

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

Date: 1/31/22

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 1/31/22 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.**

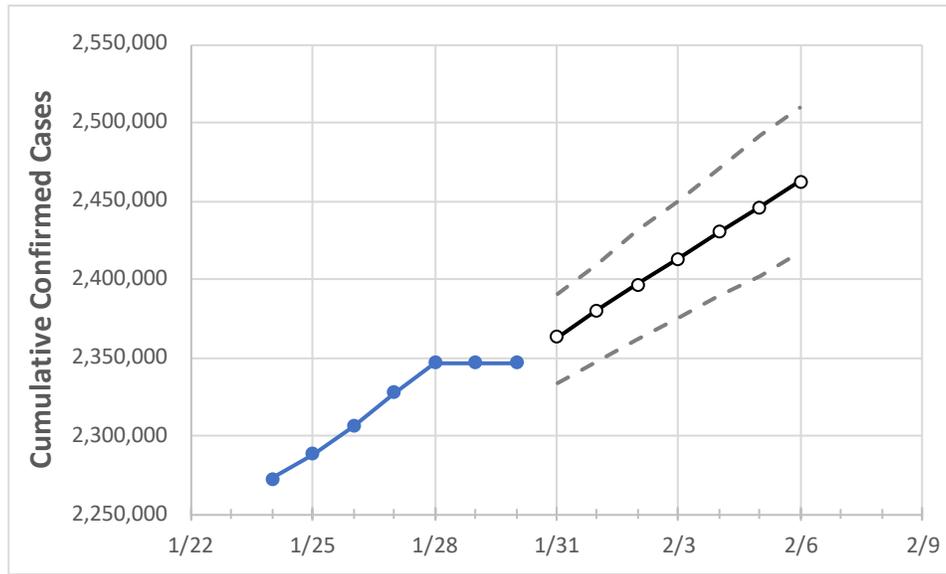
### IEM's Modeling Lead

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:							
	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6	
Georgia	2,327,733	2,346,518	2,346,518	2,346,518	2,363,378	2,380,095	2,396,415	2,413,286	2,430,109	2,446,303	2,462,686	

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:							
	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6	
Bartow	27,197	27,482	27,482	27,482	27,621	27,757	27,894	28,026	28,163	28,303	28,429	
Carroll	22,529	22,661	22,661	22,661	22,772	22,883	22,988	23,095	23,204	23,306	23,409	
Cherokee	59,958	60,319	60,319	60,319	60,693	61,051	61,410	61,779	62,120	62,483	62,833	
Clarke	28,299	28,449	28,449	28,449	28,642	28,843	29,034	29,225	29,402	29,603	29,776	
Clayton	60,653	61,070	61,070	61,070	61,540	62,072	62,550	63,016	63,542	64,046	64,522	
Cobb	160,230	161,740	161,740	161,740	162,681	163,617	164,514	165,482	166,376	167,348	168,209	
DeKalb	136,023	137,640	137,640	137,640	138,648	139,700	140,709	141,689	142,719	143,749	144,787	
Dougherty	17,588	17,896	17,896	17,896	18,129	18,357	18,580	18,815	19,054	19,306	19,536	
Douglas	33,181	33,342	33,342	33,342	33,466	33,586	33,710	33,824	33,936	34,046	34,149	
Fulton	201,448	203,428	203,428	203,428	205,317	207,323	209,490	211,703	214,022	216,431	218,877	
Gwinnett	194,507	195,984	195,984	195,984	197,245	198,514	199,752	200,997	202,245	203,445	204,657	
Hall	50,592	50,849	50,849	50,849	51,105	51,372	51,614	51,874	52,121	52,363	52,601	
Henry	54,878	55,237	55,237	55,237	55,439	55,642	55,844	56,038	56,216	56,409	56,588	
Lee	6,481	6,557	6,557	6,557	6,656	6,755	6,851	6,955	7,059	7,171	7,279	

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:											
	1/27	1/28	1/29	1/30	2/1				2/3				2/5			
Bartow	27,197	27,482	27,482	27,482	27,757	(5,551)	[1,332]	{666}	28,026	(5,605)	[1,345]	{673}	28,303	(5,661)	[1,359]	{679}
Carroll	22,529	22,661	22,661	22,661	22,883	(4,577)	[1,098]	{549}	23,095	(4,619)	[1,109]	{554}	23,306	(4,661)	[1,119]	{559}
Cherokee	59,958	60,319	60,319	60,319	61,051	(12,210)	[2,930]	{1,465}	61,779	(12,356)	[2,965]	{1,483}	62,483	(12,497)	[2,999]	{1,500}
Clarke	28,299	28,449	28,449	28,449	28,843	(5,769)	[1,384]	{692}	29,225	(5,845)	[1,403]	{701}	29,603	(5,921)	[1,421]	{710}
Clayton	60,653	61,070	61,070	61,070	62,072	(12,414)	[2,979]	{1,490}	63,016	(12,603)	[3,025]	{1,512}	64,046	(12,809)	[3,074]	{1,537}
Cobb	160,230	161,740	161,740	161,740	163,617	(32,723)	[7,854]	{3,927}	165,482	(33,096)	[7,943]	{3,972}	167,348	(33,470)	[8,033]	{4,016}
DeKalb	136,023	137,640	137,640	137,640	139,700	(27,940)	[6,706]	{3,353}	141,689	(28,338)	[6,801]	{3,401}	143,749	(28,750)	[6,900]	{3,450}
Dougherty	17,588	17,896	17,896	17,896	18,357	(3,671)	[881]	{441}	18,815	(3,763)	[903]	{452}	19,306	(3,861)	[927]	{463}
Douglas	33,181	33,342	33,342	33,342	33,586	(6,717)	[1,612]	{806}	33,824	(6,765)	[1,624]	{812}	34,046	(6,809)	[1,634]	{817}
Fulton	201,448	203,428	203,428	203,428	207,323	(41,465)	[9,951]	{4,976}	211,703	(42,341)	[10,162]	{5,081}	216,431	(43,286)	[10,389]	{5,194}
Gwinnett	194,507	195,984	195,984	195,984	198,514	(39,703)	[9,529]	{4,764}	200,997	(40,199)	[9,648]	{4,824}	203,445	(40,689)	[9,765]	{4,883}
Hall	50,592	50,849	50,849	50,849	51,372	(10,274)	[2,466]	{1,233}	51,874	(10,375)	[2,490]	{1,245}	52,363	(10,473)	[2,513]	{1,257}
Henry	54,878	55,237	55,237	55,237	55,642	(11,128)	[2,671]	{1,335}	56,038	(11,208)	[2,690]	{1,345}	56,409	(11,282)	[2,708]	{1,354}
Lee	6,481	6,557	6,557	6,557	6,755	(1,351)	[324]	{162}	6,955	(1,391)	[334]	{167}	7,171	(1,434)	[344]	{172}

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.