

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 1/27/21**

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 1/27/21 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.

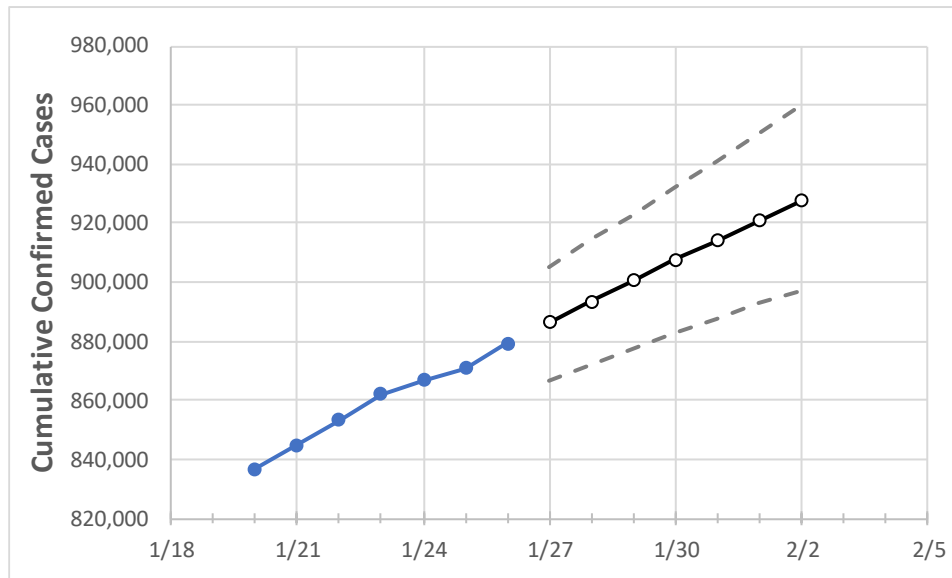
IEM's Modeling Lead

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:						
	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2
Georgia	862,158	866,911	870,828	879,221	886,423	893,604	900,668	907,552	914,185	920,932	927,667

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:						
	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2
Bartow	10,529	10,567	10,627	10,748	10,835	10,919	11,006	11,090	11,177	11,261	11,347
Carroll	9,120	9,195	9,240	9,320	9,390	9,458	9,528	9,597	9,666	9,735	9,803
Cherokee	22,752	22,860	22,995	23,305	23,518	23,731	23,938	24,149	24,362	24,563	24,759
Clarke	12,469	12,515	12,546	12,660	12,744	12,827	12,911	12,996	13,081	13,166	13,254
Clayton	18,469	18,588	18,667	18,942	19,129	19,316	19,507	19,688	19,875	20,071	20,265
Cobb	58,973	59,345	59,751	60,420	60,961	61,498	62,034	62,550	63,072	63,591	64,109
DeKalb	48,541	48,857	49,095	49,617	50,036	50,451	50,856	51,263	51,653	52,068	52,471
Dougherty	6,216	6,247	6,275	6,323	6,370	6,417	6,464	6,509	6,553	6,599	6,646
Douglas	10,933	11,036	11,111	11,243	11,348	11,451	11,554	11,659	11,760	11,864	11,966
Fulton	73,264	73,780	74,265	74,969	75,597	76,218	76,845	77,471	78,081	78,692	79,292
Gwinnett	78,494	79,103	79,518	80,517	81,479	82,462	83,450	84,457	85,465	86,476	87,492
Hall	23,057	23,141	23,207	23,392	23,571	23,751	23,929	24,105	24,276	24,445	24,611
Henry	17,947	18,059	18,143	18,393	18,587	18,777	18,973	19,161	19,351	19,549	19,743
Lee	2,220	2,235	2,241	2,278	2,305	2,332	2,359	2,386	2,415	2,442	2,467

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:											
	1/23	1/24	1/25	1/26	1/28				1/30				2/1			
Bartow	10,529	10,567	10,627	10,748	10,919	(2,184)	[524]	{262}	11,090	(2,218)	[532]	{266}	11,261	(2,252)	[541]	{270}
Carroll	9,120	9,195	9,240	9,320	9,458	(1,892)	[454]	{227}	9,597	(1,919)	[461]	{230}	9,735	(1,947)	[467]	{234}
Cherokee	22,752	22,860	22,995	23,305	23,731	(4,746)	[1,139]	{570}	24,149	(4,830)	[1,159]	{580}	24,563	(4,913)	[1,179]	{590}
Clarke	12,469	12,515	12,546	12,660	12,827	(2,565)	[616]	{308}	12,996	(2,599)	[624]	{312}	13,166	(2,633)	[632]	{316}
Clayton	18,469	18,588	18,667	18,942	19,316	(3,863)	[927]	{464}	19,688	(3,938)	[945]	{473}	20,071	(4,014)	[963]	{482}
Cobb	58,973	59,345	59,751	60,420	61,498	(12,300)	[2,952]	{1,476}	62,550	(12,510)	[3,002]	{1,501}	63,591	(12,718)	[3,052]	{1,526}
DeKalb	48,541	48,857	49,095	49,617	50,451	(10,090)	[2,422]	{1,211}	51,263	(10,253)	[2,461]	{1,230}	52,068	(10,414)	[2,499]	{1,250}
Dougherty	6,216	6,247	6,275	6,323	6,417	(1,283)	[308]	{154}	6,509	(1,302)	[312]	{156}	6,599	(1,320)	[317]	{158}
Douglas	10,933	11,036	11,111	11,243	11,451	(2,290)	[550]	{275}	11,659	(2,332)	[560]	{280}	11,864	(2,373)	[569]	{285}
Fulton	73,264	73,780	74,265	74,969	76,218	(15,244)	[3,658]	{1,829}	77,471	(15,494)	[3,719]	{1,859}	78,692	(15,738)	[3,777]	{1,889}
Gwinnett	78,494	79,103	79,518	80,517	82,462	(16,492)	[3,958]	{1,979}	84,457	(16,891)	[4,054]	{2,027}	86,476	(17,295)	[4,151]	{2,075}
Hall	23,057	23,141	23,207	23,392	23,751	(4,750)	[1,140]	{570}	24,105	(4,821)	[1,157]	{579}	24,445	(4,889)	[1,173]	{587}
Henry	17,947	18,059	18,143	18,393	18,777	(3,755)	[901]	{451}	19,161	(3,832)	[920]	{460}	19,549	(3,910)	[938]	{469}
Lee	2,220	2,235	2,241	2,278	2,332	(466)	[112]	{56}	2,386	(477)	[115]	{57}	2,442	(488)	[117]	{59}

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.