

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 3/11/21**

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 3/11/21 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.

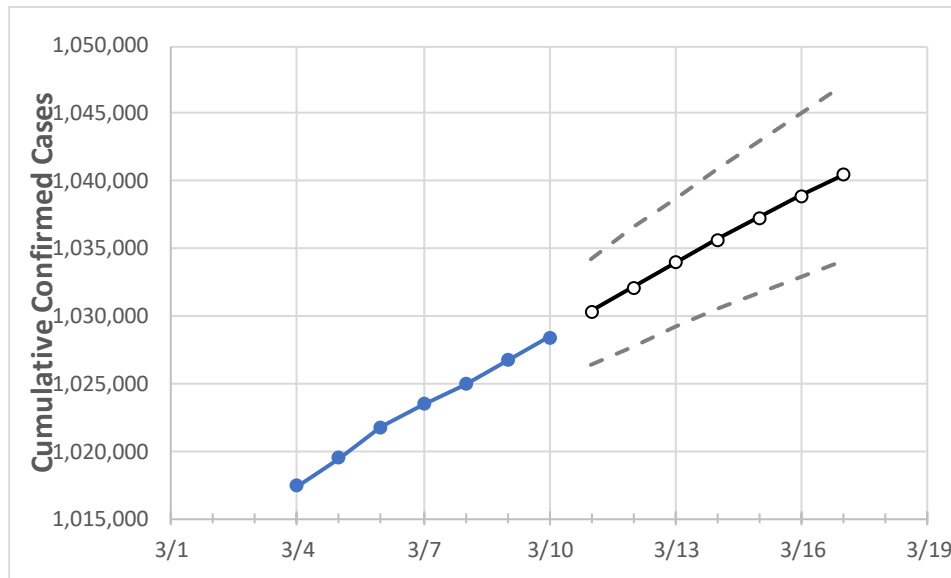
IEM's Modeling Lead

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:						
	3/7	3/8	3/9	3/10	3/11	3/12	3/13	3/14	3/15	3/16	3/17
Georgia	1,023,487	1,024,931	1,026,692	1,028,432	1,030,316	1,032,127	1,033,918	1,035,653	1,037,299	1,038,898	1,040,434

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	13,233	13,257	13,288	13,323	13,349	13,374	13,399	13,421	13,443	13,463	13,483
Carroll	10,643	10,650	10,660	10,669	10,679	10,688	10,696	10,704	10,711	10,718	10,725
Cherokee	27,924	27,956	28,042	28,116	28,180	28,241	28,296	28,353	28,409	28,460	28,510
Clarke	14,273	14,289	14,306	14,339	14,360	14,381	14,402	14,422	14,442	14,462	14,482
Clayton	23,654	23,706	23,757	23,822	23,873	23,923	23,972	24,018	24,064	24,107	24,150
Cobb	70,781	70,920	71,071	71,190	71,339	71,486	71,629	71,769	71,908	72,041	72,172
DeKalb	58,143	58,234	58,357	58,493	58,633	58,769	58,904	59,036	59,165	59,292	59,416
Dougherty	7,100	7,103	7,113	7,112	7,117	7,122	7,126	7,131	7,135	7,139	7,142
Douglas	13,689	13,704	13,736	13,774	13,806	13,838	13,869	13,899	13,927	13,956	13,984
Fulton	87,609	87,833	88,018	88,208	88,473	88,738	88,995	89,253	89,508	89,768	90,018
Gwinnett	93,720	93,839	94,044	94,189	94,373	94,548	94,720	94,886	95,046	95,204	95,362
Hall	25,728	25,753	25,787	25,822	25,852	25,881	25,909	25,936	25,963	25,989	26,013
Henry	22,398	22,502	22,549	22,597	22,696	22,793	22,889	22,984	23,079	23,174	23,269
Lee	2,610	2,614	2,617	2,622	2,626	2,630	2,633	2,637	2,640	2,644	2,647

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	13,233	13,257	13,288	13,323	13,374	(2,675)	[642]	{321}	13,421	(2,684)	[644]	{322}	13,463	(2,693)	[646]	{323}
Carroll	10,643	10,650	10,660	10,669	10,688	(2,138)	[513]	{257}	10,704	(2,141)	[514]	{257}	10,718	(2,144)	[514]	{257}
Cherokee	27,924	27,956	28,042	28,116	28,241	(5,648)	[1,356]	{678}	28,353	(5,671)	[1,361]	{680}	28,460	(5,692)	[1,366]	{683}
Clarke	14,273	14,289	14,306	14,339	14,381	(2,876)	[690]	{345}	14,422	(2,884)	[692]	{346}	14,462	(2,892)	[694]	{347}
Clayton	23,654	23,706	23,757	23,822	23,923	(4,785)	[1,148]	{574}	24,018	(4,804)	[1,153]	{576}	24,107	(4,821)	[1,157]	{579}
Cobb	70,781	70,920	71,071	71,190	71,486	(14,297)	[3,431]	{1,716}	71,769	(14,354)	[3,445]	{1,722}	72,041	(14,408)	[3,458]	{1,729}
DeKalb	58,143	58,234	58,357	58,493	58,769	(11,754)	[2,821]	{1,410}	59,036	(11,807)	[2,834]	{1,417}	59,292	(11,858)	[2,846]	{1,423}
Dougherty	7,100	7,103	7,113	7,112	7,122	(1,424)	[342]	{171}	7,131	(1,426)	[342]	{171}	7,139	(1,428)	[343]	{171}
Douglas	13,689	13,704	13,736	13,774	13,838	(2,768)	[664]	{332}	13,899	(2,780)	[667]	{334}	13,956	(2,791)	[670]	{335}
Fulton	87,609	87,833	88,018	88,208	88,738	(17,748)	[4,259]	{2,130}	89,253	(17,851)	[4,284]	{2,142}	89,768	(17,954)	[4,309]	{2,154}
Gwinnett	93,720	93,839	94,044	94,189	94,548	(18,910)	[4,538]	{2,269}	94,886	(18,977)	[4,555]	{2,277}	95,204	(19,041)	[4,570]	{2,285}
Hall	25,728	25,753	25,787	25,822	25,881	(5,176)	[1,242]	{621}	25,936	(5,187)	[1,245]	{622}	25,989	(5,198)	[1,247]	{624}
Henry	22,398	22,502	22,549	22,597	22,793	(4,559)	[1,094]	{547}	22,984	(4,597)	[1,103]	{552}	23,174	(4,635)	[1,112]	{556}
Lee	2,610	2,614	2,617	2,622	2,630	(526)	[126]	{63}	2,637	(527)	[127]	{63}	2,644	(529)	[127]	{63}

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.