

## **IEM's AI Modeling: Short-term COVID-19 Projections**

**Date: 5/6/21**

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 5/6/21 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.**

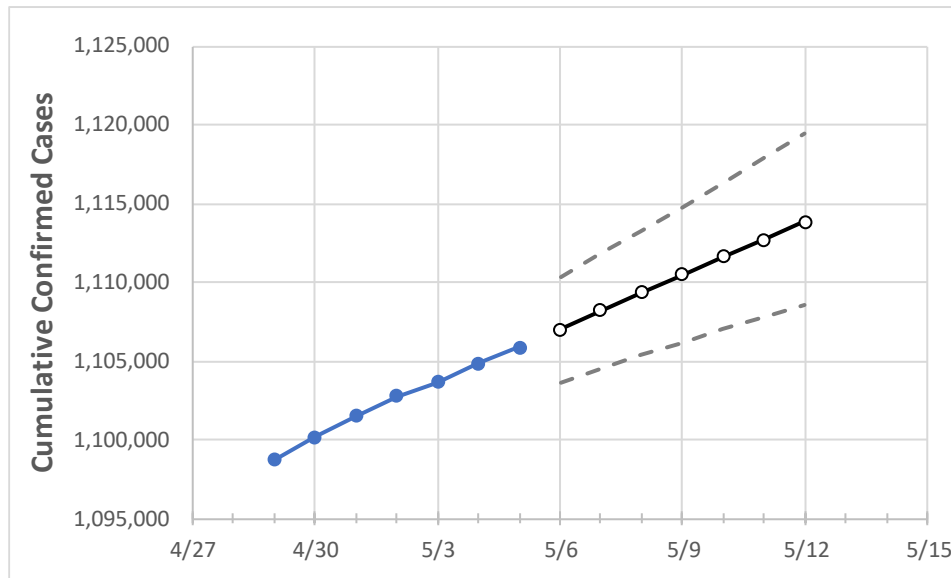
### **IEM's Modeling Lead**

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:						
	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9	5/10	5/11	5/12
Georgia	1,102,789	1,103,659	1,104,837	1,105,855	1,107,037	1,108,226	1,109,364	1,110,505	1,111,646	1,112,727	1,113,862

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:						
	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9	5/10	5/11	5/12
Bartow	14,580	14,587	14,591	14,601	14,614	14,627	14,640	14,652	14,664	14,676	14,689
Carroll	11,288	11,300	11,311	11,323	11,331	11,340	11,348	11,357	11,365	11,373	11,381
Cherokee	30,763	30,789	30,824	30,869	30,900	30,930	30,961	30,991	31,020	31,049	31,077
Clarke	14,975	14,979	14,994	15,000	15,009	15,018	15,026	15,035	15,043	15,051	15,059
Clayton	26,357	26,388	26,426	26,471	26,516	26,560	26,603	26,645	26,688	26,730	26,772
Cobb	77,809	77,892	77,997	78,100	78,198	78,296	78,390	78,483	78,573	78,664	78,754
DeKalb	65,431	65,483	65,589	65,615	65,724	65,831	65,939	66,048	66,157	66,266	66,373
Dougherty	7,496	7,501	7,519	7,525	7,535	7,545	7,555	7,566	7,577	7,587	7,598
Douglas	15,060	15,071	15,088	15,118	15,136	15,154	15,173	15,191	15,209	15,225	15,242
Fulton	96,443	96,559	96,669	96,771	96,895	97,018	97,140	97,260	97,381	97,498	97,618
Gwinnett	100,888	100,985	101,091	101,178	101,277	101,373	101,470	101,566	101,659	101,750	101,838
Hall	27,062	27,080	27,102	27,129	27,151	27,174	27,197	27,219	27,241	27,264	27,286
Henry	25,025	25,057	25,092	25,126	25,161	25,196	25,232	25,268	25,302	25,336	25,370
Lee	2,714	2,716	2,718	2,719	2,721	2,723	2,724	2,726	2,728	2,730	2,732

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:											
	5/2	5/3	5/4	5/5	5/7				5/9				5/11			
Bartow	14,580	14,587	14,591	14,601	14,627	(2,925)	[702]	{351}	14,652	(2,930)	[703]	{352}	14,676	(2,935)	[704]	{352}
Carroll	11,288	11,300	11,311	11,323	11,340	(2,268)	[544]	{272}	11,357	(2,271)	[545]	{273}	11,373	(2,275)	[546]	{273}
Cherokee	30,763	30,789	30,824	30,869	30,930	(6,186)	[1,485]	{742}	30,991	(6,198)	[1,488]	{744}	31,049	(6,210)	[1,490]	{745}
Clarke	14,975	14,979	14,994	15,000	15,018	(3,004)	[721]	{360}	15,035	(3,007)	[722]	{361}	15,051	(3,010)	[722]	{361}
Clayton	26,357	26,388	26,426	26,471	26,560	(5,312)	[1,275]	{637}	26,645	(5,329)	[1,279]	{639}	26,730	(5,346)	[1,283]	{642}
Cobb	77,809	77,892	77,997	78,100	78,296	(15,659)	[3,758]	{1,879}	78,483	(15,697)	[3,767]	{1,884}	78,664	(15,733)	[3,776]	{1,888}
DeKalb	65,431	65,483	65,589	65,615	65,831	(13,166)	[3,160]	{1,580}	66,048	(13,210)	[3,170]	{1,585}	66,266	(13,253)	[3,181]	{1,590}
Dougherty	7,496	7,501	7,519	7,525	7,545	(1,509)	[362]	{181}	7,566	(1,513)	[363]	{182}	7,587	(1,517)	[364]	{182}
Douglas	15,060	15,071	15,088	15,118	15,154	(3,031)	[727]	{364}	15,191	(3,038)	[729]	{365}	15,225	(3,045)	[731]	{365}
Fulton	96,443	96,559	96,669	96,771	97,018	(19,404)	[4,657]	{2,328}	97,260	(19,452)	[4,668]	{2,334}	97,498	(19,500)	[4,680]	{2,340}
Gwinnett	100,888	100,985	101,091	101,178	101,373	(20,275)	[4,866]	{2,433}	101,566	(20,313)	[4,875]	{2,438}	101,750	(20,350)	[4,884]	{2,442}
Hall	27,062	27,080	27,102	27,129	27,174	(5,435)	[1,304]	{652}	27,219	(5,444)	[1,306]	{653}	27,264	(5,453)	[1,309]	{654}
Henry	25,025	25,057	25,092	25,126	25,196	(5,039)	[1,209]	{605}	25,268	(5,054)	[1,213]	{606}	25,336	(5,067)	[1,216]	{608}
Lee	2,714	2,716	2,718	2,719	2,723	(545)	[131]	{65}	2,726	(545)	[131]	{65}	2,730	(546)	[131]	{66}

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.