IEM's AI Modeling: Short-term COVID-19 Projections
Date: 8/27/21

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 8/27/21 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
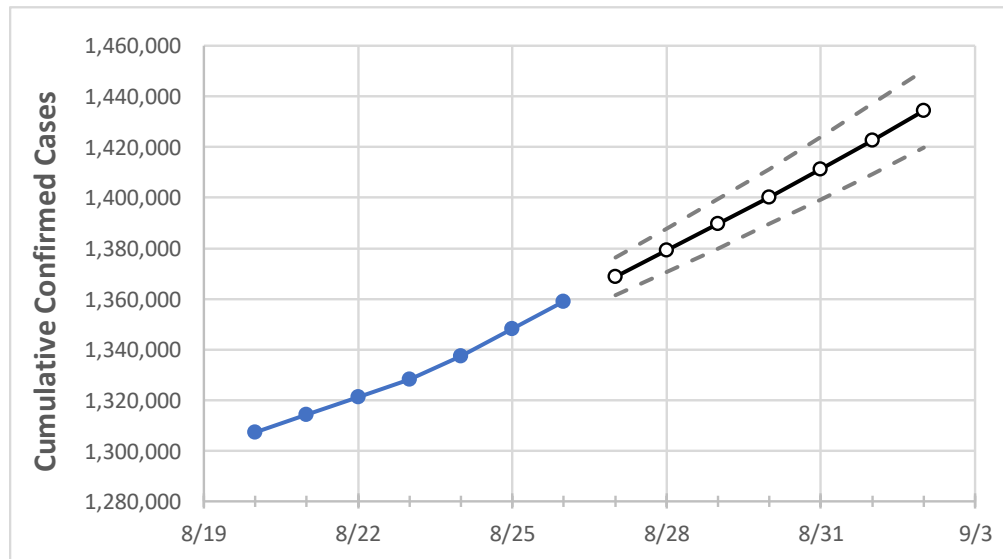
	Actual Confirmed Cases On:				Projected Cases For:						
	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2
Georgia	1,328,156	1,337,342	1,348,019	1,358,842	1,368,817	1,379,074	1,389,547	1,400,283	1,411,303	1,422,779	1,434,421

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:						
	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2
Bartow	16,692	16,816	17,005	17,106	17,216	17,327	17,444	17,562	17,691	17,823	17,963
Carroll	13,598	13,683	13,784	13,840	13,933	14,026	14,122	14,218	14,318	14,420	14,525
Cherokee	36,147	36,355	36,633	36,875	37,122	37,372	37,628	37,893	38,165	38,446	38,735
Clarke	16,864	16,943	17,085	17,184	17,279	17,380	17,482	17,591	17,703	17,815	17,935
Clayton	32,165	32,313	32,539	32,700	32,894	33,092	33,291	33,492	33,700	33,908	34,122
Cobb	91,557	91,972	92,431	93,089	93,605	94,126	94,661	95,203	95,756	96,318	96,895
DeKalb	76,405	76,691	77,168	77,621	77,986	78,359	78,735	79,112	79,496	79,899	80,301
Dougherty	9,368	9,457	9,542	9,674	9,772	9,877	9,982	10,091	10,205	10,325	10,447
Douglas	18,126	18,237	18,352	18,510	18,635	18,766	18,898	19,035	19,177	19,322	19,473
Fulton	112,881	113,214	113,777	114,372	114,862	115,355	115,862	116,365	116,874	117,401	117,916
Gwinnett	112,574	112,898	113,412	113,839	114,235	114,632	115,038	115,452	115,881	116,316	116,759
Hall	30,579	30,725	30,936	31,141	31,308	31,486	31,666	31,857	32,048	32,257	32,468
Henry	31,094	31,254	31,460	31,703	31,936	32,177	32,417	32,664	32,919	33,182	33,446
Lee	3,535	3,593	3,631	3,693	3,738	3,785	3,835	3,888	3,939	3,994	4,052

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:		
	8/23	8/24	8/25	8/26	8/28	8/30	9/1
Bartow	16,692	16,816	17,005	17,106	17,327 (3,465) [832] {416}	17,562 (3,512) [843] {421}	17,823 (3,565) [856] {428}
Carroll	13,598	13,683	13,784	13,840	14,026 (2,805) [673] {337}	14,218 (2,844) [682] {341}	14,420 (2,884) [692] {346}
Cherokee	36,147	36,355	36,633	36,875	37,372 (7,474) [1,794] {897}	37,893 (7,579) [1,819] {909}	38,446 (7,689) [1,845] {923}
Clarke	16,864	16,943	17,085	17,184	17,380 (3,476) [834] {417}	17,591 (3,518) [844] {422}	17,815 (3,563) [855] {428}
Clayton	32,165	32,313	32,539	32,700	33,092 (6,618) [1,588] {794}	33,492 (6,698) [1,608] {804}	33,908 (6,782) [1,628] {814}
Cobb	91,557	91,972	92,431	93,089	94,126 (18,825) [4,518] {2,259}	95,203 (19,041) [4,570] {2,285}	96,318 (19,264) [4,623] {2,312}
DeKalb	76,405	76,691	77,168	77,621	78,359 (15,672) [3,761] {1,881}	79,112 (15,822) [3,797] {1,899}	79,899 (15,980) [3,835] {1,918}
Dougherty	9,368	9,457	9,542	9,674	9,877 (1,975) [474] {237}	10,091 (2,018) [484] {242}	10,325 (2,065) [496] {248}
Douglas	18,126	18,237	18,352	18,510	18,766 (3,753) [901] {450}	19,035 (3,807) [914] {457}	19,322 (3,864) [927] {464}
Fulton	112,881	113,214	113,777	114,372	115,355 (23,071) [5,537] {2,769}	116,365 (23,273) [5,586] {2,793}	117,401 (23,480) [5,635] {2,818}
Gwinnett	112,574	112,898	113,412	113,839	114,632 (22,926) [5,502] {2,751}	115,452 (23,090) [5,542] {2,771}	116,316 (23,263) [5,583] {2,792}
Hall	30,579	30,725	30,936	31,141	31,486 (6,297) [1,511] {756}	31,857 (6,371) [1,529] {765}	32,257 (6,451) [1,548] {774}
Henry	31,094	31,254	31,460	31,703	32,177 (6,435) [1,545] {772}	32,664 (6,533) [1,568] {784}	33,182 (6,636) [1,593] {796}
Lee	3,535	3,593	3,631	3,693	3,785 (757) [182] {91}	3,888 (778) [187] {93}	3,994 (799) [192] {96}

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.