

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 8/13/21**

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 8/13/21 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.

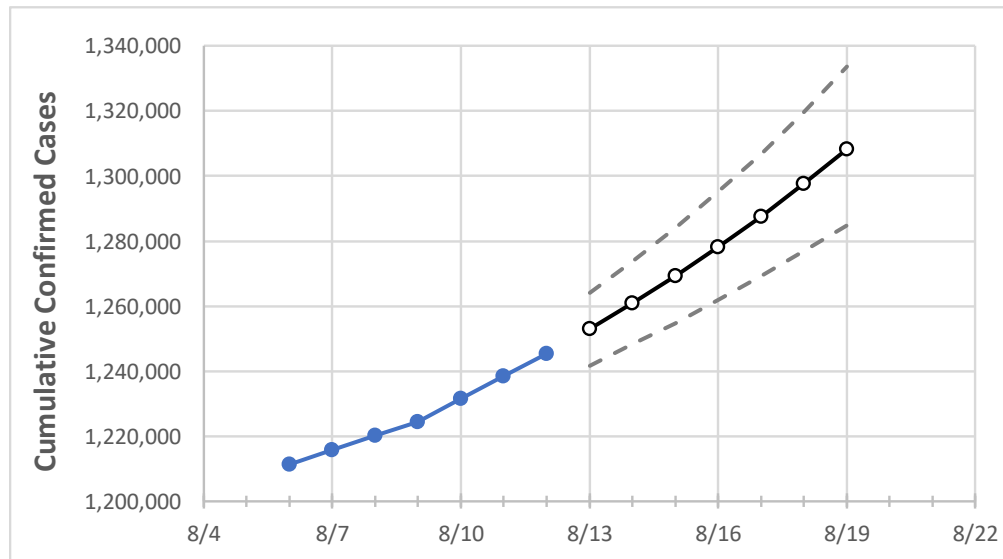
IEM's Modeling Lead

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:						
	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17	8/18	8/19
Georgia	1,224,480	1,231,425	1,238,383	1,245,399	1,252,912	1,260,865	1,269,292	1,278,171	1,287,642	1,297,656	1,308,156

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:						
	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17	8/18	8/19
Bartow	15,810	15,854	15,958	16,016	16,079	16,145	16,214	16,287	16,363	16,444	16,530
Carroll	12,569	12,635	12,688	12,718	12,786	12,858	12,930	13,007	13,087	13,170	13,257
Cherokee	33,420	33,601	33,740	33,923	34,101	34,291	34,496	34,717	34,954	35,208	35,476
Clarke	15,993	16,032	16,087	16,148	16,211	16,277	16,348	16,423	16,504	16,590	16,681
Clayton	29,723	29,831	30,037	30,190	30,351	30,518	30,696	30,884	31,078	31,278	31,492
Cobb	85,601	85,902	86,301	86,729	87,132	87,553	88,001	88,477	88,986	89,512	90,068
DeKalb	72,054	72,397	72,670	72,987	73,353	73,740	74,146	74,574	75,031	75,513	76,014
Dougherty	8,429	8,464	8,532	8,610	8,684	8,764	8,850	8,943	9,044	9,155	9,273
Douglas	16,850	16,947	17,014	17,092	17,175	17,262	17,353	17,449	17,547	17,650	17,760
Fulton	106,767	107,186	107,627	108,040	108,558	109,094	109,654	110,250	110,867	111,510	112,194
Gwinnett	108,238	108,585	108,862	109,093	109,412	109,752	110,105	110,476	110,866	111,273	111,701
Hall	29,099	29,212	29,321	29,407	29,514	29,626	29,745	29,871	30,006	30,148	30,299
Henry	28,347	28,499	28,656	28,856	29,028	29,209	29,399	29,600	29,813	30,033	30,263
Lee	3,143	3,170	3,201	3,241	3,275	3,310	3,349	3,390	3,435	3,482	3,533

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:											
	8/9	8/10	8/11	8/12	8/14				8/16				8/18			
Bartow	15,810	15,854	15,958	16,016	16,145	(3,229)	[775]	{387}	16,287	(3,257)	[782]	{391}	16,444	(3,289)	[789]	{395}
Carroll	12,569	12,635	12,688	12,718	12,858	(2,572)	[617]	{309}	13,007	(2,601)	[624]	{312}	13,170	(2,634)	[632]	{316}
Cherokee	33,420	33,601	33,740	33,923	34,291	(6,858)	[1,646]	{823}	34,717	(6,943)	[1,666]	{833}	35,208	(7,042)	[1,690]	{845}
Clarke	15,993	16,032	16,087	16,148	16,277	(3,255)	[781]	{391}	16,423	(3,285)	[788]	{394}	16,590	(3,318)	[796]	{398}
Clayton	29,723	29,831	30,037	30,190	30,518	(6,104)	[1,465]	{732}	30,884	(6,177)	[1,482]	{741}	31,278	(6,256)	[1,501]	{751}
Cobb	85,601	85,902	86,301	86,729	87,553	(17,511)	[4,203]	{2,101}	88,477	(17,695)	[4,247]	{2,123}	89,512	(17,902)	[4,297]	{2,148}
DeKalb	72,054	72,397	72,670	72,987	73,740	(14,748)	[3,540]	{1,770}	74,574	(14,915)	[3,580]	{1,790}	75,513	(15,103)	[3,625]	{1,812}
Dougherty	8,429	8,464	8,532	8,610	8,764	(1,753)	[421]	{210}	8,943	(1,789)	[429]	{215}	9,155	(1,831)	[439]	{220}
Douglas	16,850	16,947	17,014	17,092	17,262	(3,452)	[829]	{414}	17,449	(3,490)	[838]	{419}	17,650	(3,530)	[847]	{424}
Fulton	106,767	107,186	107,627	108,040	109,094	(21,819)	[5,237]	{2,618}	110,250	(22,050)	[5,292]	{2,646}	111,510	(22,302)	[5,352]	{2,676}
Gwinnett	108,238	108,585	108,862	109,093	109,752	(21,950)	[5,268]	{2,634}	110,476	(22,095)	[5,303]	{2,651}	111,273	(22,255)	[5,341]	{2,671}
Hall	29,099	29,212	29,321	29,407	29,626	(5,925)	[1,422]	{711}	29,871	(5,974)	[1,434]	{717}	30,148	(6,030)	[1,447]	{724}
Henry	28,347	28,499	28,656	28,856	29,209	(5,842)	[1,402]	{701}	29,600	(5,920)	[1,421]	{710}	30,033	(6,007)	[1,442]	{721}
Lee	3,143	3,170	3,201	3,241	3,310	(662)	[159]	{79}	3,390	(678)	[163]	{81}	3,482	(696)	[167]	{84}

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.