

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

Date: 3/2/22

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 3/2/22 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.

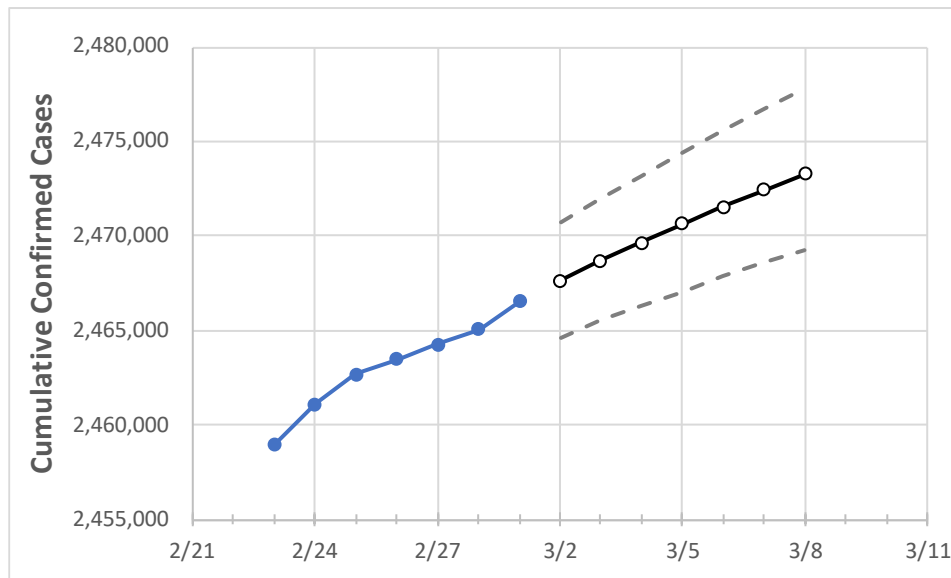
IEM's Modeling Lead

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:						
	2/26	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8
Georgia	2,463,461	2,464,258	2,465,056	2,466,525	2,467,630	2,468,680	2,469,662	2,470,655	2,471,549	2,472,436	2,473,273

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:							
	2/26	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	
Bartow	28,600	28,611	28,621	28,640	28,662	28,684	28,705	28,725	28,744	28,765	28,784	
Carroll	23,566	23,571	23,575	23,578	23,587	23,595	23,602	23,610	23,618	23,625	23,631	
Cherokee	62,600	62,617	62,633	62,658	62,676	62,694	62,710	62,725	62,739	62,754	62,767	
Clarke	29,448	29,453	29,457	29,466	29,473	29,480	29,486	29,492	29,497	29,503	29,508	
Clayton	63,022	63,038	63,054	63,082	63,104	63,126	63,146	63,168	63,186	63,208	63,224	
Cobb	169,047	169,103	169,159	169,230	169,296	169,360	169,422	169,481	169,533	169,586	169,638	
DeKalb	144,047	144,107	144,166	144,240	144,319	144,399	144,475	144,545	144,617	144,682	144,757	
Dougherty	19,323	19,325	19,328	19,333	19,339	19,345	19,351	19,356	19,361	19,366	19,371	
Douglas	34,537	34,548	34,560	34,572	34,582	34,592	34,601	34,610	34,618	34,626	34,633	
Fulton	211,957	212,039	212,120	212,186	212,279	212,364	212,445	212,528	212,605	212,681	212,749	
Gwinnett	204,923	204,975	205,028	205,099	205,176	205,250	205,318	205,384	205,448	205,509	205,565	
Hall	52,993	53,011	53,028	53,037	53,057	53,075	53,093	53,110	53,126	53,143	53,158	
Henry	57,139	57,154	57,170	57,228	57,257	57,284	57,308	57,332	57,357	57,380	57,404	
Lee	7,179	7,180	7,181	7,184	7,187	7,189	7,192	7,194	7,196	7,198	7,200	

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:											
	2/26	2/27	2/28	3/1	3/3				3/5				3/7			
Bartow	28,600	28,611	28,621	28,640	28,684	(5,737)	[1,377]	{688}	28,725	(5,745)	[1,379]	{689}	28,765	(5,753)	[1,381]	{690}
Carroll	23,566	23,571	23,575	23,578	23,595	(4,719)	[1,133]	{566}	23,610	(4,722)	[1,133]	{567}	23,625	(4,725)	[1,134]	{567}
Cherokee	62,600	62,617	62,633	62,658	62,694	(12,539)	[3,009]	{1,505}	62,725	(12,545)	[3,011]	{1,505}	62,754	(12,551)	[3,012]	{1,506}
Clarke	29,448	29,453	29,457	29,466	29,480	(5,896)	[1,415]	{708}	29,492	(5,898)	[1,416]	{708}	29,503	(5,901)	[1,416]	{708}
Clayton	63,022	63,038	63,054	63,082	63,126	(12,625)	[3,030]	{1,515}	63,168	(12,634)	[3,032]	{1,516}	63,208	(12,642)	[3,034]	{1,517}
Cobb	169,047	169,103	169,159	169,230	169,360	(33,872)	[8,129]	{4,065}	169,481	(33,896)	[8,135]	{4,068}	169,586	(33,917)	[8,140]	{4,070}
DeKalb	144,047	144,107	144,166	144,240	144,399	(28,880)	[6,931]	{3,466}	144,545	(28,909)	[6,938]	{3,469}	144,682	(28,936)	[6,945]	{3,472}
Dougherty	19,323	19,325	19,328	19,333	19,345	(3,869)	[929]	{464}	19,356	(3,871)	[929]	{465}	19,366	(3,873)	[930]	{465}
Douglas	34,537	34,548	34,560	34,572	34,592	(6,918)	[1,660]	{830}	34,610	(6,922)	[1,661]	{831}	34,626	(6,925)	[1,662]	{831}
Fulton	211,957	212,039	212,120	212,186	212,364	(42,473)	[10,193]	{5,097}	212,528	(42,506)	[10,201]	{5,101}	212,681	(42,536)	[10,209]	{5,104}
Gwinnett	204,923	204,975	205,028	205,099	205,250	(41,050)	[9,852]	{4,926}	205,384	(41,077)	[9,858]	{4,929}	205,509	(41,102)	[9,864]	{4,932}
Hall	52,993	53,011	53,028	53,037	53,075	(10,615)	[2,548]	{1,274}	53,110	(10,622)	[2,549]	{1,275}	53,143	(10,629)	[2,551]	{1,275}
Henry	57,139	57,154	57,170	57,228	57,284	(11,457)	[2,750]	{1,375}	57,332	(11,466)	[2,752]	{1,376}	57,380	(11,476)	[2,754]	{1,377}
Lee	7,179	7,180	7,181	7,184	7,189	(1,438)	[345]	{173}	7,194	(1,439)	[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.