

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 11/24/21**

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 11/24/21 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.**

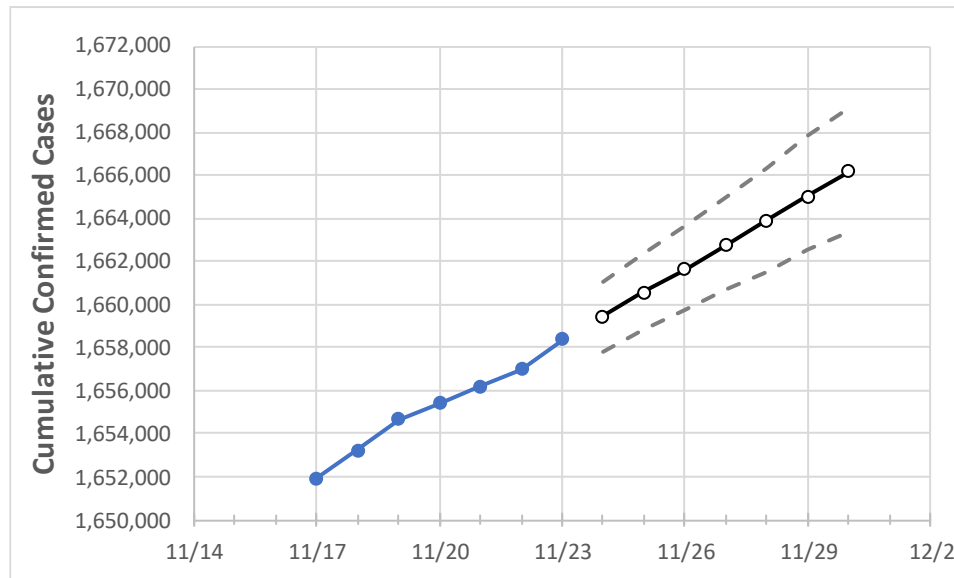
**IEM's Modeling Lead**

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:						
	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30
Georgia	1,655,430	1,656,211	1,656,992	1,658,363	1,659,463	1,660,551	1,661,637	1,662,768	1,663,907	1,665,023	1,666,176

*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:						
	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30
Bartow	20,757	20,767	20,777	20,796	20,818	20,843	20,866	20,890	20,915	20,941	20,967
Carroll	16,533	16,544	16,554	16,568	16,579	16,589	16,600	16,612	16,623	16,635	16,647
Cherokee	44,281	44,297	44,314	44,350	44,374	44,397	44,420	44,445	44,469	44,493	44,517
Clarke	20,279	20,282	20,286	20,298	20,306	20,314	20,322	20,329	20,337	20,344	20,352
Clayton	39,865	39,880	39,896	39,919	39,938	39,958	39,977	39,997	40,015	40,034	40,051
Cobb	111,126	111,205	111,283	111,417	111,525	111,633	111,743	111,855	111,968	112,082	112,198
DeKalb	92,922	92,970	93,019	93,108	93,179	93,248	93,317	93,387	93,458	93,531	93,602
Dougherty	12,512	12,516	12,519	12,520	12,523	12,525	12,528	12,530	12,533	12,535	12,537
Douglas	22,571	22,585	22,598	22,607	22,622	22,638	22,653	22,668	22,684	22,699	22,714
Fulton	133,796	133,863	133,931	134,066	134,176	134,286	134,398	134,512	134,627	134,748	134,868
Gwinnett	135,370	135,448	135,525	135,693	135,826	135,970	136,114	136,258	136,410	136,565	136,721
Hall	38,744	38,765	38,785	38,803	38,839	38,877	38,915	38,952	38,988	39,026	39,065
Henry	38,659	38,673	38,686	38,717	38,742	38,767	38,791	38,816	38,841	38,867	38,890
Lee	4,767	4,768	4,770	4,772	4,774	4,777	4,779	4,781	4,783	4,786	4,788

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:											
	11/20	11/21	11/22	11/23	11/25				11/27				11/29			
Bartow	20,757	20,767	20,777	20,796	20,843	(4,169)	[1,000]	{500}	20,890	(4,178)	[1,003]	{501}	20,941	(4,188)	[1,005]	{503}
Carroll	16,533	16,544	16,554	16,568	16,589	(3,318)	[796]	{398}	16,612	(3,322)	[797]	{399}	16,635	(3,327)	[798]	{399}
Cherokee	44,281	44,297	44,314	44,350	44,397	(8,879)	[2,131]	{1,066}	44,445	(8,889)	[2,133]	{1,067}	44,493	(8,899)	[2,136]	{1,068}
Clarke	20,279	20,282	20,286	20,298	20,314	(4,063)	[975]	{488}	20,329	(4,066)	[976]	{488}	20,344	(4,069)	[977]	{488}
Clayton	39,865	39,880	39,896	39,919	39,958	(7,992)	[1,918]	{959}	39,997	(7,999)	[1,920]	{960}	40,034	(8,007)	[1,922]	{961}
Cobb	111,126	111,205	111,283	111,417	111,633	(22,327)	[5,358]	{2,679}	111,855	(22,371)	[5,369]	{2,685}	112,082	(22,416)	[5,380]	{2,690}
DeKalb	92,922	92,970	93,019	93,108	93,248	(18,650)	[4,476]	{2,238}	93,387	(18,677)	[4,483]	{2,241}	93,531	(18,706)	[4,489]	{2,245}
Dougherty	12,512	12,516	12,519	12,520	12,525	(2,505)	[601]	{301}	12,530	(2,506)	[601]	{301}	12,535	(2,507)	[602]	{301}
Douglas	22,571	22,585	22,598	22,607	22,638	(4,528)	[1,087]	{543}	22,668	(4,534)	[1,088]	{544}	22,699	(4,540)	[1,090]	{545}
Fulton	133,796	133,863	133,931	134,066	134,286	(26,857)	[6,446]	{3,223}	134,512	(26,902)	[6,457]	{3,228}	134,748	(26,950)	[6,468]	{3,234}
Gwinnett	135,370	135,448	135,525	135,693	135,970	(27,194)	[6,527]	{3,263}	136,258	(27,252)	[6,540]	{3,270}	136,565	(27,313)	[6,555]	{3,278}
Hall	38,744	38,765	38,785	38,803	38,877	(7,775)	[1,866]	{933}	38,952	(7,790)	[1,870]	{935}	39,026	(7,805)	[1,873]	{937}
Henry	38,659	38,673	38,686	38,717	38,767	(7,753)	[1,861]	{930}	38,816	(7,763)	[1,863]	{932}	38,867	(7,773)	[1,866]	{933}
Lee	4,767	4,768	4,770	4,772	4,777	(955)	[229]	{115}	4,781	(956)	[229]	{115}	4,786	(957)	[230]	{115}

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.