IEM's AI Modeling: Short-term COVID-19 Projections
Date: 2/19/21

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 2/19/21 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
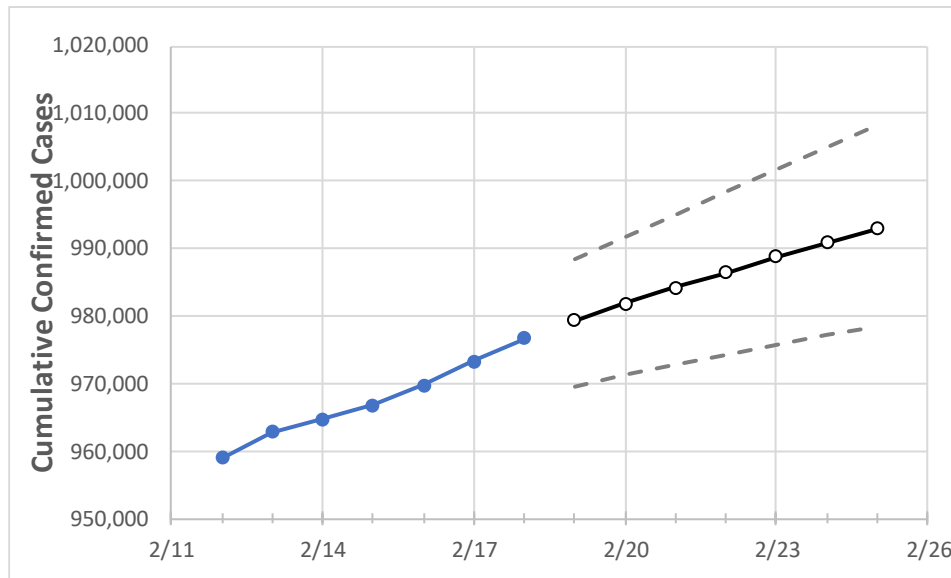
	Actual Confirmed Cases On:				Projected Cases For:						
	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22	2/23	2/24	2/25
Georgia	966,807	969,702	973,247	976,732	979,300	981,784	984,216	986,502	988,764	990,847	992,948

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:						
	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22	2/23	2/24	2/25
Bartow	12,190	12,252	12,320	12,378	12,428	12,476	12,522	12,567	12,613	12,656	12,699
Carroll	10,209	10,222	10,243	10,268	10,289	10,309	10,328	10,345	10,362	10,378	10,394
Cherokee	25,812	25,906	26,051	26,207	26,297	26,384	26,469	26,556	26,640	26,721	26,801
Clarke	13,733	13,764	13,800	13,834	13,863	13,890	13,917	13,943	13,968	13,992	14,015
Clayton	22,127	22,196	22,265	22,355	22,460	22,563	22,663	22,762	22,861	22,949	23,037
Cobb	66,805	66,980	67,268	67,508	67,690	67,866	68,032	68,191	68,348	68,496	68,635
DeKalb	54,603	54,691	54,913	55,111	55,264	55,418	55,564	55,706	55,840	55,976	56,108
Dougherty	6,916	6,919	6,945	6,960	6,971	6,981	6,991	7,001	7,009	7,017	7,025
Douglas	12,832	12,872	12,914	12,973	13,018	13,062	13,104	13,145	13,184	13,221	13,258
Fulton	82,063	82,276	82,534	82,781	82,986	83,188	83,378	83,564	83,742	83,916	84,083
Gwinnett	88,737	89,010	89,315	89,592	89,804	90,012	90,208	90,390	90,569	90,750	90,923
Hall	24,890	24,931	24,993	25,038	25,072	25,105	25,137	25,167	25,197	25,224	25,250
Henry	20,547	20,594	20,660	20,727	20,782	20,836	20,887	20,935	20,981	21,026	21,069
Lee	2,520	2,527	2,533	2,535	2,539	2,542	2,545	2,549	2,552	2,554	2,557

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:		
	2/15	2/16	2/17	2/18	2/20	2/22	2/24
Bartow	12,190	12,252	12,320	12,378	12,476 (2,495) [599] {299}	12,567 (2,513) [603] {302}	12,656 (2,531) [608] {304}
Carroll	10,209	10,222	10,243	10,268	10,309 (2,062) [495] {247}	10,345 (2,069) [497] {248}	10,378 (2,076) [498] {249}
Cherokee	25,812	25,906	26,051	26,207	26,384 (5,277) [1,266] {633}	26,556 (5,311) [1,275] {637}	26,721 (5,344) [1,283] {641}
Clarke	13,733	13,764	13,800	13,834	13,890 (2,778) [667] {333}	13,943 (2,789) [669] {335}	13,992 (2,798) [672] {336}
Clayton	22,127	22,196	22,265	22,355	22,563 (4,513) [1,083] {542}	22,762 (4,552) [1,093] {546}	22,949 (4,590) [1,102] {551}
Cobb	66,805	66,980	67,268	67,508	67,866 (13,573) [3,258] {1,629}	68,191 (13,638) [3,273] {1,637}	68,496 (13,699) [3,288] {1,644}
DeKalb	54,603	54,691	54,913	55,111	55,418 (11,084) [2,660] {1,330}	55,706 (11,141) [2,674] {1,337}	55,976 (11,195) [2,687] {1,343}
Dougherty	6,916	6,919	6,945	6,960	6,981 (1,396) [335] {168}	7,001 (1,400) [336] {168}	7,017 (1,403) [337] {168}
Douglas	12,832	12,872	12,914	12,973	13,062 (2,612) [627] {313}	13,145 (2,629) [631] {315}	13,221 (2,644) [635] {317}
Fulton	82,063	82,276	82,534	82,781	83,188 (16,638) [3,993] {1,997}	83,564 (16,713) [4,011] {2,006}	83,916 (16,783) [4,028] {2,014}
Gwinnett	88,737	89,010	89,315	89,592	90,012 (18,002) [4,321] {2,160}	90,390 (18,078) [4,339] {2,169}	90,750 (18,150) [4,356] {2,178}
Hall	24,890	24,931	24,993	25,038	25,105 (5,021) [1,205] {603}	25,167 (5,033) [1,208] {604}	25,224 (5,045) [1,211] {605}
Henry	20,547	20,594	20,660	20,727	20,836 (4,167) [1,000] {500}	20,935 (4,187) [1,005] {502}	21,026 (4,205) [1,009] {505}
Lee	2,520	2,527	2,533	2,535	2,542 (508) [122] {61}	2,549 (510) [122] {61}	2,554 (511) [123] {61}

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.