

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 5/19/21**

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 5/19/21 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.

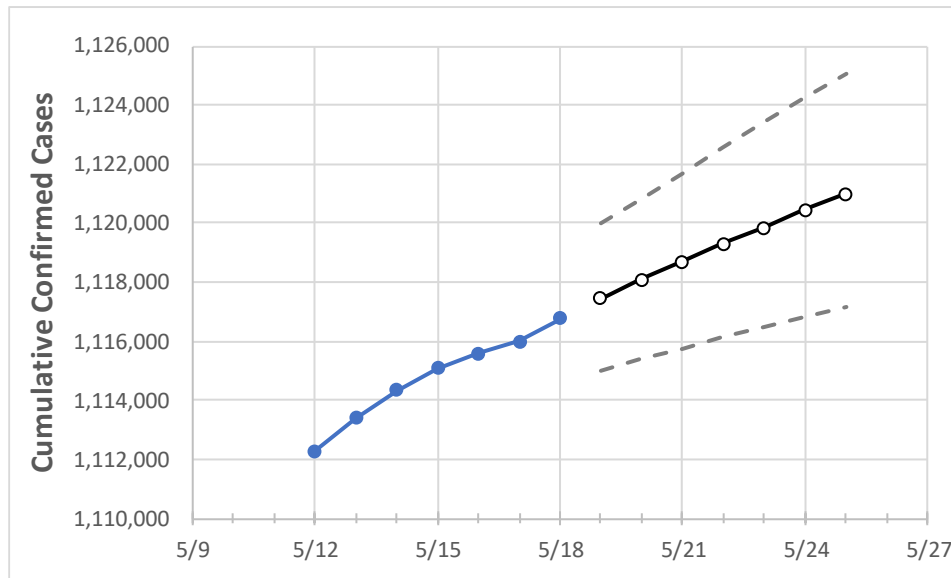
IEM's Modeling Lead

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:						
	5/15	5/16	5/17	5/18	5/19	5/20	5/21	5/22	5/23	5/24	5/25
Georgia	1,115,072	1,115,601	1,116,008	1,116,775	1,117,433	1,118,090	1,118,708	1,119,291	1,119,862	1,120,445	1,120,990

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:						
	5/15	5/16	5/17	5/18	5/19	5/20	5/21	5/22	5/23	5/24	5/25
Bartow	14,687	14,698	14,701	14,708	14,714	14,720	14,726	14,732	14,737	14,742	14,747
Carroll	11,398	11,406	11,409	11,412	11,418	11,423	11,428	11,433	11,438	11,443	11,448
Cherokee	31,131	31,146	31,150	31,170	31,188	31,205	31,221	31,237	31,253	31,268	31,283
Clarke	15,080	15,085	15,086	15,091	15,097	15,103	15,108	15,114	15,119	15,124	15,130
Clayton	26,862	26,881	26,898	26,919	26,946	26,972	26,999	27,025	27,049	27,074	27,097
Cobb	78,825	78,858	78,884	78,950	79,001	79,051	79,098	79,144	79,187	79,228	79,267
DeKalb	66,166	66,207	66,233	66,301	66,334	66,365	66,396	66,426	66,454	66,481	66,506
Dougherty	7,602	7,602	7,601	7,601	7,607	7,613	7,620	7,625	7,631	7,637	7,644
Douglas	15,297	15,306	15,316	15,327	15,340	15,352	15,364	15,376	15,387	15,398	15,409
Fulton	97,713	97,764	97,800	97,858	97,918	97,976	98,031	98,086	98,140	98,189	98,236
Gwinnett	101,819	101,863	101,892	101,951	101,994	102,034	102,074	102,112	102,148	102,182	102,216
Hall	27,345	27,352	27,359	27,369	27,383	27,396	27,410	27,422	27,435	27,447	27,459
Henry	25,398	25,415	25,428	25,445	25,465	25,484	25,503	25,521	25,539	25,557	25,575
Lee	2,750	2,750	2,749	2,750	2,753	2,755	2,758	2,761	2,763	2,766	2,769

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:											
	5/15	5/16	5/17	5/18	5/20				5/22				5/24			
Bartow	14,687	14,698	14,701	14,708	14,720	(2,944)	[707]	{353}	14,732	(2,946)	[707]	{354}	14,742	(2,948)	[708]	{354}
Carroll	11,398	11,406	11,409	11,412	11,423	(2,285)	[548]	{274}	11,433	(2,287)	[549]	{274}	11,443	(2,289)	[549]	{275}
Cherokee	31,131	31,146	31,150	31,170	31,205	(6,241)	[1,498]	{749}	31,237	(6,247)	[1,499]	{750}	31,268	(6,254)	[1,501]	{750}
Clarke	15,080	15,085	15,086	15,091	15,103	(3,021)	[725]	{362}	15,114	(3,023)	[725]	{363}	15,124	(3,025)	[726]	{363}
Clayton	26,862	26,881	26,898	26,919	26,972	(5,394)	[1,295]	{647}	27,025	(5,405)	[1,297]	{649}	27,074	(5,415)	[1,300]	{650}
Cobb	78,825	78,858	78,884	78,950	79,051	(15,810)	[3,794]	{1,897}	79,144	(15,829)	[3,799]	{1,899}	79,228	(15,846)	[3,803]	{1,901}
DeKalb	66,166	66,207	66,233	66,301	66,365	(13,273)	[3,186]	{1,593}	66,426	(13,285)	[3,188]	{1,594}	66,481	(13,296)	[3,191]	{1,596}
Dougherty	7,602	7,602	7,601	7,601	7,613	(1,523)	[365]	{183}	7,625	(1,525)	[366]	{183}	7,637	(1,527)	[367]	{183}
Douglas	15,297	15,306	15,316	15,327	15,352	(3,070)	[737]	{368}	15,376	(3,075)	[738]	{369}	15,398	(3,080)	[739]	{370}
Fulton	97,713	97,764	97,800	97,858	97,976	(19,595)	[4,703]	{2,351}	98,086	(19,617)	[4,708]	{2,354}	98,189	(19,638)	[4,713]	{2,357}
Gwinnett	101,819	101,863	101,892	101,951	102,034	(20,407)	[4,898]	{2,449}	102,112	(20,422)	[4,901]	{2,451}	102,182	(20,436)	[4,905]	{2,452}
Hall	27,345	27,352	27,359	27,369	27,396	(5,479)	[1,315]	{658}	27,422	(5,484)	[1,316]	{658}	27,447	(5,489)	[1,317]	{659}
Henry	25,398	25,415	25,428	25,445	25,484	(5,097)	[1,223]	{612}	25,521	(5,104)	[1,225]	{612}	25,557	(5,111)	[1,227]	{613}
Lee	2,750	2,750	2,749	2,750	2,755	(551)	[132]	{66}	2,761	(552)	[133]	{66}	2,766	(553)	[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.