

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

Date: 3/15/22

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 3/15/22 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.

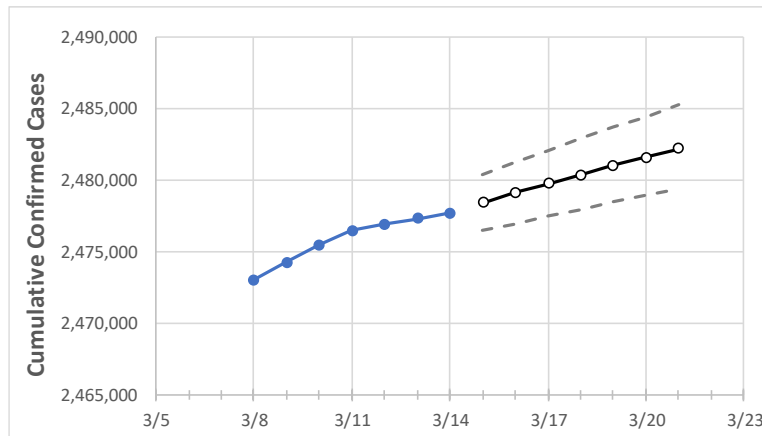
IEM's Modeling Lead

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:						
	3/11	3/12	3/13	3/14	3/15	3/16	3/17	3/18	3/19	3/20	3/21
Georgia	2,476,516	2,476,923	2,477,330	2,477,737	2,478,436	2,479,144	2,479,785	2,480,397	2,481,037	2,481,616	2,482,198

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:						
	3/11	3/12	3/13	3/14	3/15	3/16	3/17	3/18	3/19	3/20	3/21
Bartow	28,819	28,826	28,833	28,840	28,853	28,864	28,875	28,887	28,897	28,907	28,918
Carroll	23,607	23,608	23,610	23,611	23,613	23,614	23,615	23,617	23,618	23,619	23,620
Cherokee	62,717	62,723	62,730	62,736	62,743	62,750	62,756	62,762	62,768	62,774	62,779
Clarke	29,517	29,518	29,518	29,519	29,522	29,525	29,528	29,531	29,533	29,536	29,538
Clayton	63,222	63,230	63,237	63,245	63,255	63,263	63,271	63,278	63,286	63,293	63,300
Cobb	169,837	169,860	169,883	169,906	169,947	169,988	170,026	170,064	170,101	170,137	170,171
DeKalb	144,827	144,854	144,881	144,908	144,946	144,983	145,017	145,050	145,085	145,115	145,147
Dougherty	19,378	19,380	19,381	19,383	19,386	19,389	19,391	19,394	19,397	19,399	19,401
Douglas	34,632	34,635	34,637	34,640	34,644	34,647	34,650	34,653	34,657	34,659	34,662
Fulton	212,869	212,905	212,942	212,978	213,023	213,067	213,108	213,148	213,187	213,224	213,261
Gwinnett	205,646	205,679	205,711	205,744	205,779	205,813	205,844	205,876	205,905	205,934	205,962
Hall	53,081	53,084	53,086	53,089	53,093	53,096	53,099	53,102	53,105	53,108	53,110
Henry	57,404	57,412	57,419	57,427	57,438	57,450	57,460	57,470	57,480	57,490	57,499
Lee	7,200	7,200	7,200	7,200	7,201	7,203	7,204	7,205	7,207	7,208	7,209

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:											
	3/11	3/12	3/13	3/14	3/16				3/18				3/20			
Bartow	28,819	28,826	28,833	28,840	28,864	(5,773)	[1,385]	{693}	28,887	(5,777)	[1,387]	{693}	28,907	(5,781)	[1,388]	{694}
Carroll	23,607	23,608	23,610	23,611	23,614	(4,723)	[1,133]	{567}	23,617	(4,723)	[1,134]	{567}	23,619	(4,724)	[1,134]	{567}
Cherokee	62,717	62,723	62,730	62,736	62,750	(12,550)	[3,012]	{1,506}	62,762	(12,552)	[3,013]	{1,506}	62,774	(12,555)	[3,013]	{1,507}
Clarke	29,517	29,518	29,518	29,519	29,525	(5,905)	[1,417]	{709}	29,531	(5,906)	[1,417]	{709}	29,536	(5,907)	[1,418]	{709}
Clayton	63,222	63,230	63,237	63,245	63,263	(12,653)	[3,037]	{1,518}	63,278	(12,656)	[3,037]	{1,519}	63,293	(12,659)	[3,038]	{1,519}
Cobb	169,837	169,860	169,883	169,906	169,988	(33,998)	[8,159]	{4,080}	170,064	(34,013)	[8,163]	{4,082}	170,137	(34,027)	[8,167]	{4,083}
DeKalb	144,827	144,854	144,881	144,908	144,983	(28,997)	[6,959]	{3,480}	145,050	(29,010)	[6,962]	{3,481}	145,115	(29,023)	[6,966]	{3,483}
Dougherty	19,378	19,380	19,381	19,383	19,389	(3,878)	[931]	{465}	19,394	(3,879)	[931]	{465}	19,399	(3,880)	[931]	{466}
Douglas	34,632	34,635	34,637	34,640	34,647	(6,929)	[1,663]	{832}	34,653	(6,931)	[1,663]	{832}	34,659	(6,932)	[1,664]	{832}
Fulton	212,869	212,905	212,942	212,978	213,067	(42,613)	[10,227]	{5,114}	213,148	(42,630)	[10,231]	{5,116}	213,224	(42,645)	[10,235]	{5,117}
Gwinnett	205,646	205,679	205,711	205,744	205,813	(41,163)	[9,879]	{4,940}	205,876	(41,175)	[9,882]	{4,941}	205,934	(41,187)	[9,885]	{4,942}
Hall	53,081	53,084	53,086	53,089	53,096	(10,619)	[2,549]	{1,274}	53,102	(10,620)	[2,549]	{1,274}	53,108	(10,622)	[2,549]	{1,275}
Henry	57,404	57,412	57,419	57,427	57,450	(11,490)	[2,758]	{1,379}	57,470	(11,494)	[2,759]	{1,379}	57,490	(11,498)	[2,760]	{1,380}
Lee	7,200	7,200	7,200	7,200	7,203	(1,441)	[346]	{173}	7,205	(1,441)	[346]	{173}	7,208	(1,442)	[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.