

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 12/14/20**

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 12/14/20 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.**

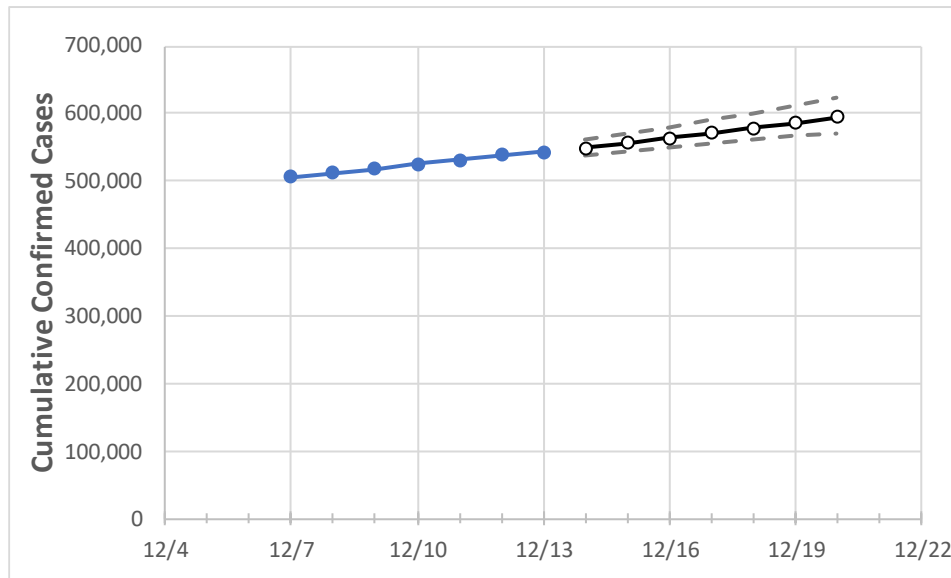
**IEM's Modeling Lead**

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:						
	12/10	12/11	12/12	12/13	12/14	12/15	12/16	12/17	12/18	12/19	12/20
Georgia	525,402	531,593	538,040	542,838	549,375	556,178	563,257	570,623	578,287	586,258	594,549

*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 20%, and are often within 10%, of actual confirmed cases.*

## Georgia Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	12/10	12/11	12/12	12/13	12/14	12/15	12/16	12/17	12/18	12/19	12/20
Bartow	5,966	6,044	6,130	6,196	6,288	6,384	6,483	6,587	6,694	6,806	6,923
Carroll	6,347	6,425	6,481	6,536	6,597	6,659	6,723	6,787	6,853	6,919	6,987
Cherokee	12,122	12,284	12,490	12,600	12,757	12,919	13,085	13,255	13,430	13,610	13,794
Clarke	8,646	8,738	8,805	8,867	8,944	9,024	9,107	9,193	9,283	9,377	9,474
Clayton	11,677	11,808	11,936	12,106	12,261	12,425	12,600	12,784	12,980	13,187	13,407
Cobb	33,719	34,198	34,687	35,101	35,572	36,066	36,583	37,124	37,690	38,282	38,901
DeKalb	30,736	31,061	31,421	31,741	32,109	32,493	32,892	33,308	33,741	34,191	34,661
Dougherty	4,053	4,093	4,143	4,167	4,203	4,243	4,286	4,333	4,383	4,439	4,498
Douglas	6,511	6,602	6,676	6,754	6,845	6,941	7,041	7,145	7,254	7,368	7,487
Fulton	45,471	45,902	46,499	46,896	47,453	48,032	48,634	49,261	49,912	50,590	51,294
Gwinnett	45,002	45,489	46,030	46,579	47,216	47,882	48,579	49,308	50,070	50,867	51,699
Hall	14,408	14,589	14,716	14,833	15,032	15,241	15,461	15,693	15,936	16,193	16,462
Henry	10,038	10,158	10,311	10,459	10,619	10,786	10,962	11,146	11,338	11,540	11,751
Lee	1,133	1,155	1,165	1,167	1,182	1,198	1,214	1,232	1,250	1,269	1,290

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:											
	12/10	12/11	12/12	12/13	12/15				12/17				12/19			
Bartow	5,966	6,044	6,130	6,196	6,384	(1,277)	[306]	{153}	6,587	(1,317)	[316]	{158}	6,806	(1,361)	[327]	{163}
Carroll	6,347	6,425	6,481	6,536	6,659	(1,332)	[320]	{160}	6,787	(1,357)	[326]	{163}	6,919	(1,384)	[332]	{166}
Cherokee	12,122	12,284	12,490	12,600	12,919	(2,584)	[620]	{310}	13,255	(2,651)	[636]	{318}	13,610	(2,722)	[653]	{327}
Clarke	8,646	8,738	8,805	8,867	9,024	(1,805)	[433]	{217}	9,193	(1,839)	[441]	{221}	9,377	(1,875)	[450]	{225}
Clayton	11,677	11,808	11,936	12,106	12,425	(2,485)	[596]	{298}	12,784	(2,557)	[614]	{307}	13,187	(2,637)	[633]	{316}
Cobb	33,719	34,198	34,687	35,101	36,066	(7,213)	[1,731]	{866}	37,124	(7,425)	[1,782]	{891}	38,282	(7,656)	[1,838]	{919}
DeKalb	30,736	31,061	31,421	31,741	32,493	(6,499)	[1,560]	{780}	33,308	(6,662)	[1,599]	{799}	34,191	(6,838)	[1,641]	{821}
Dougherty	4,053	4,093	4,143	4,167	4,243	(849)	[204]	{102}	4,333	(867)	[208]	{104}	4,439	(888)	[213]	{107}
Douglas	6,511	6,602	6,676	6,754	6,941	(1,388)	[333]	{167}	7,145	(1,429)	[343]	{171}	7,368	(1,474)	[354]	{177}
Fulton	45,471	45,902	46,499	46,896	48,032	(9,606)	[2,306]	{1,153}	49,261	(9,852)	[2,365]	{1,182}	50,590	(10,118)	[2,428]	{1,214}
Gwinnett	45,002	45,489	46,030	46,579	47,882	(9,576)	[2,298]	{1,149}	49,308	(9,862)	[2,367]	{1,183}	50,867	(10,173)	[2,442]	{1,221}
Hall	14,408	14,589	14,716	14,833	15,241	(3,048)	[732]	{366}	15,693	(3,139)	[753]	{377}	16,193	(3,239)	[777]	{389}
Henry	10,038	10,158	10,311	10,459	10,786	(2,157)	[518]	{259}	11,146	(2,229)	[535]	{267}	11,540	(2,308)	[554]	{277}
Lee	1,133	1,155	1,165	1,167	1,198	(240)	[57]	{29}	1,232	(246)	[59]	{30}	1,269	(254)	[61]	{30}

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.