

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

Date: 2/3/21

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 2/3/21 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.**

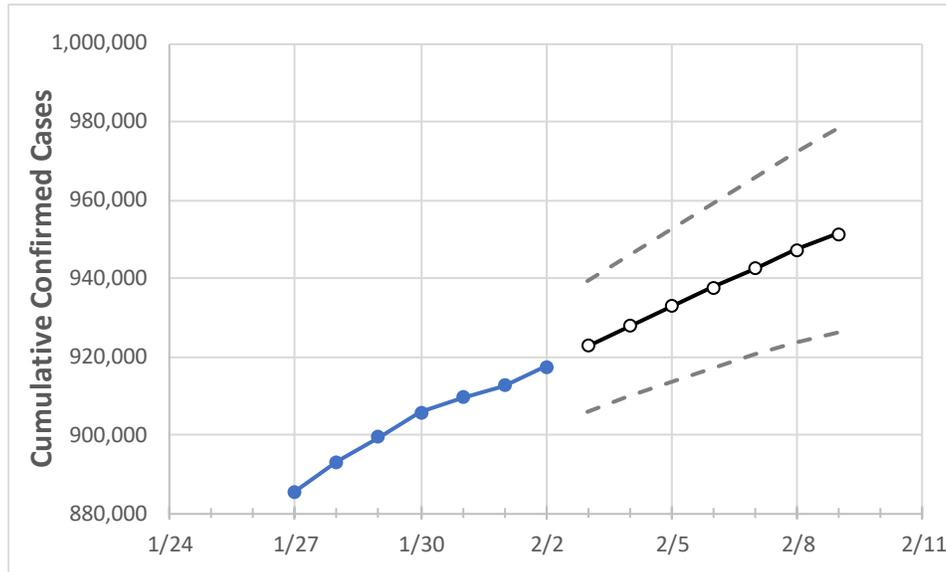
### IEM's Modeling Lead

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:							
	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6	2/7	2/8	2/9	
Georgia	905,858	909,445	912,479	917,440	922,693	927,743	932,809	937,755	942,468	947,144	951,392	

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:							
	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6	2/7	2/8	2/9	
Bartow	11,195	11,249	11,292	11,369	11,448	11,524	11,599	11,673	11,747	11,818	11,890	
Carroll	9,581	9,614	9,646	9,706	9,762	9,817	9,872	9,926	9,979	10,031	10,084	
Cherokee	24,096	24,211	24,291	24,437	24,588	24,741	24,886	25,026	25,159	25,299	25,434	
Clarke	13,011	13,054	13,080	13,137	13,200	13,266	13,326	13,388	13,449	13,510	13,572	
Clayton	19,589	19,700	19,768	19,877	20,013	20,145	20,276	20,405	20,528	20,654	20,774	
Cobb	62,440	62,694	62,974	63,322	63,714	64,096	64,476	64,837	65,201	65,558	65,890	
DeKalb	51,063	51,275	51,476	51,738	52,022	52,299	52,576	52,840	53,101	53,363	53,607	
Dougherty	6,594	6,613	6,623	6,648	6,690	6,731	6,771	6,810	6,848	6,885	6,922	
Douglas	11,659	11,746	11,818	11,891	11,981	12,069	12,155	12,241	12,325	12,409	12,494	
Fulton	77,020	77,344	77,629	77,977	78,400	78,811	79,214	79,600	79,980	80,348	80,696	
Gwinnett	83,090	83,370	83,675	84,210	84,805	85,369	85,926	86,498	87,022	87,538	88,055	
Hall	23,868	23,916	23,954	24,087	24,192	24,293	24,392	24,484	24,577	24,665	24,752	
Henry	19,032	19,121	19,197	19,324	19,464	19,604	19,743	19,874	20,004	20,132	20,259	
Lee	2,379	2,385	2,389	2,405	2,423	2,440	2,458	2,476	2,492	2,508	2,524	

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:											
	1/30	1/31	2/1	2/2	2/4			2/6			2/8					
Bartow	11,195	11,249	11,292	11,369	11,524	(2,305)	[553]	{277}	11,673	(2,335)	[560]	{280}	11,818	(2,364)	[567]	{284}
Carroll	9,581	9,614	9,646	9,706	9,817	(1,963)	[471]	{236}	9,926	(1,985)	[476]	{238}	10,031	(2,006)	[482]	{241}
Cherokee	24,096	24,211	24,291	24,437	24,741	(4,948)	[1,188]	{594}	25,026	(5,005)	[1,201]	{601}	25,299	(5,060)	[1,214]	{607}
Clarke	13,011	13,054	13,080	13,137	13,266	(2,653)	[637]	{318}	13,388	(2,678)	[643]	{321}	13,510	(2,702)	[648]	{324}
Clayton	19,589	19,700	19,768	19,877	20,145	(4,029)	[967]	{483}	20,405	(4,081)	[979]	{490}	20,654	(4,131)	[991]	{496}
Cobb	62,440	62,694	62,974	63,322	64,096	(12,819)	[3,077]	{1,538}	64,837	(12,967)	[3,112]	{1,556}	65,558	(13,112)	[3,147]	{1,573}
DeKalb	51,063	51,275	51,476	51,738	52,299	(10,460)	[2,510]	{1,255}	52,840	(10,568)	[2,536]	{1,268}	53,363	(10,673)	[2,561]	{1,281}
Dougherty	6,594	6,613	6,623	6,648	6,731	(1,346)	[323]	{162}	6,810	(1,362)	[327]	{163}	6,885	(1,377)	[330]	{165}
Douglas	11,659	11,746	11,818	11,891	12,069	(2,414)	[579]	{290}	12,241	(2,448)	[588]	{294}	12,409	(2,482)	[596]	{298}
Fulton	77,020	77,344	77,629	77,977	78,811	(15,762)	[3,783]	{1,891}	79,600	(15,920)	[3,821]	{1,910}	80,348	(16,070)	[3,857]	{1,928}
Gwinnett	83,090	83,370	83,675	84,210	85,369	(17,074)	[4,098]	{2,049}	86,498	(17,300)	[4,152]	{2,076}	87,538	(17,508)	[4,202]	{2,101}
Hall	23,868	23,916	23,954	24,087	24,293	(4,859)	[1,166]	{583}	24,484	(4,897)	[1,175]	{588}	24,665	(4,933)	[1,184]	{592}
Henry	19,032	19,121	19,197	19,324	19,604	(3,921)	[941]	{470}	19,874	(3,975)	[954]	{477}	20,132	(4,026)	[966]	{483}
Lee	2,379	2,385	2,389	2,405	2,440	(488)	[117]	{59}	2,476	(495)	[119]	{59}	2,508	(502)	[120]	{60}

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.