

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 3/11/22**

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 3/11/22 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.

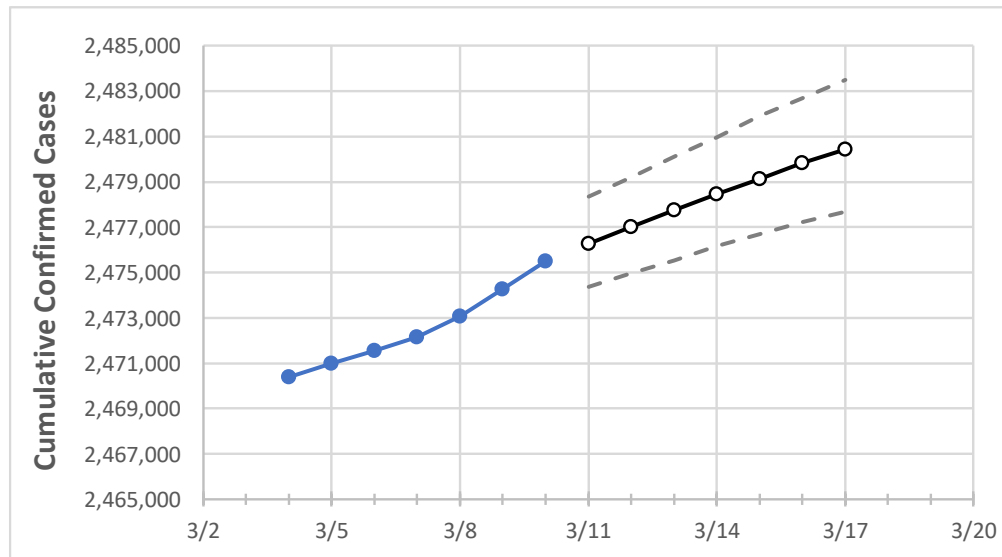
IEM's Modeling Lead

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:						
	3/7	3/8	3/9	3/10	3/11	3/12	3/13	3/14	3/15	3/16	3/17
Georgia	2,472,140	2,473,056	2,474,277	2,475,489	2,476,253	2,477,009	2,477,739	2,478,446	2,479,113	2,479,825	2,480,419

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:						
	3/7	3/8	3/9	3/10	3/11	3/12	3/13	3/14	3/15	3/16	3/17
Bartow	28,747	28,773	28,786	28,805	28,819	28,833	28,846	28,860	28,874	28,885	28,899
Carroll	23,596	23,599	23,603	23,606	23,609	23,611	23,613	23,616	23,618	23,620	23,621
Cherokee	62,726	62,708	62,693	62,697	62,706	62,714	62,722	62,729	62,736	62,743	62,750
Clarke	29,484	29,500	29,506	29,509	29,513	29,516	29,520	29,523	29,526	29,529	29,531
Clayton	63,170	63,186	63,201	63,213	63,225	63,236	63,247	63,257	63,267	63,278	63,287
Cobb	169,573	169,642	169,707	169,776	169,826	169,876	169,924	169,969	170,014	170,058	170,098
DeKalb	144,591	144,646	144,703	144,782	144,830	144,877	144,920	144,964	145,004	145,047	145,085
Dougherty	19,360	19,365	19,369	19,373	19,376	19,379	19,382	19,384	19,387	19,389	19,391
Douglas	34,613	34,619	34,625	34,629	34,635	34,640	34,645	34,650	34,655	34,659	34,664
Fulton	212,630	212,651	212,711	212,786	212,837	212,887	212,934	212,982	213,027	213,070	213,109
Gwinnett	205,507	205,546	205,584	205,620	205,665	205,705	205,743	205,780	205,817	205,852	205,885
Hall	53,076	53,077	53,076	53,086	53,094	53,102	53,108	53,115	53,122	53,128	53,134
Henry	57,333	57,348	57,375	57,388	57,404	57,418	57,432	57,448	57,460	57,474	57,487
Lee	7,196	7,200	7,201	7,200	7,201	7,203	7,204	7,205	7,206	7,207	7,208

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:											
	3/7	3/8	3/9	3/10	3/12				3/14				3/16			
Bartow	28,747	28,773	28,786	28,805	28,833	(5,767)	[1,384]	{692}	28,860	(5,772)	[1,385]	{693}	28,885	(5,777)	[1,387]	{693}
Carroll	23,596	23,599	23,603	23,606	23,611	(4,722)	[1,133]	{567}	23,616	(4,723)	[1,134]	{567}	23,620	(4,724)	[1,134]	{567}
Cherokee	62,726	62,708	62,693	62,697	62,714	(12,543)	[3,010]	{1,505}	62,729	(12,546)	[3,011]	{1,506}	62,743	(12,549)	[3,012]	{1,506}
Clarke	29,484	29,500	29,506	29,509	29,516	(5,903)	[1,417]	{708}	29,523	(5,905)	[1,417]	{709}	29,529	(5,906)	[1,417]	{709}
Clayton	63,170	63,186	63,201	63,213	63,236	(12,647)	[3,035]	{1,518}	63,257	(12,651)	[3,036]	{1,518}	63,278	(12,656)	[3,037]	{1,519}
Cobb	169,573	169,642	169,707	169,776	169,876	(33,975)	[8,154]	{4,077}	169,969	(33,994)	[8,158]	{4,079}	170,058	(34,012)	[8,163]	{4,081}
DeKalb	144,591	144,646	144,703	144,782	144,877	(28,975)	[6,954]	{3,477}	144,964	(28,993)	[6,958]	{3,479}	145,047	(29,009)	[6,962]	{3,481}
Dougherty	19,360	19,365	19,369	19,373	19,379	(3,876)	[930]	{465}	19,384	(3,877)	[930]	{465}	19,389	(3,878)	[931]	{465}
Douglas	34,613	34,619	34,625	34,629	34,640	(6,928)	[1,663]	{831}	34,650	(6,930)	[1,663]	{832}	34,659	(6,932)	[1,664]	{832}
Fulton	212,630	212,651	212,711	212,786	212,887	(42,577)	[10,219]	{5,109}	212,982	(42,596)	[10,223]	{5,112}	213,070	(42,614)	[10,227]	{5,114}
Gwinnett	205,507	205,546	205,584	205,620	205,705	(41,141)	[9,874]	{4,937}	205,780	(41,156)	[9,877]	{4,939}	205,852	(41,170)	[9,881]	{4,940}
Hall	53,076	53,077	53,076	53,086	53,102	(10,620)	[2,549]	{1,274}	53,115	(10,623)	[2,550]	{1,275}	53,128	(10,626)	[2,550]	{1,275}
Henry	57,333	57,348	57,375	57,388	57,418	(11,484)	[2,756]	{1,378}	57,448	(11,490)	[2,757]	{1,379}	57,474	(11,495)	[2,759]	{1,379}
Lee	7,196	7,200	7,201	7,200	7,203	(1,441)	[346]	{173}	7,205	(1,441)	[346]	{173}	7,207	(1,441)	[346]	{173}

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.