

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

Date: 8/2/21

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 8/2/21 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.

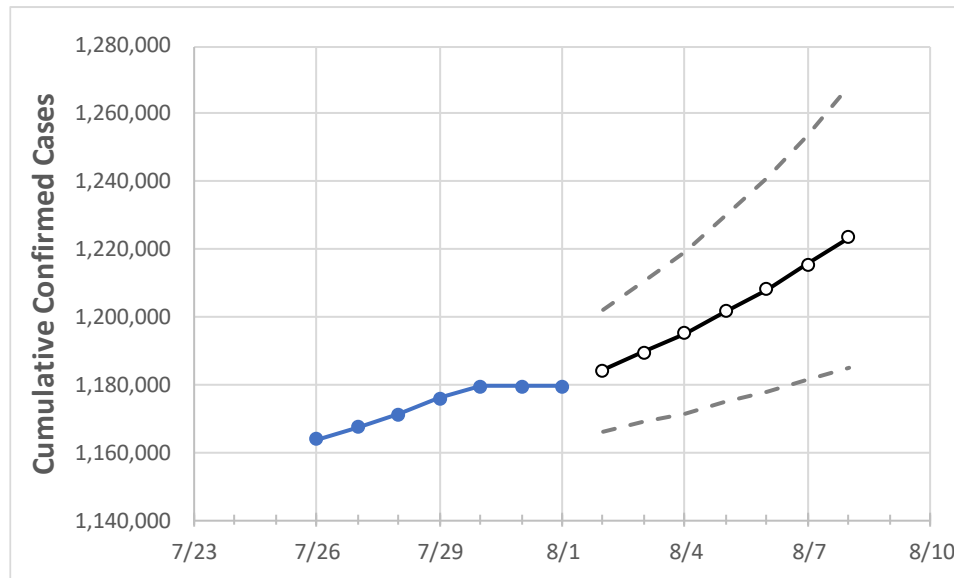
IEM's Modeling Lead

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:							
	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	
Georgia	1,175,845	1,179,449	1,179,449	1,179,449	1,184,260	1,189,546	1,195,251	1,201,499	1,208,142	1,215,398	1,223,368	

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:							
	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	
Bartow	15,407	15,437	15,437	15,437	15,476	15,517	15,560	15,607	15,656	15,707	15,763	
Carroll	12,024	12,049	12,049	12,049	12,104	12,165	12,229	12,300	12,379	12,464	12,556	
Cherokee	32,412	32,483	32,483	32,483	32,602	32,733	32,877	33,039	33,216	33,410	33,627	
Clarke	15,560	15,588	15,588	15,588	15,626	15,665	15,710	15,759	15,810	15,864	15,925	
Clayton	28,617	28,706	28,706	28,706	28,848	29,003	29,176	29,359	29,557	29,777	30,021	
Cobb	82,897	83,040	83,040	83,040	83,310	83,608	83,923	84,264	84,637	85,030	85,463	
DeKalb	69,447	69,601	69,601	69,601	69,861	70,151	70,463	70,802	71,177	71,583	72,030	
Dougherty	7,970	8,003	8,003	8,003	8,047	8,098	8,153	8,217	8,288	8,365	8,454	
Douglas	16,231	16,273	16,273	16,273	16,350	16,437	16,532	16,632	16,743	16,864	17,000	
Fulton	102,824	103,094	103,094	103,094	103,480	103,894	104,336	104,817	105,355	105,923	106,557	
Gwinnett	105,809	105,969	105,969	105,969	106,203	106,451	106,719	107,008	107,309	107,640	107,991	
Hall	28,438	28,483	28,483	28,483	28,553	28,629	28,709	28,796	28,891	28,994	29,106	
Henry	27,175	27,267	27,267	27,267	27,402	27,550	27,709	27,880	28,071	28,269	28,484	
Lee	2,935	2,957	2,957	2,957	2,982	3,011	3,043	3,080	3,121	3,166	3,217	

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:											
	7/29	7/30	7/31	8/1	8/3			8/5			8/7					
Bartow	15,407	15,437	15,437	15,437	15,517	(3,103)	[745]	{372}	15,607	(3,121)	[749]	{375}	15,707	(3,141)	[754]	{377}
Carroll	12,024	12,049	12,049	12,049	12,165	(2,433)	[584]	{292}	12,300	(2,460)	[590]	{295}	12,464	(2,493)	[598]	{299}
Cherokee	32,412	32,483	32,483	32,483	32,733	(6,547)	[1,571]	{786}	33,039	(6,608)	[1,586]	{793}	33,410	(6,682)	[1,604]	{802}
Clarke	15,560	15,588	15,588	15,588	15,665	(3,133)	[752]	{376}	15,759	(3,152)	[756]	{378}	15,864	(3,173)	[761]	{381}
Clayton	28,617	28,706	28,706	28,706	29,003	(5,801)	[1,392]	{696}	29,359	(5,872)	[1,409]	{705}	29,777	(5,955)	[1,429]	{715}
Cobb	82,897	83,040	83,040	83,040	83,608	(16,722)	[4,013]	{2,007}	84,264	(16,853)	[4,045]	{2,022}	85,030	(17,006)	[4,081]	{2,041}
DeKalb	69,447	69,601	69,601	69,601	70,151	(14,030)	[3,367]	{1,684}	70,802	(14,160)	[3,398]	{1,699}	71,583	(14,317)	[3,436]	{1,718}
Dougherty	7,970	8,003	8,003	8,003	8,098	(1,620)	[389]	{194}	8,217	(1,643)	[394]	{197}	8,365	(1,673)	[402]	{201}
Douglas	16,231	16,273	16,273	16,273	16,437	(3,287)	[789]	{394}	16,632	(3,326)	[798]	{399}	16,864	(3,373)	[809]	{405}
Fulton	102,824	103,094	103,094	103,094	103,894	(20,779)	[4,987]	{2,493}	104,817	(20,963)	[5,031]	{2,516}	105,923	(21,185)	[5,084]	{2,542}
Gwinnett	105,809	105,969	105,969	105,969	106,451	(21,290)	[5,110]	{2,555}	107,008	(21,402)	[5,136]	{2,568}	107,640	(21,528)	[5,167]	{2,583}
Hall	28,438	28,483	28,483	28,483	28,629	(5,726)	[1,374]	{687}	28,796	(5,759)	[1,382]	{691}	28,994	(5,799)	[1,392]	{696}
Henry	27,175	27,267	27,267	27,267	27,550	(5,510)	[1,322]	{661}	27,880	(5,576)	[1,338]	{669}	28,269	(5,654)	[1,357]	{678}
Lee	2,935	2,957	2,957	2,957	3,011	(602)	[145]	{72}	3,080	(616)	[148]	{74}	3,166	(633)	[152]	{76}

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.