

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

Date: 2/25/22

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 2/25/22 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.

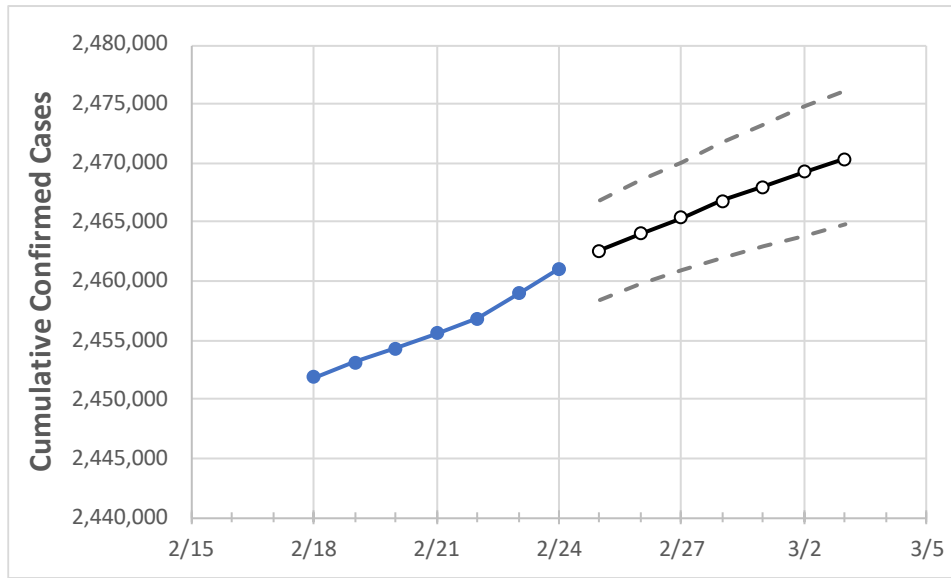
IEM's Modeling Lead

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:						
	2/21	2/22	2/23	2/24	2/25	2/26	2/27	2/28	3/1	3/2	3/3

Georgia 2,455,573 2,456,866 2,458,946 2,461,103 2,462,612 2,464,051 2,465,415 2,466,788 2,468,023 2,469,251 2,470,385

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:						
	2/21	2/22	2/23	2/24	2/25	2/26	2/27	2/28	3/1	3/2	3/3
Bartow	28,451	28,467	28,540	28,568	28,595	28,620	28,644	28,671	28,697	28,724	28,745
Carroll	23,505	23,524	23,536	23,549	23,561	23,572	23,583	23,593	23,603	23,613	23,622
Cherokee	62,488	62,509	62,523	62,565	62,591	62,614	62,637	62,658	62,678	62,698	62,716
Clarke	29,408	29,414	29,427	29,435	29,446	29,455	29,465	29,473	29,481	29,489	29,497
Clayton	62,871	62,896	62,943	62,979	63,007	63,033	63,059	63,085	63,111	63,135	63,154
Cobb	168,542	168,623	168,755	168,910	169,011	169,101	169,190	169,272	169,353	169,430	169,500
DeKalb	143,473	143,552	143,767	143,927	144,037	144,144	144,242	144,345	144,439	144,531	144,614
Dougherty	19,255	19,277	19,282	19,314	19,324	19,332	19,341	19,349	19,357	19,364	19,371
Douglas	34,461	34,476	34,494	34,509	34,521	34,533	34,544	34,554	34,564	34,573	34,582
Fulton	211,299	211,426	211,625	211,783	211,910	212,033	212,150	212,263	212,371	212,478	212,577
Gwinnett	204,410	204,490	204,615	204,788	204,893	204,994	205,090	205,178	205,273	205,362	205,436
Hall	52,850	52,868	52,907	52,938	52,965	52,990	53,016	53,037	53,058	53,081	53,100
Henry	57,004	57,030	57,068	57,095	57,128	57,158	57,188	57,219	57,244	57,272	57,298
Lee	7,157	7,159	7,165	7,176	7,180	7,184	7,188	7,191	7,195	7,198	7,201

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:											
	2/21	2/22	2/23	2/24	2/26				2/28				3/2			
Bartow	28,451	28,467	28,540	28,568	28,620	(5,724)	[1,374]	{687}	28,671	(5,734)	[1,376]	{688}	28,724	(5,745)	[1,379]	{689}
Carroll	23,505	23,524	23,536	23,549	23,572	(4,714)	[1,131]	{566}	23,593	(4,719)	[1,132]	{566}	23,613	(4,723)	[1,133]	{567}
Cherokee	62,488	62,509	62,523	62,565	62,614	(12,523)	[3,005]	{1,503}	62,658	(12,532)	[3,008]	{1,504}	62,698	(12,540)	[3,010]	{1,505}
Clarke	29,408	29,414	29,427	29,435	29,455	(5,891)	[1,414]	{707}	29,473	(5,895)	[1,415]	{707}	29,489	(5,898)	[1,415]	{708}
Clayton	62,871	62,896	62,943	62,979	63,033	(12,607)	[3,026]	{1,513}	63,085	(12,617)	[3,028]	{1,514}	63,135	(12,627)	[3,030]	{1,515}
Cobb	168,542	168,623	168,755	168,910	169,101	(33,820)	[8,117]	{4,058}	169,272	(33,854)	[8,125]	{4,063}	169,430	(33,886)	[8,133]	{4,066}
DeKalb	143,473	143,552	143,767	143,927	144,144	(28,829)	[6,919]	{3,459}	144,345	(28,869)	[6,929]	{3,464}	144,531	(28,906)	[6,938]	{3,469}
Dougherty	19,255	19,277	19,282	19,314	19,332	(3,866)	[928]	{464}	19,349	(3,870)	[929]	{464}	19,364	(3,873)	[929]	{465}
Douglas	34,461	34,476	34,494	34,509	34,533	(6,907)	[1,658]	{829}	34,554	(6,911)	[1,659]	{829}	34,573	(6,915)	[1,660]	{830}
Fulton	211,299	211,426	211,625	211,783	212,033	(42,407)	[10,178]	{5,089}	212,263	(42,453)	[10,189]	{5,094}	212,478	(42,496)	[10,199]	{5,099}
Gwinnett	204,410	204,490	204,615	204,788	204,994	(40,999)	[9,840]	{4,920}	205,178	(41,036)	[9,849]	{4,924}	205,362	(41,072)	[9,857]	{4,929}
Hall	52,850	52,868	52,907	52,938	52,990	(10,598)	[2,544]	{1,272}	53,037	(10,607)	[2,546]	{1,273}	53,081	(10,616)	[2,548]	{1,274}
Henry	57,004	57,030	57,068	57,095	57,158	(11,432)	[2,744]	{1,372}	57,219	(11,444)	[2,746]	{1,373}	57,272	(11,454)	[2,749]	{1,375}
Lee	7,157	7,159	7,165	7,176	7,184	(1,437)	[345]	{172}	7,191	(1,438)	[345]	{173}	7,198	(1,440)	[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.