

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

Date: 3/5/21

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 3/5/21 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.**

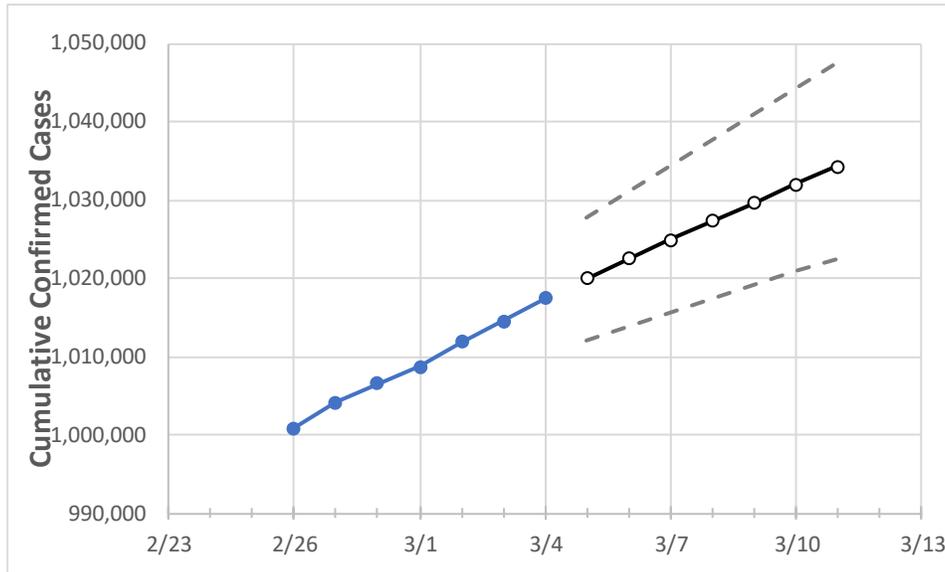
### IEM's Modeling Lead

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:						
	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	3/9	3/10	3/11

Georgia 1,008,660 1,011,807 1,014,542 1,017,428 1,019,986 1,022,451 1,024,906 1,027,295 1,029,628 1,031,983 1,034,273

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:						
	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	3/9	3/10	3/11
Bartow	13,032	13,059	13,097	13,129	13,174	13,218	13,262	13,305	13,348	13,392	13,433
Carroll	10,556	10,576	10,588	10,601	10,618	10,635	10,652	10,667	10,682	10,696	10,711
Cherokee	27,426	27,549	27,624	27,713	27,812	27,911	28,006	28,101	28,200	28,293	28,390
Clarke	14,100	14,141	14,209	14,232	14,256	14,279	14,302	14,324	14,347	14,368	14,390
Clayton	23,301	23,379	23,462	23,518	23,589	23,657	23,725	23,792	23,856	23,923	23,987
Cobb	69,646	69,858	70,055	70,279	70,471	70,662	70,854	71,044	71,235	71,423	71,612
DeKalb	57,093	57,326	57,530	57,718	57,891	58,059	58,227	58,396	58,564	58,735	58,904
Dougherty	7,060	7,066	7,075	7,085	7,092	7,098	7,104	7,110	7,116	7,122	7,127
Douglas	13,442	13,493	13,520	13,556	13,588	13,619	13,648	13,677	13,705	13,732	13,758
Fulton	85,878	86,190	86,477	86,856	87,133	87,410	87,684	87,967	88,251	88,530	88,820
Gwinnett	92,410	92,712	92,926	93,192	93,416	93,642	93,865	94,087	94,296	94,516	94,729
Hall	25,544	25,580	25,611	25,657	25,694	25,731	25,768	25,803	25,839	25,874	25,908
Henry	21,823	21,923	22,037	22,142	22,249	22,355	22,462	22,573	22,684	22,797	22,913
Lee	2,583	2,588	2,593	2,601	2,606	2,610	2,614	2,619	2,623	2,628	2,631

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:											
	3/1	3/2	3/3	3/4	3/6				3/8				3/10			
Bartow	13,032	13,059	13,097	13,129	13,218	(2,644)	{634}	{317}	13,305	(2,661)	{639}	{319}	13,392	(2,678)	{643}	{321}
Carroll	10,556	10,576	10,588	10,601	10,635	(2,127)	{510}	{255}	10,667	(2,133)	{512}	{256}	10,696	(2,139)	{513}	{257}
Cherokee	27,426	27,549	27,624	27,713	27,911	(5,582)	{1,340}	{670}	28,101	(5,620)	{1,349}	{674}	28,293	(5,659)	{1,358}	{679}
Clarke	14,100	14,141	14,209	14,232	14,279	(2,856)	{685}	{343}	14,324	(2,865)	{688}	{344}	14,368	(2,874)	{690}	{345}
Clayton	23,301	23,379	23,462	23,518	23,657	(4,731)	{1,136}	{568}	23,792	(4,758)	{1,142}	{571}	23,923	(4,785)	{1,148}	{574}
Cobb	69,646	69,858	70,055	70,279	70,662	(14,132)	{3,392}	{1,696}	71,044	(14,209)	{3,410}	{1,705}	71,423	(14,285)	{3,428}	{1,714}
DeKalb	57,093	57,326	57,530	57,718	58,059	(11,612)	{2,787}	{1,393}	58,396	(11,679)	{2,803}	{1,401}	58,735	(11,747)	{2,819}	{1,410}
Dougherty	7,060	7,066	7,075	7,085	7,098	(1,420)	{341}	{170}	7,110	(1,422)	{341}	{171}	7,122	(1,424)	{342}	{171}
Douglas	13,442	13,493	13,520	13,556	13,619	(2,724)	{654}	{327}	13,677	(2,735)	{656}	{328}	13,732	(2,746)	{659}	{330}
Fulton	85,878	86,190	86,477	86,856	87,410	(17,482)	{4,196}	{2,098}	87,967	(17,593)	{4,222}	{2,111}	88,530	(17,706)	{4,249}	{2,125}
Gwinnett	92,410	92,712	92,926	93,192	93,642	(18,728)	{4,495}	{2,247}	94,087	(18,817)	{4,516}	{2,258}	94,516	(18,903)	{4,537}	{2,268}
Hall	25,544	25,580	25,611	25,657	25,731	(5,146)	{1,235}	{618}	25,803	(5,161)	{1,239}	{619}	25,874	(5,175)	{1,242}	{621}
Henry	21,823	21,923	22,037	22,142	22,355	(4,471)	{1,073}	{537}	22,573	(4,515)	{1,084}	{542}	22,797	(4,559)	{1,094}	{547}
Lee	2,583	2,588	2,593	2,601	2,610	(522)	{125}	{63}	2,619	(524)	{126}	{63}	2,628	(526)	{126}	{63}

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.