

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 1/26/21**

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 1/26/21 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.**

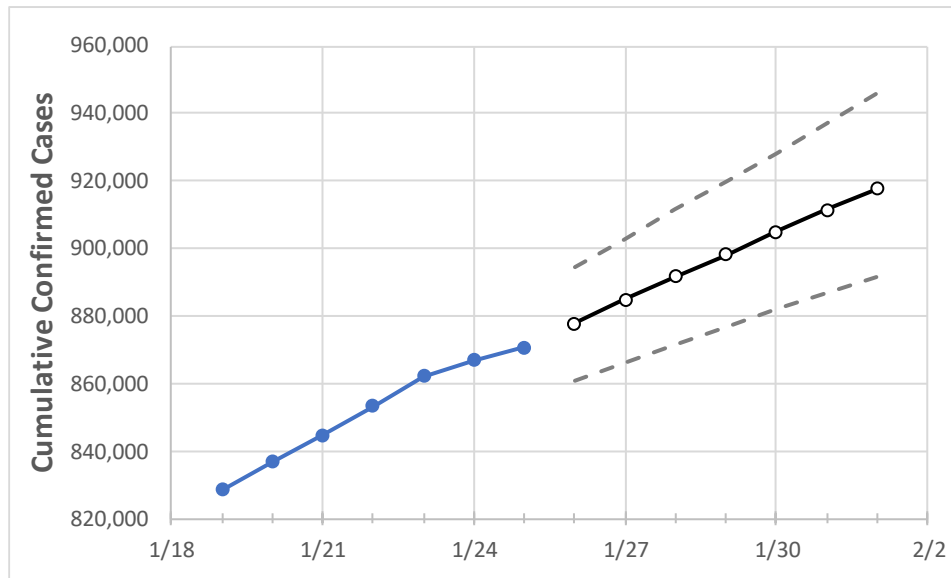
**IEM's Modeling Lead**

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:						
	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1
Georgia	853,173	862,158	866,911	870,828	877,912	884,901	891,629	898,272	905,020	911,426	917,739

*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:						
	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1
Bartow	10,443	10,529	10,567	10,627	10,711	10,793	10,872	10,952	11,030	11,106	11,182
Carroll	9,036	9,120	9,195	9,240	9,306	9,372	9,439	9,504	9,571	9,637	9,704
Cherokee	22,519	22,752	22,860	22,995	23,200	23,406	23,609	23,804	24,000	24,191	24,379
Clarke	12,305	12,469	12,515	12,546	12,629	12,713	12,794	12,874	12,948	13,029	13,109
Clayton	18,217	18,469	18,588	18,667	18,836	19,001	19,169	19,338	19,505	19,672	19,837
Cobb	58,349	58,973	59,345	59,751	60,273	60,790	61,292	61,784	62,277	62,756	63,237
DeKalb	48,028	48,541	48,857	49,095	49,496	49,888	50,286	50,683	51,072	51,452	51,822
Dougherty	6,145	6,216	6,247	6,275	6,325	6,375	6,424	6,471	6,520	6,570	6,615
Douglas	10,856	10,933	11,036	11,111	11,213	11,313	11,411	11,510	11,609	11,708	11,804
Fulton	72,509	73,264	73,780	74,265	74,898	75,519	76,133	76,756	77,372	77,979	78,579
Gwinnett	77,226	78,494	79,103	79,518	80,484	81,487	82,472	83,461	84,452	85,467	86,498
Hall	22,857	23,057	23,141	23,207	23,390	23,572	23,752	23,936	24,115	24,286	24,460
Henry	17,651	17,947	18,059	18,143	18,329	18,509	18,693	18,875	19,059	19,235	19,410
Lee	2,183	2,220	2,235	2,241	2,267	2,292	2,317	2,344	2,368	2,395	2,422

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:											
	1/22	1/23	1/24	1/25	1/27				1/29				1/31			
Bartow	10,443	10,529	10,567	10,627	10,793	(2,159)	[518]	{259}	10,952	(2,190)	[526]	{263}	11,106	(2,221)	[533]	{267}
Carroll	9,036	9,120	9,195	9,240	9,372	(1,874)	[450]	{225}	9,504	(1,901)	[456]	{228}	9,637	(1,927)	[463]	{231}
Cherokee	22,519	22,752	22,860	22,995	23,406	(4,681)	[1,123]	{562}	23,804	(4,761)	[1,143]	{571}	24,191	(4,838)	[1,161]	{581}
Clarke	12,305	12,469	12,515	12,546	12,713	(2,543)	[610]	{305}	12,874	(2,575)	[618]	{309}	13,029	(2,606)	[625]	{313}
Clayton	18,217	18,469	18,588	18,667	19,001	(3,800)	[912]	{456}	19,338	(3,868)	[928]	{464}	19,672	(3,934)	[944]	{472}
Cobb	58,349	58,973	59,345	59,751	60,790	(12,158)	[2,918]	{1,459}	61,784	(12,357)	[2,966]	{1,483}	62,756	(12,551)	[3,012]	{1,506}
DeKalb	48,028	48,541	48,857	49,095	49,888	(9,978)	[2,395]	{1,197}	50,683	(10,137)	[2,433]	{1,216}	51,452	(10,290)	[2,470]	{1,235}
Dougherty	6,145	6,216	6,247	6,275	6,375	(1,275)	[306]	{153}	6,471	(1,294)	[311]	{155}	6,570	(1,314)	[315]	{158}
Douglas	10,856	10,933	11,036	11,111	11,313	(2,263)	[543]	{272}	11,510	(2,302)	[552]	{276}	11,708	(2,342)	[562]	{281}
Fulton	72,509	73,264	73,780	74,265	75,519	(15,104)	[3,625]	{1,812}	76,756	(15,351)	[3,684]	{1,842}	77,979	(15,596)	[3,743]	{1,871}
Gwinnett	77,226	78,494	79,103	79,518	81,487	(16,297)	[3,911]	{1,956}	83,461	(16,692)	[4,006]	{2,003}	85,467	(17,093)	[4,102]	{2,051}
Hall	22,857	23,057	23,141	23,207	23,572	(4,714)	[1,131]	{566}	23,936	(4,787)	[1,149]	{574}	24,286	(4,857)	[1,166]	{583}
Henry	17,651	17,947	18,059	18,143	18,509	(3,702)	[888]	{444}	18,875	(3,775)	[906]	{453}	19,235	(3,847)	[923]	{462}
Lee	2,183	2,220	2,235	2,241	2,292	(458)	[110]	{55}	2,344	(469)	[112]	{56}	2,395	(479)	[115]	{57}

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.