IEM's AI Modeling: Short-term COVID-19 Projections
Date: 1/28/22

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 1/28/22 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
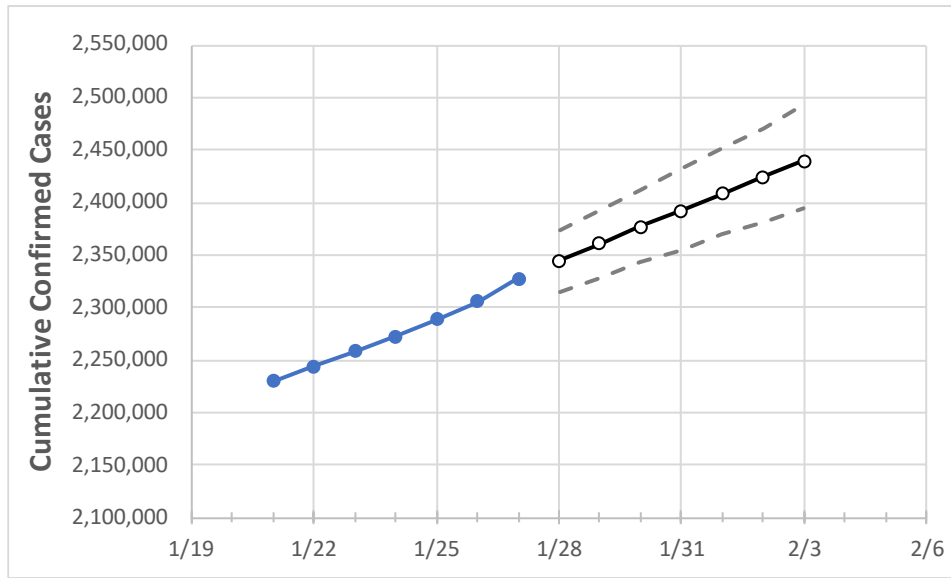
	Actual Confirmed Cases On:				Projected Cases For:						
	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3
Georgia	2,272,461	2,288,693	2,306,025	2,327,733	2,344,310	2,360,586	2,376,565	2,392,130	2,408,211	2,424,196	2,439,393

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:						
	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3
Bartow	26,843	26,950	27,087	27,197	27,324	27,451	27,573	27,698	27,818	27,933	28,052
Carroll	22,160	22,249	22,344	22,529	22,643	22,753	22,863	22,972	23,080	23,187	23,289
Cherokee	58,608	58,943	59,261	59,958	60,335	60,694	61,051	61,408	61,768	62,122	62,476
Clarke	27,632	27,746	27,928	28,299	28,495	28,700	28,894	29,093	29,293	29,488	29,689
Clayton	57,231	57,525	57,906	60,653	61,114	61,536	61,970	62,358	62,785	63,227	63,675
Cobb	156,943	157,950	159,133	160,230	161,109	161,946	162,785	163,636	164,455	165,284	166,082
DeKalb	131,946	133,653	135,360	136,023	136,914	137,774	138,628	139,515	140,359	141,220	142,094
Dougherty	17,048	17,249	17,476	17,588	17,794	18,016	18,243	18,455	18,676	18,907	19,140
Douglas	32,709	32,864	33,021	33,181	33,309	33,427	33,547	33,663	33,773	33,882	33,989
Fulton	196,810	198,398	200,005	201,448	202,904	204,413	205,937	207,486	209,091	210,690	212,323
Gwinnett	189,714	191,501	193,620	194,507	195,738	196,940	198,127	199,313	200,513	201,658	202,838
Hall	49,845	50,071	50,348	50,592	50,856	51,112	51,370	51,629	51,876	52,128	52,374
Henry	54,014	54,231	54,468	54,878	55,075	55,254	55,437	55,615	55,799	55,960	56,129
Lee	6,240	6,340	6,415	6,481	6,574	6,669	6,763	6,862	6,965	7,075	7,183

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:		
	1/24	1/25	1/26	1/27	1/29	1/31	2/2
Bartow	26,843	26,950	27,087	27,197	27,451 (5,490) [1,318] {659}	27,698 (5,540) [1,329] {665}	27,933 (5,587) [1,341] {670}
Carroll	22,160	22,249	22,344	22,529	22,753 (4,551) [1,092] {546}	22,972 (4,594) [1,103] {551}	23,187 (4,637) [1,113] {556}
Cherokee	58,608	58,943	59,261	59,958	60,694 (12,139) [2,913] {1,457}	61,408 (12,282) [2,948] {1,474}	62,122 (12,424) [2,982] {1,491}
Clarke	27,632	27,746	27,928	28,299	28,700 (5,740) [1,378] {689}	29,093 (5,819) [1,396] {698}	29,488 (5,898) [1,415] {708}
Clayton	57,231	57,525	57,906	60,653	61,536 (12,307) [2,954] {1,477}	62,358 (12,472) [2,993] {1,497}	63,227 (12,645) [3,035] {1,517}
Cobb	156,943	157,950	159,133	160,230	161,946 (32,389) [7,773] {3,887}	163,636 (32,727) [7,855] {3,927}	165,284 (33,057) [7,934] {3,967}
DeKalb	131,946	133,653	135,360	136,023	137,774 (27,555) [6,613] {3,307}	139,515 (27,903) [6,697] {3,348}	141,220 (28,244) [6,779] {3,389}
Dougherty	17,048	17,249	17,476	17,588	18,016 (3,603) [865] {432}	18,455 (3,691) [886] {443}	18,907 (3,781) [908] {454}
Douglas	32,709	32,864	33,021	33,181	33,427 (6,685) [1,604] {802}	33,663 (6,733) [1,616] {808}	33,882 (6,776) [1,626] {813}
Fulton	196,810	198,398	200,005	201,448	204,413 (40,883) [9,812] {4,906}	207,486 (41,497) [9,959] {4,980}	210,690 (42,138) [10,113] {5,057}
Gwinnett	189,714	191,501	193,620	194,507	196,940 (39,388) [9,453] {4,727}	199,313 (39,863) [9,567] {4,784}	201,658 (40,332) [9,680] {4,840}
Hall	49,845	50,071	50,348	50,592	51,112 (10,222) [2,453] {1,227}	51,629 (10,326) [2,478] {1,239}	52,128 (10,426) [2,502] {1,251}
Henry	54,014	54,231	54,468	54,878	55,254 (11,051) [2,652] {1,326}	55,615 (11,123) [2,670] {1,335}	55,960 (11,192) [2,686] {1,343}
Lee	6,240	6,340	6,415	6,481	6,669 (1,334) [320] {160}	6,862 (1,372) [329] {165}	7,075 (1,415) [340] {170}

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.