

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 10/16/20**

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 10/16/20 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.**

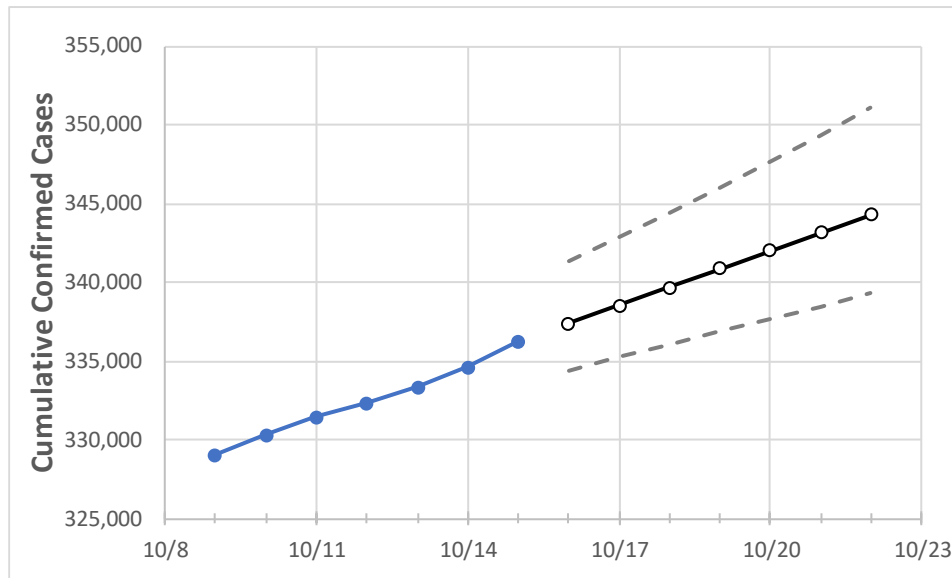
**IEM's Modeling Lead**

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:						
	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21	10/22
Georgia	332,311	333,304	334,601	336,241	337,389	338,539	339,691	340,845	342,000	343,157	344,315

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:						
	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21	10/22
Bartow	3,153	3,178	3,219	3,257	3,278	3,299	3,321	3,344	3,367	3,391	3,416
Carroll	3,015	3,032	3,045	3,078	3,096	3,115	3,134	3,153	3,172	3,192	3,212
Cherokee	6,497	6,518	6,571	6,625	6,656	6,688	6,719	6,752	6,784	6,816	6,849
Clarke	5,375	5,399	5,435	5,477	5,492	5,506	5,519	5,533	5,546	5,559	5,571
Clayton	7,509	7,569	7,616	7,686	7,756	7,832	7,914	8,002	8,098	8,200	8,311
Cobb	20,610	20,679	20,838	20,924	21,002	21,081	21,161	21,242	21,325	21,409	21,493
DeKalb	19,743	19,797	19,857	19,969	20,035	20,102	20,168	20,234	20,300	20,366	20,432
Dougherty	3,223	3,227	3,237	3,245	3,250	3,255	3,260	3,266	3,271	3,277	3,283
Douglas	3,850	3,864	3,877	3,896	3,915	3,935	3,955	3,975	3,995	4,016	4,038
Fulton	29,170	29,274	29,329	29,429	29,544	29,661	29,781	29,903	30,027	30,154	30,283
Gwinnett	28,861	29,015	29,157	29,295	29,404	29,515	29,626	29,738	29,851	29,965	30,081
Hall	9,985	10,028	10,098	10,163	10,202	10,243	10,284	10,326	10,368	10,412	10,457
Henry	5,669	5,699	5,723	5,770	5,801	5,831	5,862	5,893	5,924	5,955	5,987
Lee	726	728	730	731	732	734	735	736	737	738	740

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:											
	10/12	10/13	10/14	10/15	10/17			10/19			10/21					
Bartow	3,153	3,178	3,219	3,257	3,299	(660)	[158]	{79}	3,344	(669)	[161]	{80}	3,391	(678)	[163]	{81}
Carroll	3,015	3,032	3,045	3,078	3,115	(623)	[150]	{75}	3,153	(631)	[151]	{76}	3,192	(638)	[153]	{77}
Cherokee	6,497	6,518	6,571	6,625	6,688	(1,338)	[321]	{161}	6,752	(1,350)	[324]	{162}	6,816	(1,363)	[327]	{164}
Clarke	5,375	5,399	5,435	5,477	5,506	(1,101)	[264]	{132}	5,533	(1,107)	[266]	{133}	5,559	(1,112)	[267]	{133}
Clayton	7,509	7,569	7,616	7,686	7,832	(1,566)	[376]	{188}	8,002	(1,600)	[384]	{192}	8,200	(1,640)	[394]	{197}
Cobb	20,610	20,679	20,838	20,924	21,081	(4,216)	[1,012]	{506}	21,242	(4,248)	[1,020]	{510}	21,409	(4,282)	[1,028]	{514}
DeKalb	19,743	19,797	19,857	19,969	20,102	(4,020)	[965]	{482}	20,234	(4,047)	[971]	{486}	20,366	(4,073)	[978]	{489}
Dougherty	3,223	3,227	3,237	3,245	3,255	(651)	[156]	{78}	3,266	(653)	[157]	{78}	3,277	(655)	[157]	{79}
Douglas	3,850	3,864	3,877	3,896	3,935	(787)	[189]	{94}	3,975	(795)	[191]	{95}	4,016	(803)	[193]	{96}
Fulton	29,170	29,274	29,329	29,429	29,661	(5,932)	[1,424]	{712}	29,903	(5,981)	[1,435]	{718}	30,154	(6,031)	[1,447]	{724}
Gwinnett	28,861	29,015	29,157	29,295	29,515	(5,903)	[1,417]	{708}	29,738	(5,948)	[1,427]	{714}	29,965	(5,993)	[1,438]	{719}
Hall	9,985	10,028	10,098	10,163	10,243	(2,049)	[492]	{246}	10,326	(2,065)	[496]	{248}	10,412	(2,082)	[500]	{250}
Henry	5,669	5,699	5,723	5,770	5,831	(1,166)	[280]	{140}	5,893	(1,179)	[283]	{141}	5,955	(1,191)	[286]	{143}
Lee	726	728	730	731	734	(147)	[35]	{18}	736	(147)	[35]	{18}	738	(148)	[35]	{18}

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.