

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 10/18/21**

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 10/18/21 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.

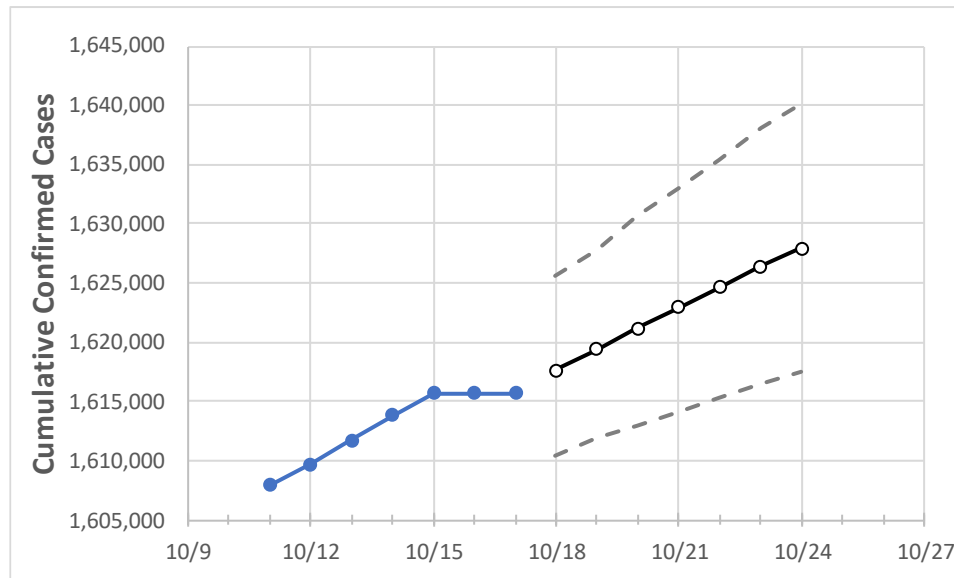
IEM's Modeling Lead

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:						
	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21	10/22	10/23	10/24
Georgia	1,613,794	1,615,699	1,615,699	1,615,699	1,617,590	1,619,390	1,621,143	1,622,970	1,624,663	1,626,405	1,627,947

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:						
	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21	10/22	10/23	10/24
Bartow	20,185	20,201	20,201	20,201	20,226	20,250	20,273	20,295	20,318	20,341	20,364
Carroll	16,223	16,235	16,235	16,235	16,248	16,259	16,270	16,281	16,292	16,304	16,314
Cherokee	42,912	42,949	42,949	42,949	42,993	43,032	43,073	43,115	43,153	43,194	43,226
Clarke	19,840	19,863	19,863	19,863	19,876	19,889	19,901	19,912	19,923	19,935	19,945
Clayton	38,731	38,797	38,797	38,797	38,845	38,890	38,935	38,980	39,023	39,067	39,106
Cobb	107,780	107,875	107,875	107,875	108,020	108,150	108,293	108,442	108,566	108,718	108,851
DeKalb	90,214	90,367	90,367	90,367	90,494	90,628	90,756	90,874	90,999	91,117	91,235
Dougherty	12,248	12,270	12,270	12,270	12,288	12,305	12,321	12,338	12,354	12,370	12,384
Douglas	22,015	22,051	22,051	22,051	22,084	22,118	22,153	22,184	22,220	22,255	22,286
Fulton	130,452	130,608	130,608	130,608	130,759	130,921	131,047	131,203	131,346	131,502	131,621
Gwinnett	131,478	131,649	131,649	131,649	131,863	132,056	132,256	132,452	132,642	132,843	133,023
Hall	37,309	37,376	37,376	37,376	37,434	37,488	37,540	37,591	37,647	37,699	37,748
Henry	37,541	37,585	37,585	37,585	37,627	37,669	37,707	37,745	37,784	37,822	37,860
Lee	4,607	4,615	4,615	4,615	4,620	4,624	4,628	4,633	4,637	4,641	4,645

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:											
	10/14	10/15	10/16	10/17	10/19				10/21				10/23			
Bartow	20,185	20,201	20,201	20,201	20,250	(4,050)	[972]	{486}	20,295	(4,059)	[974]	{487}	20,341	(4,068)	[976]	{488}
Carroll	16,223	16,235	16,235	16,235	16,259	(3,252)	[780]	{390}	16,281	(3,256)	[782]	{391}	16,304	(3,261)	[783]	{391}
Cherokee	42,912	42,949	42,949	42,949	43,032	(8,606)	[2,066]	{1,033}	43,115	(8,623)	[2,070]	{1,035}	43,194	(8,639)	[2,073]	{1,037}
Clarke	19,840	19,863	19,863	19,863	19,889	(3,978)	[955]	{477}	19,912	(3,982)	[956]	{478}	19,935	(3,987)	[957]	{478}
Clayton	38,731	38,797	38,797	38,797	38,890	(7,778)	[1,867]	{933}	38,980	(7,796)	[1,871]	{936}	39,067	(7,813)	[1,875]	{938}
Cobb	107,780	107,875	107,875	107,875	108,150	(21,630)	[5,191]	{2,596}	108,442	(21,688)	[5,205]	{2,603}	108,718	(21,744)	[5,218]	{2,609}
DeKalb	90,214	90,367	90,367	90,367	90,628	(18,126)	[4,350]	{2,175}	90,874	(18,175)	[4,362]	{2,181}	91,117	(18,223)	[4,374]	{2,187}
Dougherty	12,248	12,270	12,270	12,270	12,305	(2,461)	[591]	{295}	12,338	(2,468)	[592]	{296}	12,370	(2,474)	[594]	{297}
Douglas	22,015	22,051	22,051	22,051	22,118	(4,424)	[1,062]	{531}	22,184	(4,437)	[1,065]	{532}	22,255	(4,451)	[1,068]	{534}
Fulton	130,452	130,608	130,608	130,608	130,921	(26,184)	[6,284]	{3,142}	131,203	(26,241)	[6,298]	{3,149}	131,502	(26,300)	[6,312]	{3,156}
Gwinnett	131,478	131,649	131,649	131,649	132,056	(26,411)	[6,339]	{3,169}	132,452	(26,490)	[6,358]	{3,179}	132,843	(26,569)	[6,376]	{3,188}
Hall	37,309	37,376	37,376	37,376	37,488	(7,498)	[1,799]	{900}	37,591	(7,518)	[1,804]	{902}	37,699	(7,540)	[1,810]	{905}
Henry	37,541	37,585	37,585	37,585	37,669	(7,534)	[1,808]	{904}	37,745	(7,549)	[1,812]	{906}	37,822	(7,564)	[1,815]	{908}
Lee	4,607	4,615	4,615	4,615	4,624	(925)	[222]	{111}	4,633	(927)	[222]	{111}	4,641	(928)	[223]	{111}

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.