(5,571)	[1,337]	{668}	27,919	(5,584)	[1,340]	{670}	27,991	(5,598)	[1,344]	{672}
Cobb	80,978	81,045	81,045	81,045	81,233	(16,247)	[3,899]	{1,950}	81,442	(16,288)	[3,909]	{1,955}	81,688	(16,338)	[3,921]	{1,961}
DeKalb	67,765	67,828	67,828	67,828	67,976	(13,595)	[3,263]	{1,631}	68,152	(13,630)	[3,271]	{1,636}	68,354	(13,671)	[3,281]	{1,641}
Dougherty	7,762	7,763	7,763	7,763	7,769	(1,554)	[373]	{186}	7,775	(1,555)	[373]	{187}	7,782	(1,556)	[374]	{187}
Douglas	15,736	15,766	15,766	15,766	15,809	(3,162)	[759]	{379}	15,860	(3,172)	[761]	{381}	15,920	(3,184)	[764]	{382}
Fulton	100,260	100,349	100,349	100,349	100,586	(20,117)	[4,828]	{2,414}	100,852	(20,170)	[4,841]	{2,420}	101,154	(20,231)	[4,855]	{2,428}
Gwinnett	104,059	104,137	104,137	104,137	104,351	(20,870)	[5,009]	{2,504}	104,602	(20,920)	[5,021]	{2,510}	104,889	(20,978)	[5,035]	{2,517}
Hall	27,984	27,998	27,998	27,998	28,035	(5,607)	[1,346]	{673}	28,075	(5,615)	[1,348]	{674}	28,117	(5,623)	[1,350]	{675}
Henry	26,231	26,258	26,258	26,258	26,345	(5,269)	[1,265]	{632}	26,446	(5,289)	[1,269]	{635}	26,566	(5,313)	[1,275]	{638}
Lee	2,817	2,820	2,820	2,820	2,835	(567)	[136]	{68}	2,852	(570)	[137]	{68}	2,874	(575)	[138]	{69}

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.