

IEM's AI Modeling: Short-term COVID-19 Projections

Date: 6/28/21

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 6/28/21 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.

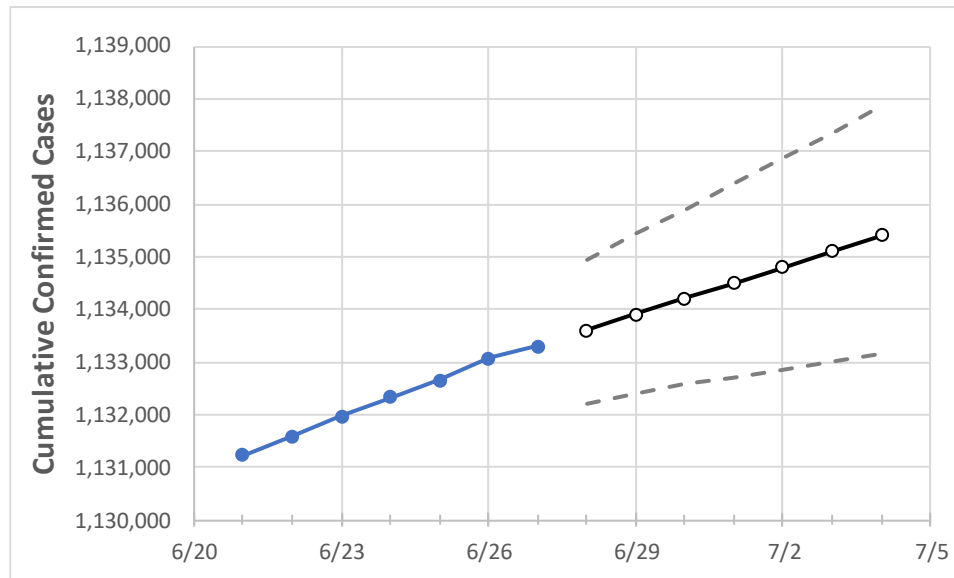
IEM's Modeling Lead

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:						
	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4
Georgia	1,132,329	1,132,661	1,133,063	1,133,291	1,133,597	1,133,903	1,134,212	1,134,502	1,134,804	1,135,103	1,135,402

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:						
	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4
Bartow	14,932	14,939	14,944	14,947	14,952	14,958	14,963	14,968	14,974	14,979	14,984
Carroll	11,552	11,556	11,563	11,568	11,572	11,576	11,580	11,584	11,588	11,592	11,597
Cherokee	31,530	31,541	31,548	31,554	31,561	31,567	31,574	31,580	31,587	31,593	31,600
Clarke	15,199	15,200	15,204	15,205	15,207	15,209	15,211	15,213	15,215	15,217	15,219
Clayton	27,456	27,465	27,476	27,485	27,495	27,505	27,515	27,525	27,534	27,544	27,554
Cobb	80,103	80,113	80,136	80,162	80,182	80,202	80,221	80,241	80,260	80,279	80,298
DeKalb	67,204	67,226	67,258	67,275	67,298	67,321	67,345	67,368	67,391	67,415	67,438
Dougherty	7,700	7,699	7,700	7,700	7,702	7,703	7,705	7,706	7,707	7,709	7,710
Douglas	15,581	15,584	15,593	15,601	15,606	15,610	15,615	15,620	15,624	15,629	15,634
Fulton	99,185	99,207	99,245	99,264	99,295	99,326	99,357	99,388	99,420	99,451	99,481
Gwinnett	103,168	103,181	103,217	103,252	103,271	103,289	103,308	103,326	103,344	103,361	103,378
Hall	27,764	27,770	27,772	27,772	27,775	27,778	27,781	27,784	27,786	27,789	27,791
Henry	25,933	25,939	25,944	25,946	25,955	25,963	25,971	25,979	25,988	25,996	26,003
Lee	2,761	2,761	2,761	2,761	2,762	2,762	2,763	2,763	2,764	2,765	2,765

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:											
	6/24	6/25	6/26	6/27	6/29				7/1				7/3			
Bartow	14,932	14,939	14,944	14,947	14,958	(2,992)	[718]	{359}	14,968	(2,994)	[718]	{359}	14,979	(2,996)	[719]	{359}
Carroll	11,552	11,556	11,563	11,568	11,576	(2,315)	[556]	{278}	11,584	(2,317)	[556]	{278}	11,592	(2,318)	[556]	{278}
Cherokee	31,530	31,541	31,548	31,554	31,567	(6,313)	[1,515]	{758}	31,580	(6,316)	[1,516]	{758}	31,593	(6,319)	[1,516]	{758}
Clarke	15,199	15,200	15,204	15,205	15,209	(3,042)	[730]	{365}	15,213	(3,043)	[730]	{365}	15,217	(3,043)	[730]	{365}
Clayton	27,456	27,465	27,476	27,485	27,505	(5,501)	[1,320]	{660}	27,525	(5,505)	[1,321]	{661}	27,544	(5,509)	[1,322]	{661}
Cobb	80,103	80,113	80,136	80,162	80,202	(16,040)	[3,850]	{1,925}	80,241	(16,048)	[3,852]	{1,926}	80,279	(16,056)	[3,853]	{1,927}
DeKalb	67,204	67,226	67,258	67,275	67,321	(13,464)	[3,231]	{1,616}	67,368	(13,474)	[3,234]	{1,617}	67,415	(13,483)	[3,236]	{1,618}
Dougherty	7,700	7,699	7,700	7,700	7,703	(1,541)	[370]	{185}	7,706	(1,541)	[370]	{185}	7,709	(1,542)	[370]	{185}
Douglas	15,581	15,584	15,593	15,601	15,610	(3,122)	[749]	{375}	15,620	(3,124)	[750]	{375}	15,629	(3,126)	[750]	{375}
Fulton	99,185	99,207	99,245	99,264	99,326	(19,865)	[4,768]	{2,384}	99,388	(19,878)	[4,771]	{2,385}	99,451	(19,890)	[4,774]	{2,387}
Gwinnett	103,168	103,181	103,217	103,252	103,289	(20,658)	[4,958]	{2,479}	103,326	(20,665)	[4,960]	{2,480}	103,361	(20,672)	[4,961]	{2,481}
Hall	27,764	27,770	27,772	27,772	27,778	(5,556)	[1,333]	{667}	27,784	(5,557)	[1,334]	{667}	27,789	(5,558)	[1,334]	{667}
Henry	25,933	25,939	25,944	25,946	25,963	(5,193)	[1,246]	{623}	25,979	(5,196)	[1,247]	{624}	25,996	(5,199)	[1,248]	{624}
Lee	2,761	2,761	2,761	2,761	2,762	(552)	[133]	{66}	2,763	(553)	[133]	{66}	2,765	(553)	[133]	{66}

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.