

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 11/17/20**

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 11/17/20 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.**

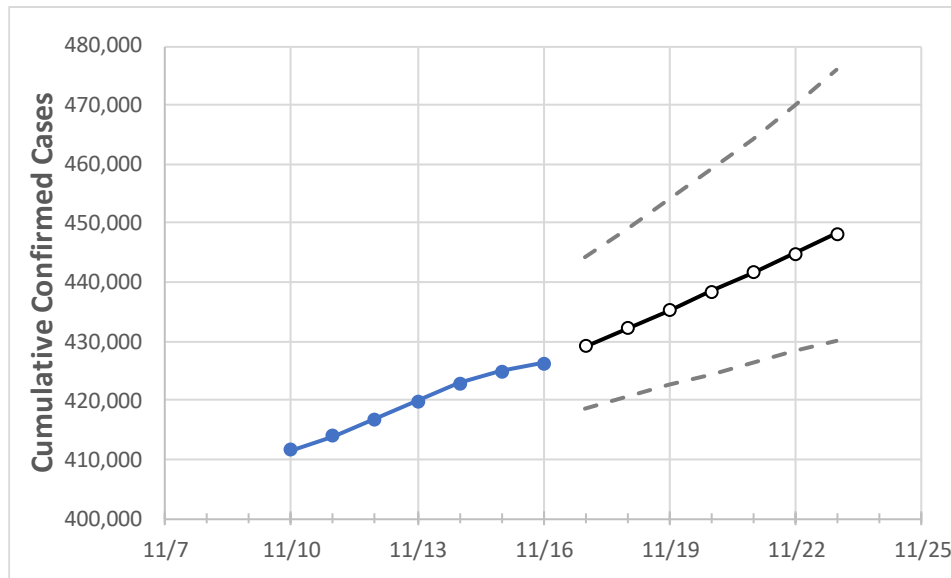
**IEM's Modeling Lead**

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:						
	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23
Georgia	419,870	422,905	424,989	426,236	429,175	432,182	435,257	438,403	441,620	444,911	448,276

*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:						
	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23
Bartow	4,451	4,485	4,515	4,536	4,562	4,590	4,617	4,646	4,675	4,705	4,736
Carroll	4,826	4,859	4,884	4,921	4,979	5,040	5,104	5,170	5,239	5,310	5,385
Cherokee	8,923	9,042	9,107	9,144	9,247	9,353	9,463	9,576	9,694	9,815	9,941
Clarke	7,376	7,412	7,425	7,437	7,474	7,512	7,551	7,591	7,631	7,673	7,715
Clayton	9,548	9,611	9,659	9,675	9,725	9,776	9,827	9,878	9,929	9,980	10,031
Cobb	26,369	26,606	26,758	26,826	27,027	27,234	27,447	27,668	27,896	28,131	28,373
DeKalb	24,521	24,743	24,915	24,961	25,141	25,326	25,516	25,710	25,910	26,114	26,324
Dougherty	3,579	3,589	3,595	3,596	3,604	3,612	3,621	3,629	3,638	3,647	3,657
Douglas	4,985	5,020	5,041	5,061	5,097	5,134	5,173	5,213	5,254	5,296	5,340
Fulton	35,994	36,266	36,425	36,496	36,721	36,951	37,183	37,420	37,660	37,905	38,153
Gwinnett	35,549	35,812	35,995	36,087	36,343	36,605	36,876	37,154	37,440	37,734	38,037
Hall	11,616	11,671	11,708	11,720	11,764	11,808	11,853	11,897	11,942	11,987	12,032
Henry	7,636	7,707	7,744	7,756	7,810	7,864	7,919	7,975	8,031	8,088	8,146
Lee	863	869	869	869	873	877	881	885	890	894	899

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:											
	11/13	11/14	11/15	11/16	11/18				11/20				11/22			
Bartow	4,451	4,485	4,515	4,536	4,590	(918)	[220]	{110}	4,646	(929)	[223]	{112}	4,705	(941)	[226]	{113}
Carroll	4,826	4,859	4,884	4,921	5,040	(1,008)	[242]	{121}	5,170	(1,034)	[248]	{124}	5,310	(1,062)	[255]	{127}
Cherokee	8,923	9,042	9,107	9,144	9,353	(1,871)	[449]	{224}	9,576	(1,915)	[460]	{230}	9,815	(1,963)	[471]	{236}
Clarke	7,376	7,412	7,425	7,437	7,512	(1,502)	[361]	{180}	7,591	(1,518)	[364]	{182}	7,673	(1,535)	[368]	{184}
Clayton	9,548	9,611	9,659	9,675	9,776	(1,955)	[469]	{235}	9,878	(1,976)	[474]	{237}	9,980	(1,996)	[479]	{240}
Cobb	26,369	26,606	26,758	26,826	27,234	(5,447)	[1,307]	{654}	27,668	(5,534)	[1,328]	{664}	28,131	(5,626)	[1,350]	{675}
DeKalb	24,521	24,743	24,915	24,961	25,326	(5,065)	[1,216]	{608}	25,710	(5,142)	[1,234]	{617}	26,114	(5,223)	[1,253]	{627}
Dougherty	3,579	3,589	3,595	3,596	3,612	(722)	[173]	{87}	3,629	(726)	[174]	{87}	3,647	(729)	[175]	{88}
Douglas	4,985	5,020	5,041	5,061	5,134	(1,027)	[246]	{123}	5,213	(1,043)	[250]	{125}	5,296	(1,059)	[254]	{127}
Fulton	35,994	36,266	36,425	36,496	36,951	(7,390)	[1,774]	{887}	37,420	(7,484)	[1,796]	{898}	37,905	(7,581)	[1,819]	{910}
Gwinnett	35,549	35,812	35,995	36,087	36,605	(7,321)	[1,757]	{879}	37,154	(7,431)	[1,783]	{892}	37,734	(7,547)	[1,811]	{906}
Hall	11,616	11,671	11,708	11,720	11,808	(2,362)	[567]	{283}	11,897	(2,379)	[571]	{286}	11,987	(2,397)	[575]	{288}
Henry	7,636	7,707	7,744	7,756	7,864	(1,573)	[377]	{189}	7,975	(1,595)	[383]	{191}	8,088	(1,618)	[388]	{194}
Lee	863	869	869	869	877	(175)	[42]	{21}	885	(177)	[42]	{21}	894	(179)	[43]	{21}

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.