

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 10/13/21**

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 10/13/21 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.

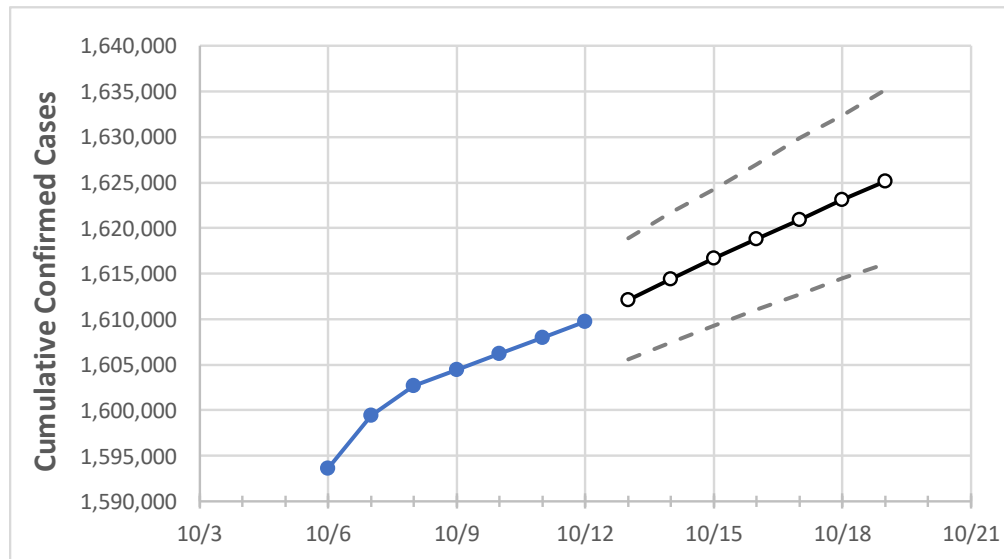
IEM's Modeling Lead

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:						
	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19
Georgia	1,604,421	1,606,174	1,607,928	1,609,681	1,612,075	1,614,360	1,616,653	1,618,774	1,620,925	1,623,116	1,625,146

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:						
	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19
Bartow	20,060	20,085	20,109	20,133	20,164	20,192	20,221	20,249	20,276	20,304	20,331
Carroll	16,170	16,182	16,193	16,204	16,218	16,231	16,245	16,258	16,271	16,284	16,294
Cherokee	42,718	42,756	42,793	42,830	42,879	42,925	42,972	43,016	43,058	43,103	43,146
Clarke	19,775	19,787	19,799	19,811	19,828	19,846	19,863	19,877	19,893	19,909	19,923
Clayton	38,474	38,526	38,578	38,630	38,685	38,735	38,786	38,834	38,882	38,929	38,975
Cobb	107,226	107,341	107,457	107,572	107,736	107,910	108,055	108,211	108,369	108,515	108,664
DeKalb	89,593	89,713	89,832	89,951	90,144	90,313	90,498	90,660	90,838	91,012	91,181
Dougherty	12,161	12,178	12,195	12,212	12,236	12,260	12,282	12,303	12,326	12,347	12,367
Douglas	21,886	21,915	21,945	21,974	22,011	22,043	22,073	22,107	22,138	22,170	22,200
Fulton	129,789	129,915	130,041	130,167	130,366	130,569	130,752	130,945	131,135	131,313	131,499
Gwinnett	130,448	130,648	130,849	131,049	131,362	131,666	131,944	132,242	132,546	132,827	133,113
Hall	37,041	37,085	37,130	37,174	37,236	37,297	37,355	37,413	37,469	37,526	37,579
Henry	37,316	37,363	37,409	37,455	37,512	37,565	37,616	37,668	37,719	37,769	37,818
Lee	4,586	4,591	4,595	4,599	4,605	4,610	4,615	4,620	4,625	4,630	4,635

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:											
	10/9	10/10	10/11	10/12	10/14				10/16				10/18			
Bartow	20,060	20,085	20,109	20,133	20,192	(4,038)	[969]	{485}	20,249	(4,050)	[972]	{486}	20,304	(4,061)	[975]	{487}
Carroll	16,170	16,182	16,193	16,204	16,231	(3,246)	[779]	{390}	16,258	(3,252)	[780]	{390}	16,284	(3,257)	[782]	{391}
Cherokee	42,718	42,756	42,793	42,830	42,925	(8,585)	[2,060]	{1,030}	43,016	(8,603)	[2,065]	{1,032}	43,103	(8,621)	[2,069]	{1,034}
Clarke	19,775	19,787	19,799	19,811	19,846	(3,969)	[953]	{476}	19,877	(3,975)	[954]	{477}	19,909	(3,982)	[956]	{478}
Clayton	38,474	38,526	38,578	38,630	38,735	(7,747)	[1,859]	{930}	38,834	(7,767)	[1,864]	{932}	38,929	(7,786)	[1,869]	{934}
Cobb	107,226	107,341	107,457	107,572	107,910	(21,582)	[5,180]	{2,590}	108,211	(21,642)	[5,194]	{2,597}	108,515	(21,703)	[5,209]	{2,604}
DeKalb	89,593	89,713	89,832	89,951	90,313	(18,063)	[4,335]	{2,168}	90,660	(18,132)	[4,352]	{2,176}	91,012	(18,202)	[4,369]	{2,184}
Dougherty	12,161	12,178	12,195	12,212	12,260	(2,452)	[588]	{294}	12,303	(2,461)	[591]	{295}	12,347	(2,469)	[593]	{296}
Douglas	21,886	21,915	21,945	21,974	22,043	(4,409)	[1,058]	{529}	22,107	(4,421)	[1,061]	{531}	22,170	(4,434)	[1,064]	{532}
Fulton	129,789	129,915	130,041	130,167	130,569	(26,114)	[6,267]	{3,134}	130,945	(26,189)	[6,285]	{3,143}	131,313	(26,263)	[6,303]	{3,152}
Gwinnett	130,448	130,648	130,849	131,049	131,666	(26,333)	[6,320]	{3,160}	132,242	(26,448)	[6,348]	{3,174}	132,827	(26,565)	[6,376]	{3,188}
Hall	37,041	37,085	37,130	37,174	37,297	(7,459)	[1,790]	{895}	37,413	(7,483)	[1,796]	{898}	37,526	(7,505)	[1,801]	{901}
Henry	37,316	37,363	37,409	37,455	37,565	(7,513)	[1,803]	{902}	37,668	(7,534)	[1,808]	{904}	37,769	(7,554)	[1,813]	{906}
Lee	4,586	4,591	4,595	4,599	4,610	(922)	[221]	{111}	4,620	(924)	[222]	{111}	4,630	(926)	[222]	{111}

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.