

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

Date: 8/6/21

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 8/6/21 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.

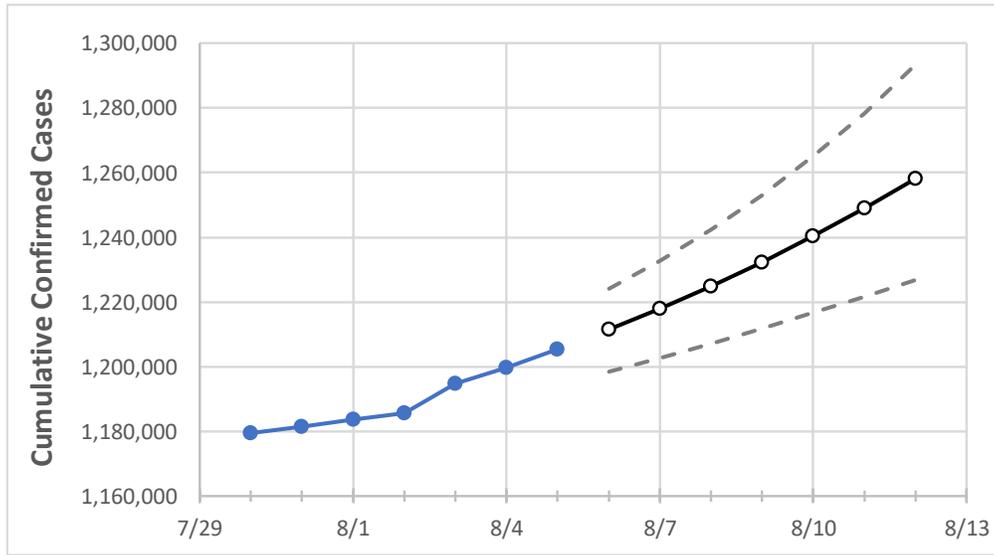
IEM's Modeling Lead

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:					
	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12
Georgia	1,185,594	1,194,768	1,199,628	1,205,434	1,211,484	1,217,899	1,224,897	1,232,305	1,240,322	1,248,919	1,258,145

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:					
	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12
Bartow	15,491	15,544	15,584	15,627	15,661	15,697	15,733	15,771	15,811	15,851	15,893
Carroll	12,123	12,250	12,302	12,358	12,426	12,500	12,578	12,663	12,753	12,852	12,957
Cherokee	32,645	32,808	32,894	32,994	33,111	33,236	33,368	33,512	33,668	33,834	34,005
Clarke	15,643	15,739	15,789	15,837	15,897	15,962	16,033	16,112	16,200	16,296	16,400
Clayton	28,834	29,094	29,200	29,319	29,449	29,588	29,736	29,890	30,057	30,233	30,425
Cobb	83,384	83,966	84,224	84,582	84,913	85,266	85,653	86,064	86,499	86,970	87,476
DeKalb	69,952	70,473	70,722	70,997	71,308	71,641	71,996	72,378	72,793	73,232	73,711
Dougherty	8,085	8,163	8,208	8,255	8,317	8,385	8,462	8,545	8,638	8,740	8,853
Douglas	16,368	16,493	16,568	16,627	16,699	16,776	16,860	16,948	17,041	17,140	17,248
Fulton	103,626	104,433	104,794	105,255	105,722	106,216	106,743	107,304	107,920	108,559	109,241
Gwinnett	106,259	106,738	106,960	107,213	107,476	107,753	108,048	108,361	108,689	109,036	109,399
Hall	28,583	28,684	28,761	28,838	28,916	29,001	29,091	29,191	29,296	29,408	29,531
Henry	27,401	27,619	27,708	27,835	27,954	28,078	28,212	28,346	28,493	28,644	28,803
Lee	2,993	3,029	3,055	3,081	3,113	3,148	3,187	3,229	3,278	3,332	3,393

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:											
	8/2	8/3	8/4	8/5	8/7			8/9			8/11					
Bartow	15,491	15,544	15,584	15,627	15,697	(3,139)	[753]	{377}	15,771	(3,154)	[757]	{378}	15,851	(3,170)	[761]	{380}
Carroll	12,123	12,250	12,302	12,358	12,500	(2,500)	[600]	{300}	12,663	(2,533)	[608]	{304}	12,852	(2,570)	[617]	{308}
Cherokee	32,645	32,808	32,894	32,994	33,236	(6,647)	[1,595]	{798}	33,512	(6,702)	[1,609]	{804}	33,834	(6,767)	[1,624]	{812}
Clarke	15,643	15,739	15,789	15,837	15,962	(3,192)	[766]	{383}	16,112	(3,222)	[773]	{387}	16,296	(3,259)	[782]	{391}
Clayton	28,834	29,094	29,200	29,319	29,588	(5,918)	[1,420]	{710}	29,890	(5,978)	[1,435]	{717}	30,233	(6,047)	[1,451]	{726}
Cobb	83,384	83,966	84,224	84,582	85,266	(17,053)	[4,093]	{2,046}	86,064	(17,213)	[4,131]	{2,066}	86,970	(17,394)	[4,175]	{2,087}
DeKalb	69,952	70,473	70,722	70,997	71,641	(14,328)	[3,439]	{1,719}	72,378	(14,476)	[3,474]	{1,737}	73,232	(14,646)	[3,515]	{1,758}
Dougherty	8,085	8,163	8,208	8,255	8,385	(1,677)	[402]	{201}	8,545	(1,709)	[410]	{205}	8,740	(1,748)	[420]	{210}
Douglas	16,368	16,493	16,568	16,627	16,776	(3,355)	[805]	{403}	16,948	(3,390)	[813]	{407}	17,140	(3,428)	[823]	{411}
Fulton	103,626	104,433	104,794	105,255	106,216	(21,243)	[5,098]	{2,549}	107,304	(21,461)	[5,151]	{2,575}	108,559	(21,712)	[5,211]	{2,605}
Gwinnett	106,259	106,738	106,960	107,213	107,753	(21,551)	[5,172]	{2,586}	108,361	(21,672)	[5,201]	{2,601}	109,036	(21,807)	[5,234]	{2,617}
Hall	28,583	28,684	28,761	28,838	29,001	(5,800)	[1,392]	{696}	29,191	(5,838)	[1,401]	{701}	29,408	(5,882)	[1,412]	{706}
Henry	27,401	27,619	27,708	27,835	28,078	(5,616)	[1,348]	{674}	28,346	(5,669)	[1,361]	{680}	28,644	(5,729)	[1,375]	{687}
Lee	2,993	3,029	3,055	3,081	3,148	(630)	[151]	{76}	3,229	(646)	[155]	{78}	3,332	(666)	[160]	{80}

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.