

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

**Date: 10/26/20**

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 10/26/20 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.**

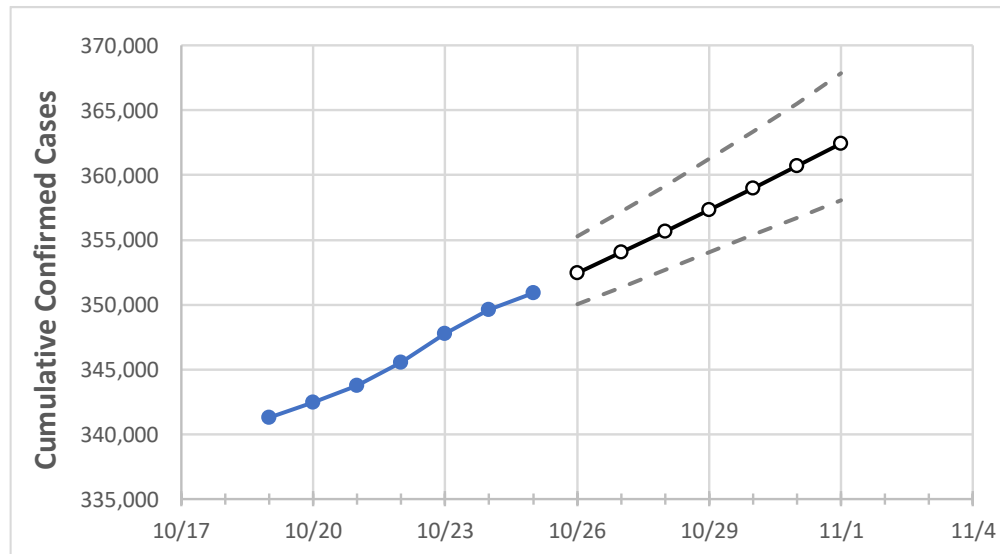
### **IEM's Modeling Lead**

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:						
	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1
Georgia	345,535	347,759	349,605	350,923	352,471	354,050	355,660	357,302	358,978	360,686	362,429

*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:						
	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1
Bartow	3,484	3,511	3,538	3,571	3,610	3,650	3,693	3,738	3,784	3,833	3,885
Carroll	3,243	3,297	3,310	3,332	3,356	3,381	3,407	3,433	3,460	3,487	3,515
Cherokee	6,881	6,950	6,998	7,037	7,077	7,117	7,158	7,200	7,242	7,285	7,328
Clarke	5,624	5,656	5,678	5,699	5,718	5,736	5,755	5,774	5,793	5,812	5,831
Clayton	7,983	8,037	8,102	8,137	8,180	8,223	8,266	8,309	8,351	8,393	8,435
Cobb	21,453	21,563	21,676	21,750	21,837	21,924	22,013	22,104	22,196	22,289	22,384
DeKalb	20,583	20,769	20,883	20,977	21,072	21,169	21,268	21,369	21,472	21,578	21,685
Dougherty	3,282	3,289	3,293	3,295	3,300	3,305	3,310	3,315	3,321	3,326	3,331
Douglas	4,002	4,039	4,053	4,066	4,081	4,096	4,111	4,126	4,141	4,156	4,171
Fulton	30,264	30,540	30,691	30,838	30,985	31,136	31,291	31,452	31,617	31,786	31,961
Gwinnett	29,959	30,109	30,204	30,306	30,403	30,500	30,597	30,693	30,790	30,887	30,984
Hall	10,485	10,529	10,574	10,595	10,635	10,675	10,716	10,756	10,797	10,839	10,880
Henry	5,999	6,050	6,096	6,136	6,172	6,208	6,245	6,282	6,320	6,358	6,397
Lee	743	744	746	746	747	748	749	750	751	752	753

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:											
	10/22	10/23	10/24	10/25	10/27				10/29				10/31			
Bartow	3,484	3,511	3,538	3,571	3,650	(730)	[175]	{88}	3,738	(748)	[179]	{90}	3,833	(767)	[184]	{92}
Carroll	3,243	3,297	3,310	3,332	3,381	(676)	[162]	{81}	3,433	(687)	[165]	{82}	3,487	(697)	[167]	{84}
Cherokee	6,881	6,950	6,998	7,037	7,117	(1,423)	[342]	{171}	7,200	(1,440)	[346]	{173}	7,285	(1,457)	[350]	{175}
Clarke	5,624	5,656	5,678	5,699	5,736	(1,147)	[275]	{138}	5,774	(1,155)	[277]	{139}	5,812	(1,162)	[279]	{139}
Clayton	7,983	8,037	8,102	8,137	8,223	(1,645)	[395]	{197}	8,309	(1,662)	[399]	{199}	8,393	(1,679)	[403]	{201}
Cobb	21,453	21,563	21,676	21,750	21,924	(4,385)	[1,052]	{526}	22,104	(4,421)	[1,061]	{530}	22,289	(4,458)	[1,070]	{535}
DeKalb	20,583	20,769	20,883	20,977	21,169	(4,234)	[1,016]	{508}	21,369	(4,274)	[1,026]	{513}	21,578	(4,316)	[1,036]	{518}
Dougherty	3,282	3,289	3,293	3,295	3,305	(661)	[159]	{79}	3,315	(663)	[159]	{80}	3,326	(665)	[160]	{80}
Douglas	4,002	4,039	4,053	4,066	4,096	(819)	[197]	{98}	4,126	(825)	[198]	{99}	4,156	(831)	[199]	{100}
Fulton	30,264	30,540	30,691	30,838	31,136	(6,227)	[1,495]	{747}	31,452	(6,290)	[1,510]	{755}	31,786	(6,357)	[1,526]	{763}
Gwinnett	29,959	30,109	30,204	30,306	30,500	(6,100)	[1,464]	{732}	30,693	(6,139)	[1,473]	{737}	30,887	(6,177)	[1,483]	{741}
Hall	10,485	10,529	10,574	10,595	10,675	(2,135)	[512]	{256}	10,756	(2,151)	[516]	{258}	10,839	(2,168)	[520]	{260}
Henry	5,999	6,050	6,096	6,136	6,208	(1,242)	[298]	{149}	6,282	(1,256)	[302]	{151}	6,358	(1,272)	[305]	{153}
Lee	743	744	746	746	748	(150)	[36]	{18}	750	(150)	[36]	{18}	752	(150)	[36]	{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.