

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 2/11/22**

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 2/11/22 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.**

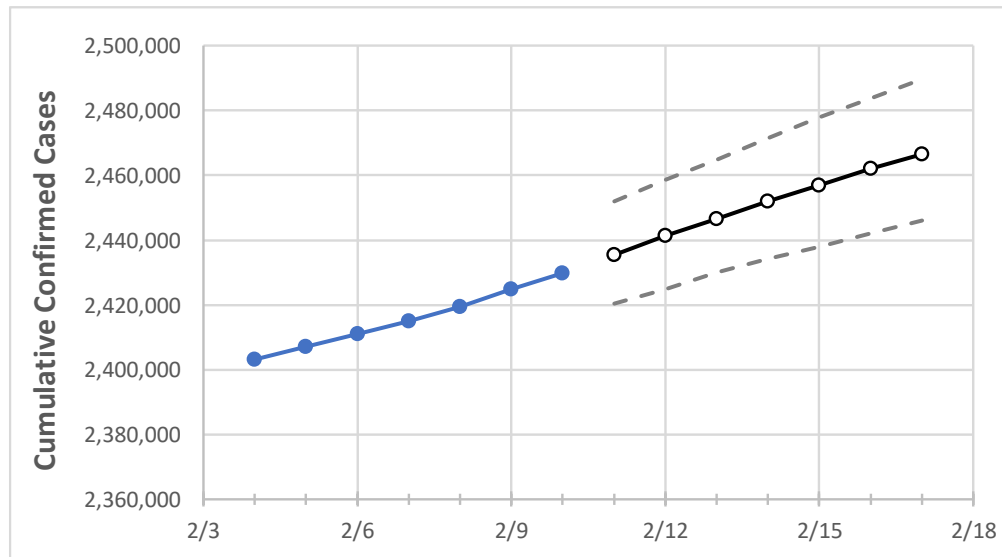
**IEM's Modeling Lead**

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:						
	2/7	2/8	2/9	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17
Georgia	2,414,929	2,419,503	2,424,950	2,429,839	2,435,500	2,441,256	2,446,575	2,452,065	2,456,873	2,461,981	2,466,603

*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:						
	2/7	2/8	2/9	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17
Bartow	28,007	28,027	28,059	28,087	28,141	28,190	28,241	28,289	28,339	28,387	28,428
Carroll	23,188	23,239	23,282	23,309	23,352	23,393	23,429	23,466	23,503	23,537	23,571
Cherokee	61,663	61,789	61,921	62,015	62,122	62,227	62,325	62,422	62,506	62,601	62,689
Clarke	29,088	29,119	29,174	29,209	29,251	29,293	29,331	29,369	29,403	29,439	29,471
Clayton	62,160	62,249	62,326	62,410	62,498	62,582	62,655	62,725	62,801	62,875	62,942
Cobb	165,874	166,159	166,503	166,876	167,272	167,671	168,062	168,431	168,784	169,151	169,481
DeKalb	141,001	141,199	141,438	141,867	142,258	142,661	143,015	143,390	143,721	144,106	144,438
Dougherty	18,939	18,977	19,049	19,095	19,182	19,267	19,344	19,422	19,493	19,576	19,647
Douglas	34,037	34,111	34,169	34,225	34,281	34,332	34,382	34,431	34,476	34,522	34,564
Fulton	208,062	208,372	208,696	209,177	209,692	210,199	210,665	211,141	211,583	212,058	212,450
Gwinnett	201,509	201,693	202,131	202,602	203,090	203,549	203,977	204,412	204,818	205,239	205,593
Hall	52,136	52,196	52,296	52,377	52,465	52,549	52,631	52,709	52,783	52,857	52,924
Henry	56,273	56,334	56,416	56,473	56,566	56,657	56,737	56,819	56,900	56,978	57,050
Lee	6,996	7,031	7,066	7,083	7,119	7,153	7,187	7,221	7,254	7,284	7,318

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:											
	2/7	2/8	2/9	2/10	2/12				2/14				2/16			
Bartow	28,007	28,027	28,059	28,087	28,190	(5,638)	[1,353]	{677}	28,289	(5,658)	[1,358]	{679}	28,387	(5,677)	[1,363]	{681}
Carroll	23,188	23,239	23,282	23,309	23,393	(4,679)	[1,123]	{561}	23,466	(4,693)	[1,126]	{563}	23,537	(4,707)	[1,130]	{565}
Cherokee	61,663	61,789	61,921	62,015	62,227	(12,445)	[2,987]	{1,493}	62,422	(12,484)	[2,996]	{1,498}	62,601	(12,520)	[3,005]	{1,502}
Clarke	29,088	29,119	29,174	29,209	29,293	(5,859)	[1,406]	{703}	29,369	(5,874)	[1,410]	{705}	29,439	(5,888)	[1,413]	{707}
Clayton	62,160	62,249	62,326	62,410	62,582	(12,516)	[3,004]	{1,502}	62,725	(12,545)	[3,011]	{1,505}	62,875	(12,575)	[3,018]	{1,509}
Cobb	165,874	166,159	166,503	166,876	167,671	(33,534)	[8,048]	{4,024}	168,431	(33,686)	[8,085]	{4,042}	169,151	(33,830)	[8,119]	{4,060}
DeKalb	141,001	141,199	141,438	141,867	142,661	(28,532)	[6,848]	{3,424}	143,390	(28,678)	[6,883]	{3,441}	144,106	(28,821)	[6,917]	{3,459}
Dougherty	18,939	18,977	19,049	19,095	19,267	(3,853)	[925]	{462}	19,422	(3,884)	[932]	{466}	19,576	(3,915)	[940]	{470}
Douglas	34,037	34,111	34,169	34,225	34,332	(6,866)	[1,648]	{824}	34,431	(6,886)	[1,653]	{826}	34,522	(6,904)	[1,657]	{829}
Fulton	208,062	208,372	208,696	209,177	210,199	(42,040)	[10,090]	{5,045}	211,141	(42,228)	[10,135]	{5,067}	212,058	(42,412)	[10,179]	{5,089}
Gwinnett	201,509	201,693	202,131	202,602	203,549	(40,710)	[9,770]	{4,885}	204,412	(40,882)	[9,812]	{4,906}	205,239	(41,048)	[9,851]	{4,926}
Hall	52,136	52,196	52,296	52,377	52,549	(10,510)	[2,522]	{1,261}	52,709	(10,542)	[2,530]	{1,265}	52,857	(10,571)	[2,537]	{1,269}
Henry	56,273	56,334	56,416	56,473	56,657	(11,331)	[2,720]	{1,360}	56,819	(11,364)	[2,727]	{1,364}	56,978	(11,396)	[2,735]	{1,367}
Lee	6,996	7,031	7,066	7,083	7,153	(1,431)	[343]	{172}	7,221	(1,444)	[347]	{173}	7,284	(1,457)	[350]	{175}

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.