IEM's AI Modeling: Short-term COVID-19 Projections
Date: 8/25/21

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 8/25/21 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
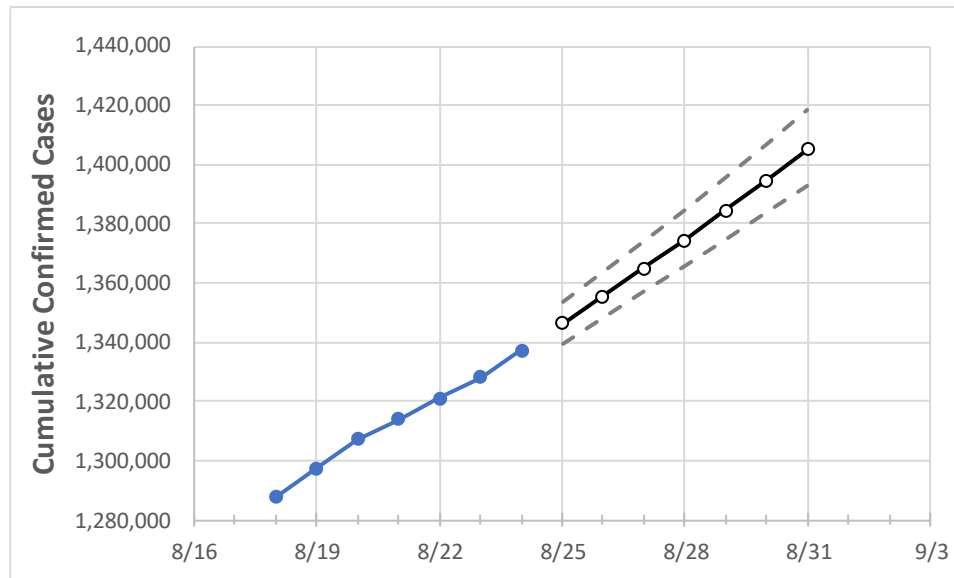
	Actual Confirmed Cases On:				Projected Cases For:						
	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31
Georgia	1,314,108	1,321,132	1,328,156	1,337,342	1,346,337	1,355,472	1,364,943	1,374,545	1,384,487	1,394,693	1,405,083

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:						
	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31
Bartow	16,585	16,639	16,692	16,816	16,903	16,992	17,083	17,176	17,275	17,377	17,482
Carroll	13,448	13,523	13,598	13,683	13,775	13,868	13,962	14,060	14,161	14,264	14,369
Cherokee	35,800	35,974	36,147	36,355	36,601	36,855	37,118	37,383	37,662	37,951	38,256
Clarke	16,738	16,801	16,864	16,943	17,021	17,101	17,184	17,269	17,356	17,446	17,537
Clayton	31,789	31,977	32,165	32,313	32,516	32,720	32,933	33,149	33,368	33,592	33,827
Cobb	90,699	91,128	91,557	91,972	92,444	92,922	93,411	93,910	94,421	94,946	95,487
DeKalb	75,916	76,161	76,405	76,691	77,021	77,363	77,701	78,048	78,395	78,748	79,107
Dougherty	9,223	9,295	9,368	9,457	9,547	9,634	9,727	9,822	9,921	10,022	10,125
Douglas	17,940	18,033	18,126	18,237	18,346	18,458	18,573	18,691	18,810	18,935	19,060
Fulton	112,049	112,465	112,881	113,214	113,661	114,111	114,560	115,019	115,484	115,956	116,438
Gwinnett	112,061	112,318	112,574	112,898	113,251	113,609	113,972	114,335	114,702	115,093	115,490
Hall	30,388	30,483	30,579	30,725	30,859	31,000	31,144	31,291	31,444	31,601	31,765
Henry	30,666	30,880	31,094	31,254	31,491	31,727	31,973	32,223	32,484	32,749	33,020
Lee	3,476	3,505	3,535	3,593	3,629	3,665	3,703	3,742	3,780	3,822	3,864

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:		
	8/21	8/22	8/23	8/24	8/26	8/28	8/30
Bartow	16,585	16,639	16,692	16,816	16,992 (3,398) [816] {408}	17,176 (3,435) [824] {412}	17,377 (3,475) [834] {417}
Carroll	13,448	13,523	13,598	13,683	13,868 (2,774) [666] {333}	14,060 (2,812) [675] {337}	14,264 (2,853) [685] {342}
Cherokee	35,800	35,974	36,147	36,355	36,855 (7,371) [1,769] {885}	37,383 (7,477) [1,794] {897}	37,951 (7,590) [1,822] {911}
Clarke	16,738	16,801	16,864	16,943	17,101 (3,420) [821] {410}	17,269 (3,454) [829] {414}	17,446 (3,489) [837] {419}
Clayton	31,789	31,977	32,165	32,313	32,720 (6,544) [1,571] {785}	33,149 (6,630) [1,591] {796}	33,592 (6,718) [1,612] {806}
Cobb	90,699	91,128	91,557	91,972	92,922 (18,584) [4,460] {2,230}	93,910 (18,782) [4,508] {2,254}	94,946 (18,989) [4,557] {2,279}
DeKalb	75,916	76,161	76,405	76,691	77,363 (15,473) [3,713] {1,857}	78,048 (15,610) [3,746] {1,873}	78,748 (15,750) [3,780] {1,890}
Dougherty	9,223	9,295	9,368	9,457	9,634 (1,927) [462] {231}	9,822 (1,964) [471] {236}	10,022 (2,004) [481] {241}
Douglas	17,940	18,033	18,126	18,237	18,458 (3,692) [886] {443}	18,691 (3,738) [897] {449}	18,935 (3,787) [909] {454}
Fulton	112,049	112,465	112,881	113,214	114,111 (22,822) [5,477] {2,739}	115,019 (23,004) [5,521] {2,760}	115,956 (23,191) [5,566] {2,783}
Gwinnett	112,061	112,318	112,574	112,898	113,609 (22,722) [5,453] {2,727}	114,335 (22,867) [5,488] {2,744}	115,093 (23,019) [5,524] {2,762}
Hall	30,388	30,483	30,579	30,725	31,000 (6,200) [1,488] {744}	31,291 (6,258) [1,502] {751}	31,601 (6,320) [1,517] {758}
Henry	30,666	30,880	31,094	31,254	31,727 (6,345) [1,523] {761}	32,223 (6,445) [1,547] {773}	32,749 (6,550) [1,572] {786}
Lee	3,476	3,505	3,535	3,593	3,665 (733) [176] {88}	3,742 (748) [180] {90}	3,822 (764) [183] {92}

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.