

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

Date: 6/8/21

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 6/8/21 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.

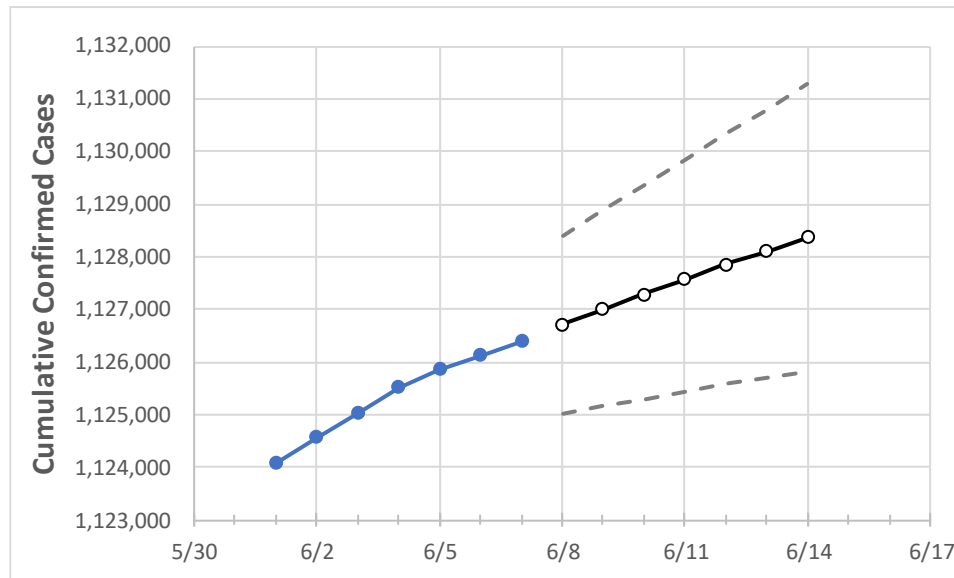
IEM's Modeling Lead

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:						
	6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14
Georgia	1,125,512	1,125,854	1,126,134	1,126,397	1,126,706	1,126,993	1,127,288	1,127,575	1,127,848	1,128,110	1,128,367

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:						
	6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14
Bartow	14,821	14,831	14,838	14,847	14,852	14,857	14,862	14,866	14,871	14,876	14,880
Carroll	11,493	11,496	11,497	11,498	11,500	11,502	11,504	11,506	11,508	11,510	11,512
Cherokee	31,393	31,395	31,403	31,411	31,418	31,424	31,430	31,436	31,442	31,447	31,452
Clarke	15,151	15,152	15,155	15,155	15,157	15,159	15,161	15,162	15,164	15,166	15,167
Clayton	27,211	27,220	27,230	27,242	27,255	27,267	27,279	27,291	27,302	27,313	27,324
Cobb	79,642	79,660	79,685	79,704	79,727	79,749	79,771	79,791	79,810	79,829	79,847
DeKalb	66,797	66,820	66,829	66,840	66,855	66,869	66,883	66,896	66,908	66,920	66,932
Dougherty	7,655	7,656	7,657	7,666	7,669	7,672	7,676	7,679	7,682	7,685	7,688
Douglas	15,492	15,493	15,496	15,499	15,503	15,507	15,511	15,514	15,518	15,521	15,523
Fulton	98,548	98,587	98,613	98,629	98,652	98,675	98,696	98,718	98,737	98,756	98,774
Gwinnett	102,722	102,763	102,781	102,795	102,825	102,854	102,881	102,906	102,932	102,958	102,982
Hall	27,539	27,549	27,552	27,556	27,562	27,568	27,574	27,579	27,585	27,590	27,595
Henry	25,707	25,720	25,723	25,729	25,737	25,745	25,752	25,759	25,766	25,772	25,779
Lee	2,757	2,758	2,758	2,762	2,763	2,764	2,766	2,767	2,768	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:											
	6/4	6/5	6/6	6/7	6/9				6/11				6/13			
Bartow	14,821	14,831	14,838	14,847	14,857	(2,971)	[713]	{357}	14,866	(2,973)	[714]	{357}	14,876	(2,975)	[714]	{357}
Carroll	11,493	11,496	11,497	11,498	11,502	(2,300)	[552]	{276}	11,506	(2,301)	[552]	{276}	11,510	(2,302)	[552]	{276}
Cherokee	31,393	31,395	31,403	31,411	31,424	(6,285)	[1,508]	{754}	31,436	(6,287)	[1,509]	{754}	31,447	(6,289)	[1,509]	{755}
Clarke	15,151	15,152	15,155	15,155	15,159	(3,032)	[728]	{364}	15,162	(3,032)	[728]	{364}	15,166	(3,033)	[728]	{364}
Clayton	27,211	27,220	27,230	27,242	27,267	(5,453)	[1,309]	{654}	27,291	(5,458)	[1,310]	{655}	27,313	(5,463)	[1,311]	{656}
Cobb	79,642	79,660	79,685	79,704	79,749	(15,950)	[3,828]	{1,914}	79,791	(15,958)	[3,830]	{1,915}	79,829	(15,966)	[3,832]	{1,916}
DeKalb	66,797	66,820	66,829	66,840	66,869	(13,374)	[3,210]	{1,605}	66,896	(13,379)	[3,211]	{1,606}	66,920	(13,384)	[3,212]	{1,606}
Dougherty	7,655	7,656	7,657	7,666	7,672	(1,534)	[368]	{184}	7,679	(1,536)	[369]	{184}	7,685	(1,537)	[369]	{184}
Douglas	15,492	15,493	15,496	15,499	15,507	(3,101)	[744]	{372}	15,514	(3,103)	[745]	{372}	15,521	(3,104)	[745]	{372}
Fulton	98,548	98,587	98,613	98,629	98,675	(19,735)	[4,736]	{2,368}	98,718	(19,744)	[4,738]	{2,369}	98,756	(19,751)	[4,740]	{2,370}
Gwinnett	102,722	102,763	102,781	102,795	102,854	(20,571)	[4,937]	{2,468}	102,906	(20,581)	[4,940]	{2,470}	102,958	(20,592)	[4,942]	{2,471}
Hall	27,539	27,549	27,552	27,556	27,568	(5,514)	[1,323]	{662}	27,579	(5,516)	[1,324]	{662}	27,590	(5,518)	[1,324]	{662}
Henry	25,707	25,720	25,723	25,729	25,745	(5,149)	[1,236]	{618}	25,759	(5,152)	[1,236]	{618}	25,772	(5,154)	[1,237]	{619}
Lee	2,757	2,758	2,758	2,762	2,764	(553)	[133]	{66}	2,767	(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 or 850-519-7966 or Stephanie Tennyson at stephanie.tennyson@iem.com or 202-309-4257.