

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 2/18/22**

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 2/18/22 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.

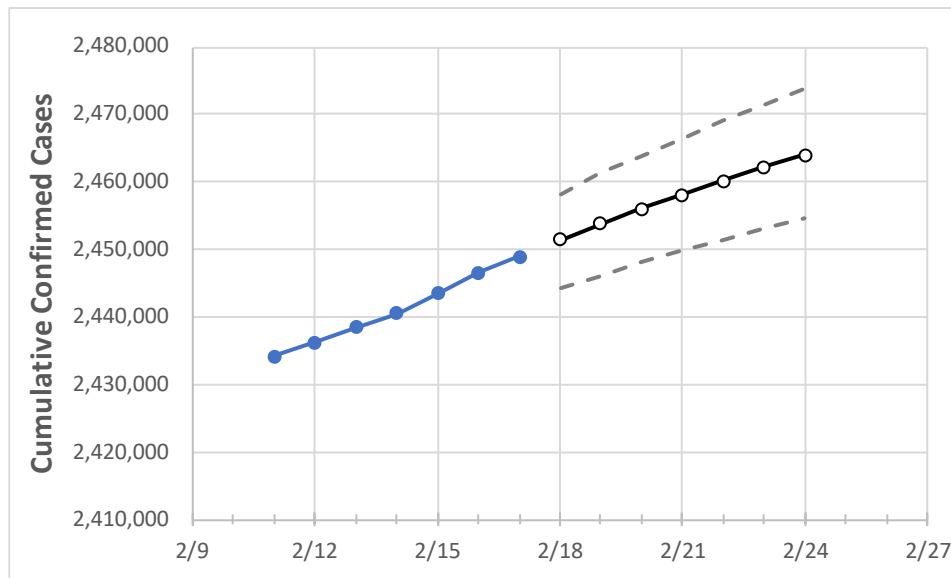
IEM's Modeling Lead

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:						
	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22	2/23	2/24
Georgia	2,440,543	2,443,410	2,446,525	2,448,939	2,451,445	2,453,757	2,456,024	2,458,162	2,460,193	2,462,219	2,464,060

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:						
	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22	2/23	2/24
Bartow	28,198	28,226	28,322	28,348	28,373	28,399	28,423	28,446	28,468	28,489	28,511
Carroll	23,388	23,402	23,421	23,436	23,454	23,472	23,488	23,504	23,519	23,535	23,547
Cherokee	62,229	62,264	62,303	62,338	62,388	62,435	62,479	62,523	62,562	62,602	62,639
Clarke	29,284	29,308	29,334	29,355	29,374	29,392	29,409	29,425	29,439	29,455	29,467
Clayton	62,565	62,606	62,670	62,731	62,771	62,808	62,846	62,879	62,913	62,943	62,972
Cobb	167,634	167,864	168,013	168,122	168,284	168,445	168,590	168,738	168,872	169,008	169,133
DeKalb	142,436	142,666	142,823	142,944	143,084	143,223	143,351	143,469	143,597	143,710	143,820
Dougherty	19,166	19,192	19,215	19,225	19,261	19,290	19,317	19,345	19,370	19,401	19,423
Douglas	34,337	34,358	34,382	34,406	34,433	34,460	34,484	34,507	34,529	34,552	34,572
Fulton	210,111	210,321	210,529	210,686	210,888	211,079	211,258	211,433	211,606	211,760	211,915
Gwinnett	203,265	203,459	203,670	203,812	203,984	204,140	204,291	204,438	204,570	204,711	204,835
Hall	52,583	52,625	52,683	52,743	52,791	52,837	52,880	52,922	52,959	52,998	53,033
Henry	56,639	56,684	56,742	56,794	56,834	56,873	56,907	56,941	56,973	57,003	57,032
Lee	7,106	7,118	7,130	7,140	7,153	7,165	7,178	7,189	7,199	7,209	7,219

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:											
	2/14	2/15	2/16	2/17	2/19				2/21				2/23			
Bartow	28,198	28,226	28,322	28,348	28,399	(5,680)	[1,363]	{682}	28,446	(5,689)	[1,365]	{683}	28,489	(5,698)	[1,367]	{684}
Carroll	23,388	23,402	23,421	23,436	23,472	(4,694)	[1,127]	{563}	23,504	(4,701)	[1,128]	{564}	23,535	(4,707)	[1,130]	{565}
Cherokee	62,229	62,264	62,303	62,338	62,435	(12,487)	[2,997]	{1,498}	62,523	(12,505)	[3,001]	{1,501}	62,602	(12,520)	[3,005]	{1,502}
Clarke	29,284	29,308	29,334	29,355	29,392	(5,878)	[1,411]	{705}	29,425	(5,885)	[1,412]	{706}	29,455	(5,891)	[1,414]	{707}
Clayton	62,565	62,606	62,670	62,731	62,808	(12,562)	[3,015]	{1,507}	62,879	(12,576)	[3,018]	{1,509}	62,943	(12,589)	[3,021]	{1,511}
Cobb	167,634	167,864	168,013	168,122	168,445	(33,689)	[8,085]	{4,043}	168,738	(33,748)	[8,099]	{4,050}	169,008	(33,802)	[8,112]	{4,056}
DeKalb	142,436	142,666	142,823	142,944	143,223	(28,645)	[6,875]	{3,437}	143,469	(28,694)	[6,887]	{3,443}	143,710	(28,742)	[6,898]	{3,449}
Dougherty	19,166	19,192	19,215	19,225	19,290	(3,858)	[926]	{463}	19,345	(3,869)	[929]	{464}	19,401	(3,880)	[931]	{466}
Douglas	34,337	34,358	34,382	34,406	34,460	(6,892)	[1,654]	{827}	34,507	(6,901)	[1,656]	{828}	34,552	(6,910)	[1,658]	{829}
Fulton	210,111	210,321	210,529	210,686	211,079	(42,216)	[10,132]	{5,066}	211,433	(42,287)	[10,149]	{5,074}	211,760	(42,352)	[10,164]	{5,082}
Gwinnett	203,265	203,459	203,670	203,812	204,140	(40,828)	[9,799]	{4,899}	204,438	(40,888)	[9,813]	{4,907}	204,711	(40,942)	[9,826]	{4,913}
Hall	52,583	52,625	52,683	52,743	52,837	(10,567)	[2,536]	{1,268}	52,922	(10,584)	[2,540]	{1,270}	52,998	(10,600)	[2,544]	{1,272}
Henry	56,639	56,684	56,742	56,794	56,873	(11,375)	[2,730]	{1,365}	56,941	(11,388)	[2,733]	{1,367}	57,003	(11,401)	[2,736]	{1,368}
Lee	7,106	7,118	7,130	7,140	7,165	(1,433)	[344]	{172}	7,189	(1,438)	[345]	{173}	7,209	(1,442)	[346]	{173}

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.