

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 5/10/21**

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 5/10/21 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.

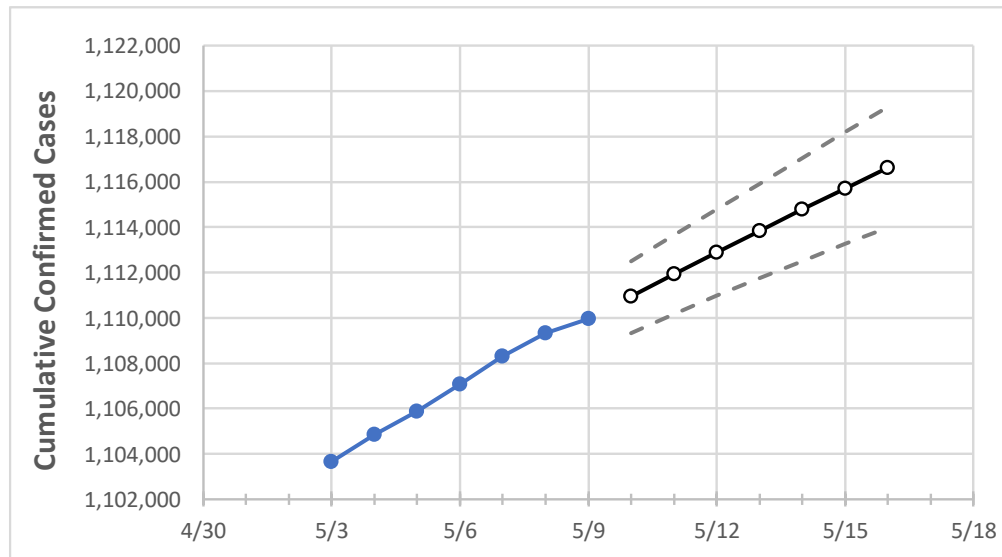
IEM's Modeling Lead

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:						
	5/6	5/7	5/8	5/9	5/10	5/11	5/12	5/13	5/14	5/15	5/16
Georgia	1,107,068	1,108,317	1,109,330	1,109,958	1,110,956	1,111,934	1,112,894	1,113,829	1,114,773	1,115,684	1,116,619

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:							
	5/6	5/7	5/8	5/9	5/10	5/11	5/12	5/13	5/14	5/15	5/16	
Bartow	14,609	14,622	14,629	14,636	14,643	14,650	14,656	14,662	14,668	14,674	14,680	
Carroll	11,330	11,341	11,350	11,354	11,362	11,370	11,378	11,386	11,393	11,400	11,408	
Cherokee	30,900	30,946	30,969	30,983	31,014	31,044	31,074	31,104	31,134	31,163	31,192	
Clarke	15,008	15,020	15,025	15,034	15,042	15,049	15,057	15,064	15,071	15,079	15,086	
Clayton	26,518	26,578	26,616	26,638	26,677	26,715	26,753	26,789	26,826	26,861	26,898	
Cobb	78,203	78,299	78,375	78,431	78,516	78,600	78,681	78,762	78,842	78,919	78,999	
DeKalb	65,674	65,748	65,809	65,851	65,949	66,047	66,142	66,238	66,333	66,427	66,520	
Dougherty	7,530	7,540	7,550	7,553	7,560	7,566	7,574	7,580	7,587	7,593	7,599	
Douglas	15,145	15,163	15,183	15,197	15,215	15,232	15,248	15,265	15,281	15,296	15,312	
Fulton	96,928	97,046	97,143	97,209	97,314	97,417	97,517	97,617	97,715	97,810	97,903	
Gwinnett	101,244	101,334	101,411	101,455	101,527	101,595	101,661	101,725	101,787	101,847	101,905	
Hall	27,161	27,194	27,231	27,242	27,267	27,292	27,318	27,343	27,369	27,394	27,421	
Henry	25,150	25,183	25,220	25,234	25,261	25,287	25,313	25,338	25,362	25,387	25,410	
Lee	2,729	2,732	2,735	2,735	2,739	2,743	2,747	2,751	2,756	2,761	2,766	

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:											
	5/6	5/7	5/8	5/9	5/11				5/13				5/15			
Bartow	14,609	14,622	14,629	14,636	14,650	(2,930)	[703]	{352}	14,662	(2,932)	[704]	{352}	14,674	(2,935)	[704]	{352}
Carroll	11,330	11,341	11,350	11,354	11,370	(2,274)	[546]	{273}	11,386	(2,277)	[547]	{273}	11,400	(2,280)	[547]	{274}
Cherokee	30,900	30,946	30,969	30,983	31,044	(6,209)	[1,490]	{745}	31,104	(6,221)	[1,493]	{746}	31,163	(6,233)	[1,496]	{748}
Clarke	15,008	15,020	15,025	15,034	15,049	(3,010)	[722]	{361}	15,064	(3,013)	[723]	{362}	15,079	(3,016)	[724]	{362}
Clayton	26,518	26,578	26,616	26,638	26,715	(5,343)	[1,282]	{641}	26,789	(5,358)	[1,286]	{643}	26,861	(5,372)	[1,289]	{645}
Cobb	78,203	78,299	78,375	78,431	78,600	(15,720)	[3,773]	{1,886}	78,762	(15,752)	[3,781]	{1,890}	78,919	(15,784)	[3,788]	{1,894}
DeKalb	65,674	65,748	65,809	65,851	66,047	(13,209)	[3,170]	{1,585}	66,238	(13,248)	[3,179]	{1,590}	66,427	(13,285)	[3,188]	{1,594}
Dougherty	7,530	7,540	7,550	7,553	7,566	(1,513)	[363]	{182}	7,580	(1,516)	[364]	{182}	7,593	(1,519)	[364]	{182}
Douglas	15,145	15,163	15,183	15,197	15,232	(3,046)	[731]	{366}	15,265	(3,053)	[733]	{366}	15,296	(3,059)	[734]	{367}
Fulton	96,928	97,046	97,143	97,209	97,417	(19,483)	[4,676]	{2,338}	97,617	(19,523)	[4,686]	{2,343}	97,810	(19,562)	[4,695]	{2,347}
Gwinnett	101,244	101,334	101,411	101,455	101,595	(20,319)	[4,877]	{2,438}	101,725	(20,345)	[4,883]	{2,441}	101,847	(20,369)	[4,889]	{2,444}
Hall	27,161	27,194	27,231	27,242	27,292	(5,458)	[1,310]	{655}	27,343	(5,469)	[1,312]	{656}	27,394	(5,479)	[1,315]	{657}
Henry	25,150	25,183	25,220	25,234	25,287	(5,057)	[1,214]	{607}	25,338	(5,068)	[1,216]	{608}	25,387	(5,077)	[1,219]	{609}
Lee	2,729	2,732	2,735	2,735	2,743	(549)	[132]	{66}	2,751	(550)	[132]	{66}	2,761	(552)	[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.