

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 11/4/20**

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 11/4/20 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.**

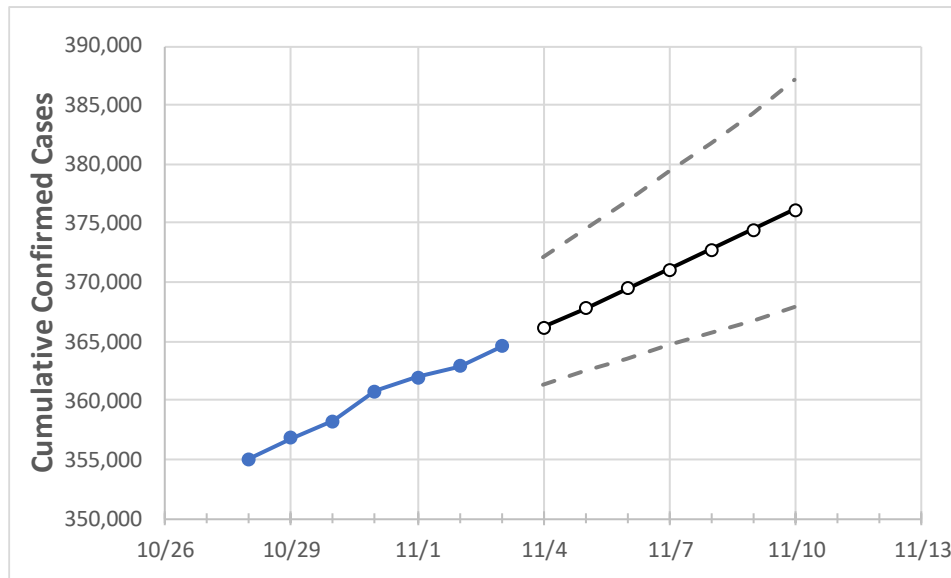
**IEM's Modeling Lead**

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:							
	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9	11/10	
Georgia	360,790	361,982	362,921	364,589	366,191	367,811	369,446	371,099	372,769	374,457	376,162	

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 20%, and are often within 10%, of actual confirmed cases.

## Georgia Counties

	Actual Confirmed Cases On:				Projected Cases For:							
	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9	11/10	
Bartow	3,714	3,716	3,717	3,741	3,751	3,761	3,771	3,780	3,789	3,798	3,807	
Carroll	3,417	3,428	3,442	3,458	3,472	3,485	3,498	3,512	3,525	3,537	3,550	
Cherokee	7,318	7,364	7,386	7,441	7,485	7,529	7,574	7,619	7,666	7,712	7,760	
Clarke	5,848	5,865	5,877	5,901	5,923	5,944	5,966	5,988	6,010	6,032	6,054	
Clayton	8,417	8,467	8,485	8,532	8,573	8,613	8,654	8,694	8,735	8,775	8,815	
Cobb	22,342	22,375	22,430	22,587	22,670	22,754	22,839	22,925	23,012	23,099	23,187	
DeKalb	21,587	21,678	21,744	21,882	21,989	22,098	22,209	22,321	22,436	22,552	22,670	
Dougherty	3,312	3,318	3,320	3,321	3,323	3,326	3,328	3,330	3,332	3,334	3,336	
Douglas	4,197	4,204	4,215	4,237	4,252	4,267	4,282	4,297	4,313	4,328	4,343	
Fulton	31,655	31,753	31,843	31,971	32,109	32,248	32,388	32,530	32,673	32,817	32,962	
Gwinnett	31,102	31,218	31,348	31,473	31,586	31,701	31,818	31,936	32,056	32,177	32,301	
Hall	10,837	10,845	10,871	10,929	10,956	10,983	11,010	11,036	11,062	11,088	11,113	
Henry	6,359	6,395	6,425	6,447	6,480	6,513	6,546	6,580	6,613	6,647	6,680	
Lee	755	756	759	759	760	761	763	764	765	766	768	

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:											
	10/31	11/1	11/2	11/3	11/5				11/7				11/9			
Bartow	3,714	3,716	3,717	3,741	3,761	(752)	[181]	{90}	3,780	(756)	[181]	{91}	3,798	(760)	[182]	{91}
Carroll	3,417	3,428	3,442	3,458	3,485	(697)	[167]	{84}	3,512	(702)	[169]	{84}	3,537	(707)	[170]	{85}
Cherokee	7,318	7,364	7,386	7,441	7,529	(1,506)	[361]	{181}	7,619	(1,524)	[366]	{183}	7,712	(1,542)	[370]	{185}
Clarke	5,848	5,865	5,877	5,901	5,944	(1,189)	[285]	{143}	5,988	(1,198)	[287]	{144}	6,032	(1,206)	[290]	{145}
Clayton	8,417	8,467	8,485	8,532	8,613	(1,723)	[413]	{207}	8,694	(1,739)	[417]	{209}	8,775	(1,755)	[421]	{211}
Cobb	22,342	22,375	22,430	22,587	22,754	(4,551)	[1,092]	{546}	22,925	(4,585)	[1,100]	{550}	23,099	(4,620)	[1,109]	{554}
DeKalb	21,587	21,678	21,744	21,882	22,098	(4,420)	[1,061]	{530}	22,321	(4,464)	[1,071]	{536}	22,552	(4,510)	[1,082]	{541}
Dougherty	3,312	3,318	3,320	3,321	3,326	(665)	[160]	{80}	3,330	(666)	[160]	{80}	3,334	(667)	[160]	{80}
Douglas	4,197	4,204	4,215	4,237	4,267	(853)	[205]	{102}	4,297	(859)	[206]	{103}	4,328	(866)	[208]	{104}
Fulton	31,655	31,753	31,843	31,971	32,248	(6,450)	[1,548]	{774}	32,530	(6,506)	[1,561]	{781}	32,817	(6,563)	[1,575]	{788}
Gwinnett	31,102	31,218	31,348	31,473	31,701	(6,340)	[1,522]	{761}	31,936	(6,387)	[1,533]	{766}	32,177	(6,435)	[1,545]	{772}
Hall	10,837	10,845	10,871	10,929	10,983	(2,197)	[527]	{264}	11,036	(2,207)	[530]	{265}	11,088	(2,218)	[532]	{266}
Henry	6,359	6,395	6,425	6,447	6,513	(1,303)	[313]	{156}	6,580	(1,316)	[316]	{158}	6,647	(1,329)	[319]	{160}
Lee	755	756	759	759	761	(152)	[37]	{18}	764	(153)	[37]	{18}	766	(153)	[37]	{18}

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.