

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

**Date: 6/9/21**

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 6/9/21 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.**

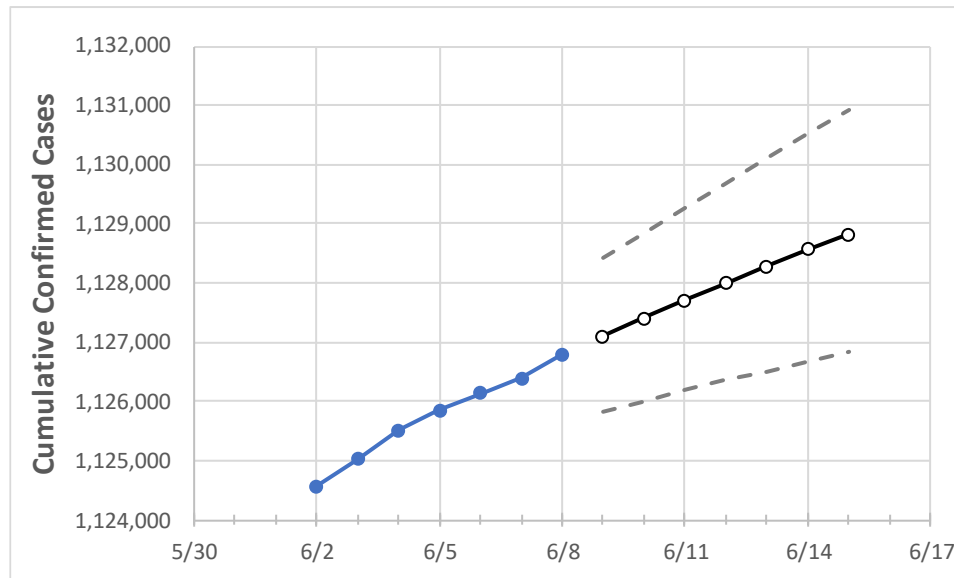
### **IEM's Modeling Lead**

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:						
	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15
Georgia	1,125,854	1,126,134	1,126,397	1,126,789	1,127,107	1,127,409	1,127,710	1,127,998	1,128,283	1,128,561	1,128,820

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:						
	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15
Bartow	14,831	14,838	14,847	14,851	14,855	14,859	14,864	14,868	14,872	14,876	14,880
Carroll	11,496	11,497	11,498	11,505	11,508	11,510	11,512	11,515	11,517	11,519	11,521
Cherokee	31,395	31,403	31,411	31,414	31,420	31,426	31,431	31,436	31,441	31,446	31,451
Clarke	15,152	15,155	15,157	15,159	15,161	15,162	15,164	15,165	15,167	15,168	15,170
Clayton	27,220	27,230	27,242	27,255	27,267	27,279	27,290	27,301	27,312	27,322	27,333
Cobb	79,660	79,685	79,704	79,724	79,746	79,766	79,785	79,804	79,822	79,840	79,857
DeKalb	66,820	66,829	66,840	66,863	66,878	66,891	66,904	66,916	66,929	66,940	66,951
Dougherty	7,656	7,657	7,666	7,670	7,673	7,676	7,680	7,683	7,686	7,689	7,692
Douglas	15,493	15,496	15,499	15,506	15,510	15,514	15,518	15,521	15,524	15,527	15,530
Fulton	98,587	98,613	98,629	98,666	98,689	98,710	98,731	98,751	98,770	98,788	98,805
Gwinnett	102,763	102,781	102,795	102,832	102,860	102,889	102,916	102,942	102,967	102,991	103,015
Hall	27,549	27,552	27,556	27,643	27,661	27,679	27,698	27,719	27,740	27,762	27,786
Henry	25,720	25,723	25,729	25,741	25,749	25,756	25,763	25,770	25,776	25,782	25,788
Lee	2,758	2,758	2,762	2,761	2,762	2,764	2,765	2,766	2,767	2,769	2,770

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:											
	6/5	6/6	6/7	6/8	6/10				6/12				6/14			
Bartow	14,831	14,838	14,847	14,851	14,859	(2,972)	[713]	{357}	14,868	(2,974)	[714]	{357}	14,876	(2,975)	[714]	{357}
Carroll	11,496	11,497	11,498	11,505	11,510	(2,302)	[552]	{276}	11,515	(2,303)	[553]	{276}	11,519	(2,304)	[553]	{276}
Cherokee	31,395	31,403	31,411	31,414	31,426	(6,285)	[1,508]	{754}	31,436	(6,287)	[1,509]	{754}	31,446	(6,289)	[1,509]	{755}
Clarke	15,152	15,155	15,157	15,159	15,162	(3,032)	[728]	{364}	15,165	(3,033)	[728]	{364}	15,168	(3,034)	[728]	{364}
Clayton	27,220	27,230	27,242	27,255	27,279	(5,456)	[1,309]	{655}	27,301	(5,460)	[1,310]	{655}	27,322	(5,464)	[1,311]	{656}
Cobb	79,660	79,685	79,704	79,724	79,766	(15,953)	[3,829]	{1,914}	79,804	(15,961)	[3,831]	{1,915}	79,840	(15,968)	[3,832]	{1,916}
DeKalb	66,820	66,829	66,840	66,863	66,891	(13,378)	[3,211]	{1,605}	66,916	(13,383)	[3,212]	{1,606}	66,940	(13,388)	[3,213]	{1,607}
Dougherty	7,656	7,657	7,666	7,670	7,676	(1,535)	[368]	{184}	7,683	(1,537)	[369]	{184}	7,689	(1,538)	[369]	{185}
Douglas	15,493	15,496	15,499	15,506	15,514	(3,103)	[745]	{372}	15,521	(3,104)	[745]	{373}	15,527	(3,105)	[745]	{373}
Fulton	98,587	98,613	98,629	98,666	98,710	(19,742)	[4,738]	{2,369}	98,751	(19,750)	[4,740]	{2,370}	98,788	(19,758)	[4,742]	{2,371}
Gwinnett	102,763	102,781	102,795	102,832	102,889	(20,578)	[4,939]	{2,469}	102,942	(20,588)	[4,941]	{2,471}	102,991	(20,598)	[4,944]	{2,472}
Hall	27,549	27,552	27,556	27,643	27,679	(5,536)	[1,329]	{664}	27,719	(5,544)	[1,330]	{665}	27,762	(5,552)	[1,333]	{666}
Henry	25,720	25,723	25,729	25,741	25,756	(5,151)	[1,236]	{618}	25,770	(5,154)	[1,237]	{618}	25,782	(5,156)	[1,238]	{619}
Lee	2,758	2,758	2,762	2,761	2,764	(553)	[133]	{66}	2,766	(553)	[133]	{66}	2,769	(554)	[133]	{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.