

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 10/20/20**

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 10/20/20 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.

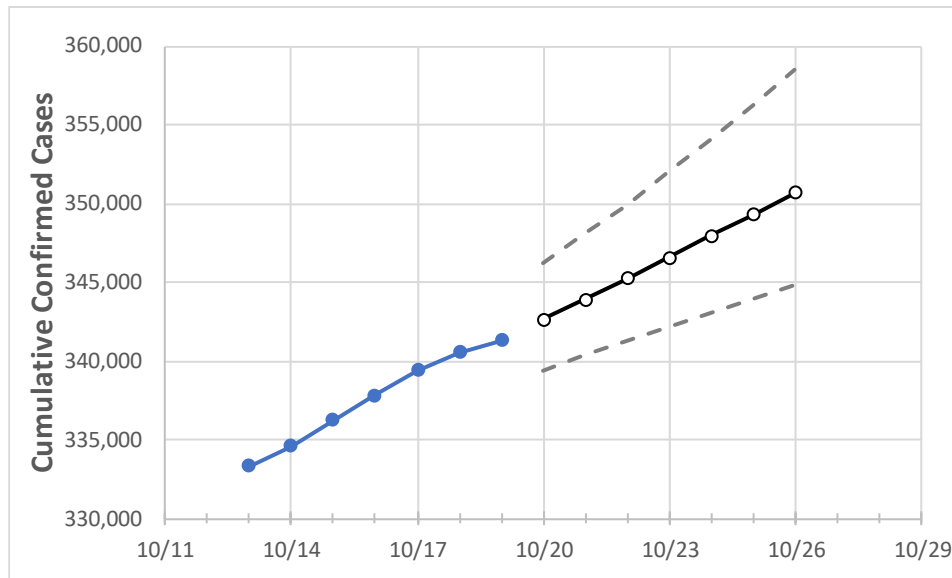
IEM's Modeling Lead

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:						
	10/16	10/17	10/18	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26
Georgia	337,850	339,384	340,558	341,310	342,610	343,922	345,246	346,582	347,931	349,292	350,665

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 20%, and are often within 10%, of actual confirmed cases.

Georgia Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	10/16	10/17	10/18	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26
Bartow	3,284	3,325	3,350	3,367	3,397	3,428	3,461	3,495	3,530	3,568	3,607
Carroll	3,126	3,147	3,170	3,184	3,211	3,238	3,267	3,297	3,328	3,361	3,394
Cherokee	6,680	6,715	6,746	6,756	6,789	6,822	6,856	6,890	6,924	6,958	6,993
Clarke	5,517	5,533	5,551	5,551	5,568	5,584	5,600	5,617	5,633	5,649	5,665
Clayton	7,754	7,799	7,842	7,859	7,905	7,951	7,996	8,041	8,085	8,130	8,174
Cobb	21,041	21,118	21,158	21,196	21,275	21,355	21,435	21,516	21,598	21,680	21,762
DeKalb	20,088	20,182	20,275	20,306	20,377	20,449	20,520	20,592	20,664	20,736	20,808
Dougherty	3,251	3,254	3,262	3,267	3,273	3,279	3,285	3,291	3,298	3,305	3,312
Douglas	3,911	3,933	3,945	3,948	3,960	3,971	3,982	3,993	4,004	4,014	4,024
Fulton	29,562	29,678	29,819	29,885	29,998	30,112	30,228	30,345	30,464	30,585	30,707
Gwinnett	29,418	29,558	29,689	29,748	29,873	29,999	30,129	30,260	30,394	30,530	30,668
Hall	10,233	10,309	10,331	10,345	10,390	10,435	10,481	10,528	10,576	10,625	10,674
Henry	5,816	5,853	5,905	5,936	5,975	6,016	6,057	6,099	6,142	6,185	6,230
Lee	734	737	738	739	740	741	743	744	745	746	747

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:											
	10/16	10/17	10/18	10/19	10/21				10/23				10/25			
Bartow	3,284	3,325	3,350	3,367	3,428	(686)	[165]	{82}	3,495	(699)	[168]	{84}	3,568	(714)	[171]	{86}
Carroll	3,126	3,147	3,170	3,184	3,238	(648)	[155]	{78}	3,297	(659)	[158]	{79}	3,361	(672)	[161]	{81}
Cherokee	6,680	6,715	6,746	6,756	6,822	(1,364)	[327]	{164}	6,890	(1,378)	[331]	{165}	6,958	(1,392)	[334]	{167}
Clarke	5,517	5,533	5,551	5,551	5,584	(1,117)	[268]	{134}	5,617	(1,123)	[270]	{135}	5,649	(1,130)	[271]	{136}
Clayton	7,754	7,799	7,842	7,859	7,951	(1,590)	[382]	{191}	8,041	(1,608)	[386]	{193}	8,130	(1,626)	[390]	{195}
Cobb	21,041	21,118	21,158	21,196	21,355	(4,271)	[1,025]	{513}	21,516	(4,303)	[1,033]	{516}	21,680	(4,336)	[1,041]	{520}
DeKalb	20,088	20,182	20,275	20,306	20,449	(4,090)	[982]	{491}	20,592	(4,118)	[988]	{494}	20,736	(4,147)	[995]	{498}
Dougherty	3,251	3,254	3,262	3,267	3,279	(656)	[157]	{79}	3,291	(658)	[158]	{79}	3,305	(661)	[159]	{79}
Douglas	3,911	3,933	3,945	3,948	3,971	(794)	[191]	{95}	3,993	(799)	[192]	{96}	4,014	(803)	[193]	{96}
Fulton	29,562	29,678	29,819	29,885	30,112	(6,022)	[1,445]	{723}	30,345	(6,069)	[1,457]	{728}	30,585	(6,117)	[1,468]	{734}
Gwinnett	29,418	29,558	29,689	29,748	29,999	(6,000)	[1,440]	{720}	30,260	(6,052)	[1,452]	{726}	30,530	(6,106)	[1,465]	{733}
Hall	10,233	10,309	10,331	10,345	10,435	(2,087)	[501]	{250}	10,528	(2,106)	[505]	{253}	10,625	(2,125)	[510]	{255}
Henry	5,816	5,853	5,905	5,936	6,016	(1,203)	[289]	{144}	6,099	(1,220)	[293]	{146}	6,185	(1,237)	[297]	{148}
Lee	734	737	738	739	741	(148)	[36]	{18}	744	(149)	[36]	{18}	746	(149)	[36]	{18}

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.