

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 3/26/21**

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 3/26/21 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.

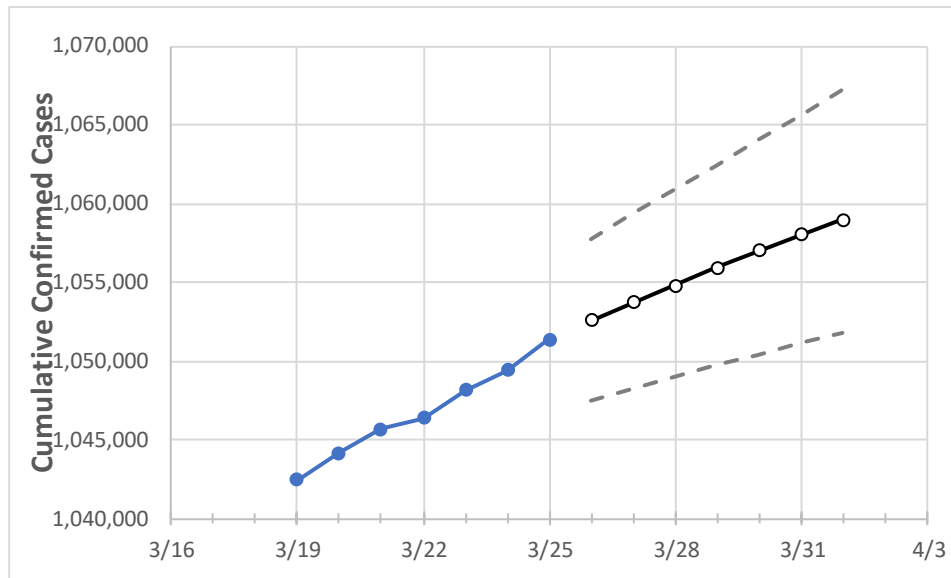
IEM's Modeling Lead

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:						
	3/22	3/23	3/24	3/25	3/26	3/27	3/28	3/29	3/30	3/31	4/1
Georgia	1,046,382	1,048,173	1,049,397	1,051,361	1,052,558	1,053,685	1,054,801	1,055,922	1,056,995	1,058,010	1,058,978

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:						
	3/22	3/23	3/24	3/25	3/26	3/27	3/28	3/29	3/30	3/31	4/1
Bartow	13,712	13,740	13,764	13,795	13,822	13,850	13,877	13,904	13,931	13,958	13,984
Carroll	10,794	10,800	10,818	10,841	10,850	10,858	10,867	10,875	10,884	10,893	10,901
Cherokee	28,895	28,984	29,034	29,137	29,204	29,271	29,338	29,404	29,470	29,536	29,603
Clarke	14,488	14,507	14,522	14,536	14,546	14,555	14,564	14,573	14,582	14,590	14,598
Clayton	24,361	24,402	24,442	24,533	24,576	24,618	24,662	24,704	24,745	24,785	24,828
Cobb	72,784	72,906	73,037	73,225	73,350	73,475	73,596	73,719	73,840	73,961	74,078
DeKalb	60,055	60,216	60,319	60,506	60,627	60,750	60,873	60,996	61,116	61,237	61,359
Dougherty	7,174	7,178	7,182	7,186	7,190	7,193	7,196	7,199	7,203	7,205	7,208
Douglas	14,034	14,056	14,071	14,111	14,130	14,149	14,167	14,185	14,202	14,220	14,237
Fulton	90,247	90,465	90,646	90,857	91,012	91,168	91,323	91,473	91,623	91,773	91,918
Gwinnett	95,659	95,835	95,944	96,112	96,214	96,314	96,412	96,508	96,601	96,692	96,779
Hall	26,108	26,143	26,167	26,203	26,224	26,244	26,265	26,285	26,305	26,325	26,345
Henry	23,277	23,316	23,342	23,425	23,465	23,504	23,540	23,575	23,611	23,645	23,676
Lee	2,643	2,644	2,646	2,652	2,653	2,655	2,656	2,657	2,658	2,659	2,660

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:											
	3/22	3/23	3/24	3/25	3/27				3/29				3/31			
Bartow	13,712	13,740	13,764	13,795	13,850	(2,770)	[665]	{332}	13,904	(2,781)	[667]	{334}	13,958	(2,792)	[670]	{335}
Carroll	10,794	10,800	10,818	10,841	10,858	(2,172)	[521]	{261}	10,875	(2,175)	[522]	{261}	10,893	(2,179)	[523]	{261}
Cherokee	28,895	28,984	29,034	29,137	29,271	(5,854)	[1,405]	{703}	29,404	(5,881)	[1,411]	{706}	29,536	(5,907)	[1,418]	{709}
Clarke	14,488	14,507	14,522	14,536	14,555	(2,911)	[699]	{349}	14,573	(2,915)	[700]	{350}	14,590	(2,918)	[700]	{350}
Clayton	24,361	24,402	24,442	24,533	24,618	(4,924)	[1,182]	{591}	24,704	(4,941)	[1,186]	{593}	24,785	(4,957)	[1,190]	{595}
Cobb	72,784	72,906	73,037	73,225	73,475	(14,695)	[3,527]	{1,763}	73,719	(14,744)	[3,539]	{1,769}	73,961	(14,792)	[3,550]	{1,775}
DeKalb	60,055	60,216	60,319	60,506	60,750	(12,150)	[2,916]	{1,458}	60,996	(12,199)	[2,928]	{1,464}	61,237	(12,247)	[2,939]	{1,470}
Dougherty	7,174	7,178	7,182	7,186	7,193	(1,439)	[345]	{173}	7,199	(1,440)	[346]	{173}	7,205	(1,441)	[346]	{173}
Douglas	14,034	14,056	14,071	14,111	14,149	(2,830)	[679]	{340}	14,185	(2,837)	[681]	{340}	14,220	(2,844)	[683]	{341}
Fulton	90,247	90,465	90,646	90,857	91,168	(18,234)	[4,376]	{2,188}	91,473	(18,295)	[4,391]	{2,195}	91,773	(18,355)	[4,405]	{2,203}
Gwinnett	95,659	95,835	95,944	96,112	96,314	(19,263)	[4,623]	{2,312}	96,508	(19,302)	[4,632]	{2,316}	96,692	(19,338)	[4,641]	{2,321}
Hall	26,108	26,143	26,167	26,203	26,244	(5,249)	[1,260]	{630}	26,285	(5,257)	[1,262]	{631}	26,325	(5,265)	[1,264]	{632}
Henry	23,277	23,316	23,342	23,425	23,504	(4,701)	[1,128]	{564}	23,575	(4,715)	[1,132]	{566}	23,645	(4,729)	[1,135]	{567}
Lee	2,643	2,644	2,646	2,652	2,655	(531)	[127]	{64}	2,657	(531)	[128]	{64}	2,659	(532)	[128]	{64}

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.