

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 10/27/21**

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 10/27/21 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.

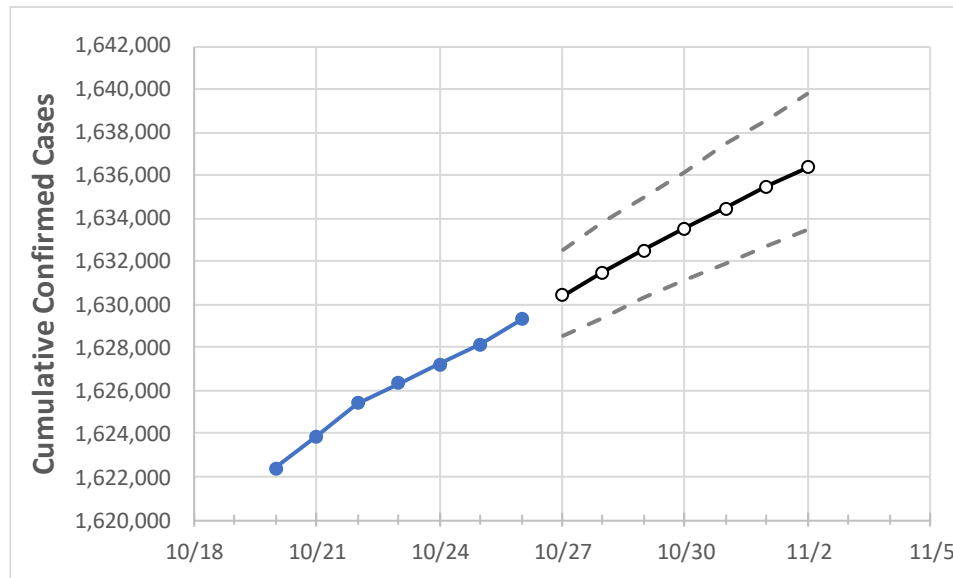
IEM's Modeling Lead

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:						
	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1	11/2
Georgia	1,626,321	1,627,244	1,628,166	1,629,337	1,630,431	1,631,499	1,632,530	1,633,531	1,634,474	1,635,491	1,636,374

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:						
	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1	11/2
Bartow	20,308	20,319	20,331	20,346	20,357	20,367	20,377	20,387	20,396	20,405	20,413
Carroll	16,314	16,321	16,329	16,332	16,339	16,347	16,354	16,361	16,368	16,375	16,382
Cherokee	43,174	43,197	43,220	43,240	43,262	43,284	43,306	43,327	43,347	43,367	43,386
Clarke	19,965	19,974	19,983	19,986	19,997	20,007	20,017	20,026	20,036	20,046	20,055
Clayton	39,055	39,081	39,107	39,138	39,166	39,194	39,221	39,247	39,273	39,299	39,321
Cobb	108,616	108,690	108,763	108,843	108,920	108,996	109,069	109,143	109,214	109,284	109,354
DeKalb	90,986	91,045	91,103	91,179	91,245	91,307	91,367	91,429	91,487	91,545	91,597
Dougherty	12,357	12,362	12,368	12,378	12,386	12,395	12,402	12,410	12,417	12,424	12,431
Douglas	22,180	22,186	22,193	22,201	22,212	22,223	22,233	22,243	22,252	22,262	22,270
Fulton	131,333	131,404	131,476	131,559	131,634	131,706	131,775	131,843	131,908	131,974	132,037
Gwinnett	132,473	132,535	132,598	132,737	132,818	132,900	132,976	133,051	133,124	133,188	133,255
Hall	37,753	37,779	37,806	37,848	37,889	37,928	37,969	38,009	38,047	38,086	38,122
Henry	37,880	37,917	37,954	37,975	38,007	38,038	38,068	38,099	38,129	38,157	38,186
Lee	4,670	4,672	4,675	4,676	4,681	4,687	4,692	4,697	4,702	4,708	4,714

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:											
	10/23	10/24	10/25	10/26	10/28				10/30				11/1			
Bartow	20,308	20,319	20,331	20,346	20,367	(4,073)	[978]	{489}	20,387	(4,077)	[979]	{489}	20,405	(4,081)	[979]	{490}
Carroll	16,314	16,321	16,329	16,332	16,347	(3,269)	[785]	{392}	16,361	(3,272)	[785]	{393}	16,375	(3,275)	[786]	{393}
Cherokee	43,174	43,197	43,220	43,240	43,284	(8,657)	[2,078]	{1,039}	43,327	(8,665)	[2,080]	{1,040}	43,367	(8,673)	[2,082]	{1,041}
Clarke	19,965	19,974	19,983	19,986	20,007	(4,001)	[960]	{480}	20,026	(4,005)	[961]	{481}	20,046	(4,009)	[962]	{481}
Clayton	39,055	39,081	39,107	39,138	39,194	(7,839)	[1,881]	{941}	39,247	(7,849)	[1,884]	{942}	39,299	(7,860)	[1,886]	{943}
Cobb	108,616	108,690	108,763	108,843	108,996	(21,799)	[5,232]	{2,616}	109,143	(21,829)	[5,239]	{2,619}	109,284	(21,857)	[5,246]	{2,623}
DeKalb	90,986	91,045	91,103	91,179	91,307	(18,261)	[4,383]	{2,191}	91,429	(18,286)	[4,389]	{2,194}	91,545	(18,309)	[4,394]	{2,197}
Dougherty	12,357	12,362	12,368	12,378	12,395	(2,479)	[595]	{297}	12,410	(2,482)	[596]	{298}	12,424	(2,485)	[596]	{298}
Douglas	22,180	22,186	22,193	22,201	22,223	(4,445)	[1,067]	{533}	22,243	(4,449)	[1,068]	{534}	22,262	(4,452)	[1,069]	{534}
Fulton	131,333	131,404	131,476	131,559	131,706	(26,341)	[6,322]	{3,161}	131,843	(26,369)	[6,328]	{3,164}	131,974	(26,395)	[6,335]	{3,167}
Gwinnett	132,473	132,535	132,598	132,737	132,900	(26,580)	[6,379]	{3,190}	133,051	(26,610)	[6,386]	{3,193}	133,188	(26,638)	[6,393]	{3,197}
Hall	37,753	37,779	37,806	37,848	37,928	(7,586)	[1,821]	{910}	38,009	(7,602)	[1,824]	{912}	38,086	(7,617)	[1,828]	{914}
Henry	37,880	37,917	37,954	37,975	38,038	(7,608)	[1,826]	{913}	38,099	(7,620)	[1,829]	{914}	38,157	(7,631)	[1,832]	{916}
Lee	4,670	4,672	4,675	4,676	4,687	(937)	[225]	{112}	4,697	(939)	[225]	{113}	4,708	(942)	[226]	{113}

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.