

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

Date: 8/23/21

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 8/23/21 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.

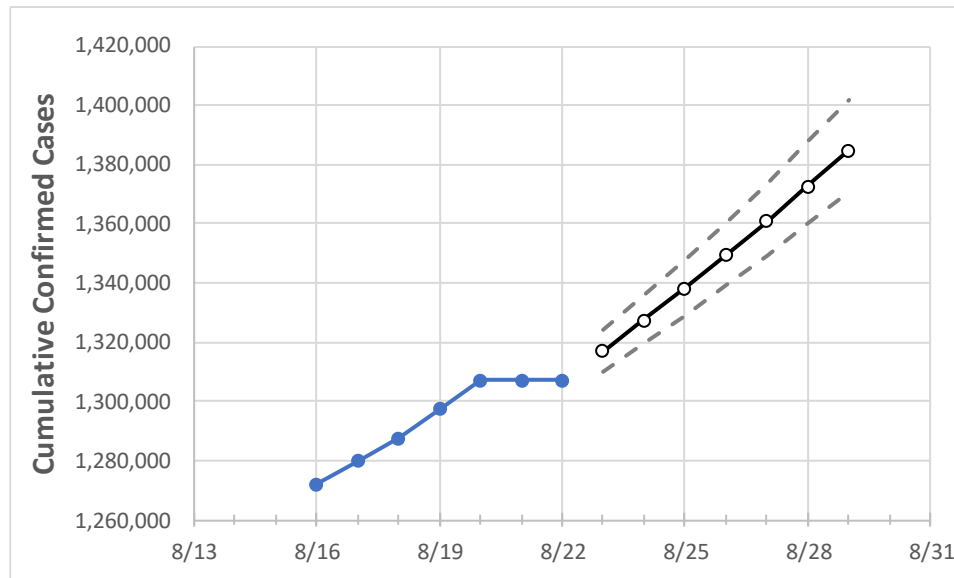
IEM's Modeling Lead

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:						
	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29
Georgia	1,297,503	1,307,084	1,307,084	1,307,084	1,317,015	1,327,486	1,338,150	1,349,271	1,360,870	1,372,691	1,384,843

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:						
	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29
Bartow	16,459	16,532	16,532	16,532	16,621	16,708	16,807	16,900	17,002	17,105	17,213
Carroll	13,271	13,373	13,373	13,373	13,473	13,577	13,685	13,795	13,909	14,026	14,149
Cherokee	35,385	35,627	35,627	35,627	35,903	36,195	36,496	36,812	37,137	37,487	37,842
Clarke	16,594	16,675	16,675	16,675	16,757	16,843	16,932	17,023	17,117	17,215	17,317
Clayton	31,405	31,601	31,601	31,601	31,809	32,029	32,247	32,481	32,719	32,959	33,209
Cobb	89,845	90,270	90,270	90,270	90,799	91,348	91,915	92,497	93,098	93,725	94,367
DeKalb	75,349	75,672	75,672	75,672	76,068	76,474	76,893	77,310	77,753	78,205	78,658
Dougherty	9,045	9,150	9,150	9,150	9,237	9,324	9,414	9,508	9,604	9,703	9,806
Douglas	17,749	17,847	17,847	17,847	17,959	18,076	18,195	18,322	18,447	18,579	18,715
Fulton	111,155	111,633	111,633	111,633	112,146	112,657	113,183	113,715	114,257	114,809	115,372
Gwinnett	111,405	111,805	111,805	111,805	112,217	112,639	113,084	113,531	113,996	114,468	114,956
Hall	30,133	30,292	30,292	30,292	30,442	30,596	30,759	30,926	31,102	31,284	31,473
Henry	30,239	30,452	30,452	30,452	30,702	30,962	31,229	31,510	31,798	32,095	32,404
Lee	3,388	3,446	3,446	3,446	3,477	3,510	3,544	3,578	3,614	3,649	3,687

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:											
	8/19	8/20	8/21	8/22	8/24				8/26				8/28			
Bartow	16,459	16,532	16,532	16,532	16,708	(3,342)	[802]	{401}	16,900	(3,380)	[811]	{406}	17,105	(3,421)	[821]	{411}
Carroll	13,271	13,373	13,373	13,373	13,577	(2,715)	[652]	{326}	13,795	(2,759)	[662]	{331}	14,026	(2,805)	[673]	{337}
Cherokee	35,385	35,627	35,627	35,627	36,195	(7,239)	[1,737]	{869}	36,812	(7,362)	[1,767]	{883}	37,487	(7,497)	[1,799]	{900}
Clarke	16,594	16,675	16,675	16,675	16,843	(3,369)	[808]	{404}	17,023	(3,405)	[817]	{409}	17,215	(3,443)	[826]	{413}
Clayton	31,405	31,601	31,601	31,601	32,029	(6,406)	[1,537]	{769}	32,481	(6,496)	[1,559]	{780}	32,959	(6,592)	[1,582]	{791}
Cobb	89,845	90,270	90,270	90,270	91,348	(18,270)	[4,385]	{2,192}	92,497	(18,499)	[4,440]	{2,220}	93,725	(18,745)	[4,499]	{2,249}
DeKalb	75,349	75,672	75,672	75,672	76,474	(15,295)	[3,671]	{1,835}	77,310	(15,462)	[3,711]	{1,855}	78,205	(15,641)	[3,754]	{1,877}
Dougherty	9,045	9,150	9,150	9,150	9,324	(1,865)	[448]	{224}	9,508	(1,902)	[456]	{228}	9,703	(1,941)	[466]	{233}
Douglas	17,749	17,847	17,847	17,847	18,076	(3,615)	[868]	{434}	18,322	(3,664)	[879]	{440}	18,579	(3,716)	[892]	{446}
Fulton	111,155	111,633	111,633	111,633	112,657	(22,531)	[5,408]	{2,704}	113,715	(22,743)	[5,458]	{2,729}	114,809	(22,962)	[5,511]	{2,755}
Gwinnett	111,405	111,805	111,805	111,805	112,639	(22,528)	[5,407]	{2,703}	113,531	(22,706)	[5,449]	{2,725}	114,468	(22,894)	[5,494]	{2,747}
Hall	30,133	30,292	30,292	30,292	30,596	(6,119)	[1,469]	{734}	30,926	(6,185)	[1,484]	{742}	31,284	(6,257)	[1,502]	{751}
Henry	30,239	30,452	30,452	30,452	30,962	(6,192)	[1,486]	{743}	31,510	(6,302)	[1,512]	{756}	32,095	(6,419)	[1,541]	{770}
Lee	3,388	3,446	3,446	3,446	3,510	(702)	[168]	{84}	3,578	(716)	[172]	{86}	3,649	(730)	[175]	{88}

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.