

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

**Date: 2/4/21**

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 2/4/21 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.**

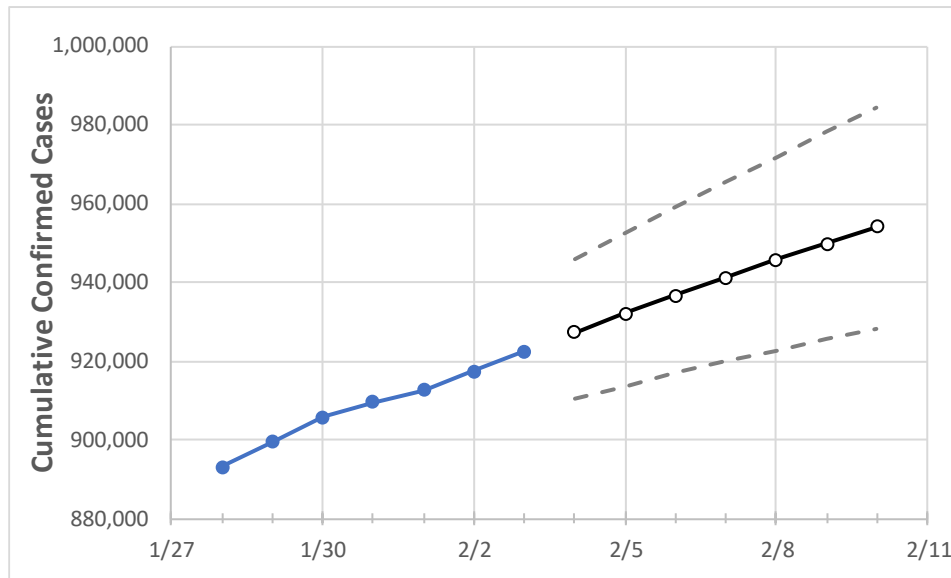
### **IEM's Modeling Lead**

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:							
	1/31	2/1	2/2	2/3	2/4	2/5	2/6	2/7	2/8	2/9	2/10	
Georgia	909,445	912,479	917,440	922,364	927,356	932,114	936,704	941,218	945,627	949,893	954,140	

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:							
	1/31	2/1	2/2	2/3	2/4	2/5	2/6	2/7	2/8	2/9	2/10	
Bartow	11,249	11,292	11,369	11,442	11,518	11,591	11,664	11,735	11,804	11,874	11,940	
Carroll	9,614	9,646	9,706	9,740	9,792	9,844	9,895	9,945	9,994	10,043	10,090	
Cherokee	24,211	24,291	24,437	24,595	24,742	24,877	25,011	25,144	25,272	25,398	25,523	
Clarke	13,054	13,080	13,137	13,201	13,261	13,322	13,381	13,437	13,495	13,552	13,606	
Clayton	19,700	19,768	19,877	19,979	20,111	20,240	20,364	20,491	20,616	20,734	20,850	
Cobb	62,694	62,974	63,322	63,643	64,018	64,385	64,738	65,086	65,411	65,737	66,050	
DeKalb	51,275	51,476	51,738	51,986	52,260	52,529	52,789	53,044	53,290	53,536	53,770	
Dougherty	6,613	6,623	6,648	6,682	6,718	6,753	6,789	6,823	6,856	6,889	6,922	
Douglas	11,746	11,818	11,891	12,006	12,099	12,190	12,280	12,368	12,458	12,545	12,632	
Fulton	77,344	77,629	77,977	78,400	78,804	79,201	79,593	79,970	80,330	80,679	81,027	
Gwinnett	83,370	83,675	84,210	84,740	85,301	85,832	86,352	86,867	87,357	87,835	88,301	
Hall	23,916	23,954	24,087	24,228	24,333	24,433	24,533	24,629	24,723	24,810	24,897	
Henry	19,121	19,197	19,324	19,439	19,575	19,710	19,839	19,966	20,093	20,212	20,332	
Lee	2,385	2,389	2,405	2,418	2,435	2,453	2,469	2,485	2,501	2,517	2,531	

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:											
	1/31	2/1	2/2	2/3	2/5				2/7				2/9			
Bartow	11,249	11,292	11,369	11,442	11,591	(2,318)	[556]	{278}	11,735	(2,347)	[563]	{282}	11,874	(2,375)	[570]	{285}
Carroll	9,614	9,646	9,706	9,740	9,844	(1,969)	[473]	{236}	9,945	(1,989)	[477]	{239}	10,043	(2,009)	[482]	{241}
Cherokee	24,211	24,291	24,437	24,595	24,877	(4,975)	[1,194]	{597}	25,144	(5,029)	[1,207]	{603}	25,398	(5,080)	[1,219]	{610}
Clarke	13,054	13,080	13,137	13,201	13,322	(2,664)	[639]	{320}	13,437	(2,687)	[645]	{322}	13,552	(2,710)	[650]	{325}
Clayton	19,700	19,768	19,877	19,979	20,240	(4,048)	[972]	{486}	20,491	(4,098)	[984]	{492}	20,734	(4,147)	[995]	{498}
Cobb	62,694	62,974	63,322	63,643	64,385	(12,877)	[3,090]	{1,545}	65,086	(13,017)	[3,124]	{1,562}	65,737	(13,147)	[3,155]	{1,578}
DeKalb	51,275	51,476	51,738	51,986	52,529	(10,506)	[2,521]	{1,261}	53,044	(10,609)	[2,546]	{1,273}	53,536	(10,707)	[2,570]	{1,285}
Dougherty	6,613	6,623	6,648	6,682	6,753	(1,351)	[324]	{162}	6,823	(1,365)	[327]	{164}	6,889	(1,378)	[331]	{165}
Douglas	11,746	11,818	11,891	12,006	12,190	(2,438)	[585]	{293}	12,368	(2,474)	[594]	{297}	12,545	(2,509)	[602]	{301}
Fulton	77,344	77,629	77,977	78,400	79,201	(15,840)	[3,802]	{1,901}	79,970	(15,994)	[3,839]	{1,919}	80,679	(16,136)	[3,873]	{1,936}
Gwinnett	83,370	83,675	84,210	84,740	85,832	(17,166)	[4,120]	{2,060}	86,867	(17,373)	[4,170]	{2,085}	87,835	(17,567)	[4,216]	{2,108}
Hall	23,916	23,954	24,087	24,228	24,433	(4,887)	[1,173]	{586}	24,629	(4,926)	[1,182]	{591}	24,810	(4,962)	[1,191]	{595}
Henry	19,121	19,197	19,324	19,439	19,710	(3,942)	[946]	{473}	19,966	(3,993)	[958]	{479}	20,212	(4,042)	[970]	{485}
Lee	2,385	2,389	2,405	2,418	2,453	(491)	[118]	{59}	2,485	(497)	[119]	{60}	2,517	(503)	[121]	{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.