

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 1/12/21**

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 1/12/21 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.**

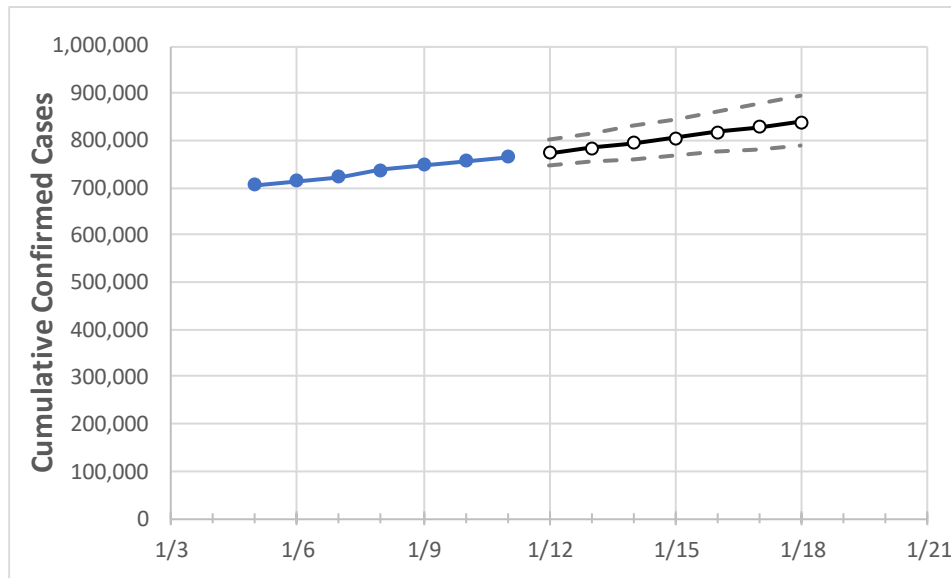
**IEM's Modeling Lead**

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:						
	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18
Georgia	736,926	748,852	757,045	764,499	774,508	784,928	795,461	806,118	817,282	828,055	839,372

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:						
	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18
Bartow	8,919	9,094	9,177	9,266	9,404	9,542	9,679	9,824	9,973	10,116	10,265
Carroll	8,122	8,211	8,273	8,339	8,412	8,486	8,561	8,639	8,716	8,794	8,874
Cherokee	18,790	19,212	19,484	19,709	20,056	20,412	20,764	21,136	21,520	21,905	22,301
Clarke	10,941	11,122	11,215	11,284	11,414	11,552	11,689	11,830	11,976	12,130	12,286
Clayton	15,594	15,968	16,113	16,248	16,439	16,637	16,837	17,048	17,269	17,487	17,700
Cobb	49,714	50,643	51,194	51,775	52,581	53,383	54,202	55,055	55,932	56,809	57,708
DeKalb	41,504	42,168	42,619	43,067	43,576	44,099	44,618	45,154	45,712	46,271	46,844
Dougherty	5,343	5,445	5,486	5,519	5,611	5,708	5,807	5,914	6,025	6,143	6,263
Douglas	9,264	9,429	9,520	9,631	9,770	9,905	10,047	10,188	10,334	10,483	10,641
Fulton	62,696	63,484	64,300	64,974	65,761	66,567	67,363	68,199	69,062	69,921	70,772
Gwinnett	63,999	65,067	65,881	66,849	67,875	68,909	69,973	71,087	72,229	73,387	74,564
Hall	19,911	20,191	20,359	20,538	20,738	20,945	21,149	21,358	21,568	21,779	21,994
Henry	14,862	15,197	15,378	15,538	15,754	15,972	16,191	16,416	16,644	16,878	17,119
Lee	1,758	1,804	1,825	1,864	1,904	1,945	1,989	2,035	2,080	2,125	2,174

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:											
	1/8	1/9	1/10	1/11	1/13				1/15				1/17			
Bartow	8,919	9,094	9,177	9,266	9,542	(1,908)	[458]	{229}	9,824	(1,965)	[472]	{236}	10,116	(2,023)	[486]	{243}
Carroll	8,122	8,211	8,273	8,339	8,486	(1,697)	[407]	{204}	8,639	(1,728)	[415]	{207}	8,794	(1,759)	[422]	{211}
Cherokee	18,790	19,212	19,484	19,709	20,412	(4,082)	[980]	{490}	21,136	(4,227)	[1,015]	{507}	21,905	(4,381)	[1,051]	{526}
Clarke	10,941	11,122	11,215	11,284	11,552	(2,310)	[554]	{277}	11,830	(2,366)	[568]	{284}	12,130	(2,426)	[582]	{291}
Clayton	15,594	15,968	16,113	16,248	16,637	(3,327)	[799]	{399}	17,048	(3,410)	[818]	{409}	17,487	(3,497)	[839]	{420}
Cobb	49,714	50,643	51,194	51,775	53,383	(10,677)	[2,562]	{1,281}	55,055	(11,011)	[2,643]	{1,321}	56,809	(11,362)	[2,727]	{1,363}
DeKalb	41,504	42,168	42,619	43,067	44,099	(8,820)	[2,117]	{1,058}	45,154	(9,031)	[2,167]	{1,084}	46,271	(9,254)	[2,221]	{1,111}
Dougherty	5,343	5,445	5,486	5,519	5,708	(1,142)	[274]	{137}	5,914	(1,183)	[284]	{142}	6,143	(1,229)	[295]	{147}
Douglas	9,264	9,429	9,520	9,631	9,905	(1,981)	[475]	{238}	10,188	(2,038)	[489]	{245}	10,483	(2,097)	[503]	{252}
Fulton	62,696	63,484	64,300	64,974	66,567	(13,313)	[3,195]	{1,598}	68,199	(13,640)	[3,274]	{1,637}	69,921	(13,984)	[3,356]	{1,678}
Gwinnett	63,999	65,067	65,881	66,849	68,909	(13,782)	[3,308]	{1,654}	71,087	(14,217)	[3,412]	{1,706}	73,387	(14,677)	[3,523]	{1,761}
Hall	19,911	20,191	20,359	20,538	20,945	(4,189)	[1,005]	{503}	21,358	(4,272)	[1,025]	{513}	21,779	(4,356)	[1,045]	{523}
Henry	14,862	15,197	15,378	15,538	15,972	(3,194)	[767]	{383}	16,416	(3,283)	[788]	{394}	16,878	(3,376)	[810]	{405}
Lee	1,758	1,804	1,825	1,864	1,945	(389)	[93]	{47}	2,035	(407)	[98]	{49}	2,125	(425)	[102]	{51}

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.