

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

Date: 9/27/21

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 9/27/21 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.**

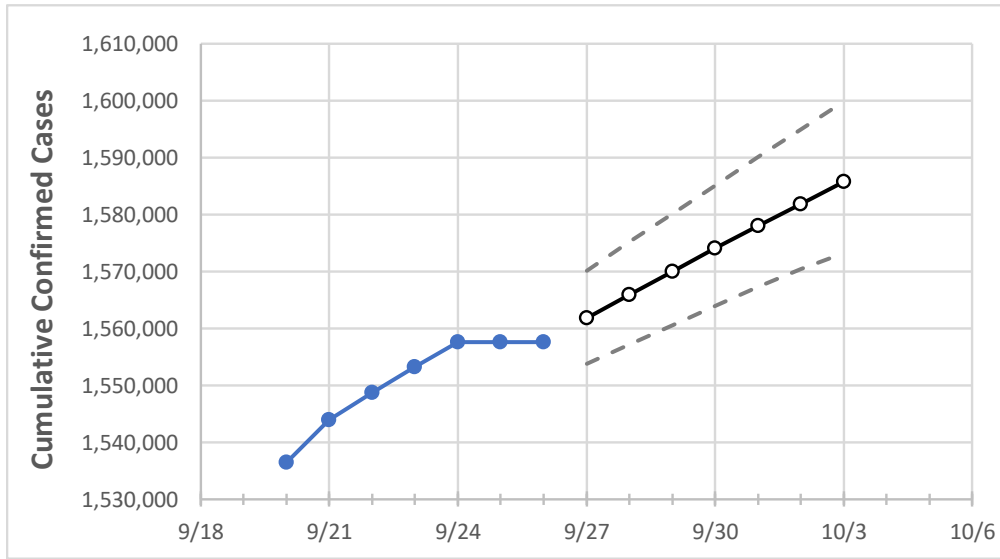
### IEM's Modeling Lead

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:						
	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3
Georgia	1,553,236	1,557,536	1,557,536	1,557,536	1,561,852	1,565,978	1,570,055	1,574,116	1,578,062	1,581,893	1,585,767

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:						
	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3
Bartow	19,412	19,465	19,465	19,465	19,512	19,557	19,602	19,644	19,686	19,727	19,767
Carroll	15,806	15,842	15,842	15,842	15,880	15,916	15,951	15,985	16,019	16,054	16,085
Cherokee	41,592	41,683	41,683	41,683	41,775	41,870	41,960	42,044	42,130	42,215	42,294
Clarke	19,332	19,366	19,366	19,366	19,407	19,448	19,491	19,531	19,568	19,609	19,647
Clayton	37,135	37,336	37,336	37,336	37,508	37,696	37,889	38,077	38,261	38,480	38,677
Cobb	104,001	104,252	104,252	104,252	104,533	104,807	105,071	105,337	105,599	105,868	106,111
DeKalb	86,194	86,420	86,420	86,420	86,676	86,941	87,182	87,433	87,675	87,926	88,169
Dougherty	11,631	11,665	11,665	11,665	11,696	11,727	11,755	11,783	11,810	11,836	11,860
Douglas	21,186	21,225	21,225	21,225	21,274	21,322	21,368	21,413	21,457	21,499	21,541
Fulton	126,038	126,299	126,299	126,299	126,640	126,980	127,338	127,665	128,003	128,361	128,683
Gwinnett	125,042	125,362	125,362	125,362	125,775	126,170	126,550	126,977	127,370	127,775	128,175
Hall	35,737	35,850	35,850	35,850	35,960	36,067	36,169	36,278	36,378	36,482	36,573
Henry	36,118	36,233	36,233	36,233	36,332	36,432	36,530	36,623	36,720	36,812	36,904
Lee	4,457	4,472	4,472	4,472	4,481	4,489	4,497	4,505	4,513	4,521	4,528

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:											
	9/23	9/24	9/25	9/26	9/28				9/30				10/2			
Bartow	19,412	19,465	19,465	19,465	19,557	(3,911)	[939]	{469}	19,644	(3,929)	[943]	{471}	19,727	(3,945)	[947]	{473}
Carroll	15,806	15,842	15,842	15,842	15,916	(3,183)	[764]	{382}	15,985	(3,197)	[767]	{384}	16,054	(3,211)	[771]	{385}
Cherokee	41,592	41,683	41,683	41,683	41,870	(8,374)	[2,010]	{1,005}	42,044	(8,409)	[2,018]	{1,009}	42,215	(8,443)	[2,026]	{1,013}
Clarke	19,332	19,366	19,366	19,366	19,448	(3,890)	[933]	{467}	19,531	(3,906)	[938]	{469}	19,609	(3,922)	[941]	{471}
Clayton	37,135	37,336	37,336	37,336	37,696	(7,539)	[1,809]	{905}	38,077	(7,615)	[1,828]	{914}	38,480	(7,696)	[1,847]	{924}
Cobb	104,001	104,252	104,252	104,252	104,807	(20,961)	[5,031]	{2,515}	105,337	(21,067)	[5,056]	{2,528}	105,868	(21,174)	[5,082]	{2,541}
DeKalb	86,194	86,420	86,420	86,420	86,941	(17,388)	[4,173]	{2,087}	87,433	(17,487)	[4,197]	{2,098}	87,926	(17,585)	[4,220]	{2,110}
Dougherty	11,631	11,665	11,665	11,665	11,727	(2,345)	[563]	{281}	11,783	(2,357)	[566]	{283}	11,836	(2,367)	[568]	{284}
Douglas	21,186	21,225	21,225	21,225	21,322	(4,264)	[1,023]	{512}	21,413	(4,283)	[1,028]	{514}	21,499	(4,300)	[1,032]	{516}
Fulton	126,038	126,299	126,299	126,299	126,980	(25,396)	[6,095]	{3,048}	127,665	(25,533)	[6,128]	{3,064}	128,361	(25,672)	[6,161]	{3,081}
Gwinnett	125,042	125,362	125,362	125,362	126,170	(25,234)	[6,056]	{3,028}	126,977	(25,395)	[6,095]	{3,047}	127,775	(25,555)	[6,133]	{3,067}
Hall	35,737	35,850	35,850	35,850	36,067	(7,213)	[1,731]	{866}	36,278	(7,256)	[1,741]	{871}	36,482	(7,296)	[1,751]	{876}
Henry	36,118	36,233	36,233	36,233	36,432	(7,286)	[1,749]	{874}	36,623	(7,325)	[1,758]	{879}	36,812	(7,362)	[1,767]	{883}
Lee	4,457	4,472	4,472	4,472	4,489	(898)	[215]	{108}	4,505	(901)	[216]	{108}	4,521	(904)	[217]	{108}

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966 or Stephanie Tennyson at [stephanie.tennyson@iem.com](mailto:stephanie.tennyson@iem.com) or 202-309-4257.