IEM's AI Modeling: Short-term COVID-19 Projections
Date: 5/6/21

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 5/6/21 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.

Louisiana State Projections
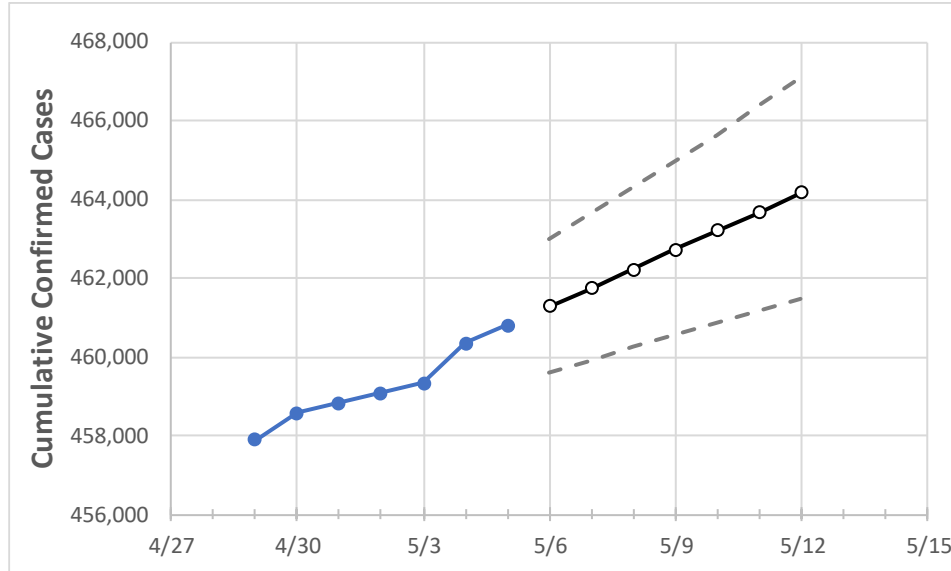
	Actual Confirmed Cases On:				Projected Cases For:						
	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9	5/10	5/11	5/12
Louisiana	459,087	459,340	460,337	460,803	461,276	461,751	462,228	462,717	463,200	463,673	464,167

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.

Louisiana Parishes

	Actual Confirmed Cases On:				Projected Cases For:						
	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9	5/10	5/11	5/12
Ascension Parish	12,091	12,097	12,138	12,137	12,155	12,175	12,196	12,215	12,235	12,255	12,277
Bossier Parish	13,774	13,785	13,794	13,817	13,833	13,849	13,865	13,882	13,898	13,914	13,931
Caddo Parish	25,857	25,871	25,936	25,977	26,007	26,037	26,068	26,099	26,132	26,164	26,198
Calcasieu Parish	22,361	22,372	22,422	22,449	22,469	22,489	22,509	22,529	22,547	22,566	22,584
East Baton Rouge Parish	39,145	39,168	39,324	39,380	39,439	39,499	39,558	39,617	39,678	39,737	39,796
Jefferson Parish	45,950	45,974	46,025	46,053	46,086	46,119	46,151	46,185	46,219	46,253	46,288
Lafayette Parish	23,259	23,278	23,393	23,405	23,443	23,482	23,520	23,560	23,601	23,644	23,689
Lafourche Parish	9,539	9,552	9,571	9,571	9,584	9,599	9,613	9,630	9,646	9,664	9,682
Orleans Parish	29,903	29,916	29,965	29,974	29,996	30,018	30,040	30,063	30,085	30,109	30,131
Ouachita Parish	18,309	18,313	18,359	18,381	18,401	18,422	18,443	18,466	18,491	18,514	18,538
Rapides Parish	11,991	11,999	12,035	12,045	12,061	12,077	12,094	12,110	12,127	12,145	12,163
St. Bernard Parish	4,007	4,009	4,013	4,017	4,020	4,023	4,026	4,029	4,033	4,036	4,039
St. Charles Parish	5,386	5,392	5,397	5,401	5,406	5,412	5,417	5,423	5,429	5,435	5,441
St. James Parish	1,953	1,952	1,954	1,958	1,961	1,965	1,969	1,973	1,976	1,980	1,985
St. John the Baptist Parish	3,702	3,705	3,715	3,716	3,720	3,724	3,728	3,732	3,736	3,740	3,745
St. Tammany Parish	25,585	25,594	25,619	25,653	25,674	25,694	25,715	25,736	25,758	25,780	25,802

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.*

Louisiana Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:		
	5/2	5/3	5/4	5/5	5/7	5/9	5/11
Ascension Parish	12,091	12,097	12,138	12,137	12,175 (2,435) [584] {292}	12,215 (2,443) [586] {293}	12,255 (2,451) [588] {294}
Bossier Parish	13,774	13,785	13,794	13,817	13,849 (2,770) [665] {332}	13,882 (2,776) [666] {333}	13,914 (2,783) [668] {334}
Caddo Parish	25,857	25,871	25,936	25,977	26,037 (5,207) [1,250] {625}	26,099 (5,220) [1,253] {626}	26,164 (5,233) [1,256] {628}
Calcasieu Parish	22,361	22,372	22,422	22,449	22,489 (4,498) [1,079] {540}	22,529 (4,506) [1,081] {541}	22,566 (4,513) [1,083] {542}
East Baton Rouge Parish	39,145	39,168	39,324	39,380	39,499 (7,900) [1,896] {948}	39,617 (7,923) [1,902] {951}	39,737 (7,947) [1,907] {954}
Jefferson Parish	45,950	45,974	46,025	46,053	46,119 (9,224) [2,214] {1,107}	46,185 (9,237) [2,217] {1,108}	46,253 (9,251) [2,220] {1,110}
Lafayette Parish	23,259	23,278	23,393	23,405	23,482 (4,696) [1,127] {564}	23,560 (4,712) [1,131] {565}	23,644 (4,729) [1,135] {567}
Lafourche Parish	9,539	9,552	9,571	9,571	9,599 (1,920) [461] {230}	9,630 (1,926) [462] {231}	9,664 (1,933) [464] {232}
Orleans Parish	29,903	29,916	29,965	29,974	30,018 (6,004) [1,441] {720}	30,063 (6,013) [1,443] {722}	30,109 (6,022) [1,445] {723}
Ouachita Parish	18,309	18,313	18,359	18,381	18,422 (3,684) [884] {442}	18,466 (3,693) [886] {443}	18,514 (3,703) [889] {444}
Rapides Parish	11,991	11,999	12,035	12,045	12,077 (2,415) [580] {290}	12,110 (2,422) [581] {291}	12,145 (2,429) [583] {291}
St. Bernard Parish	4,007	4,009	4,013	4,017	4,023 (805) [193] {97}	4,029 (806) [193] {97}	4,036 (807) [194] {97}
St. Charles Parish	5,386	5,392	5,397	5,401	5,412 (1,082) [260] {130}	5,423 (1,085) [260] {130}	5,435 (1,087) [261] {130}
St. James Parish	1,953	1,952	1,954	1,958	1,965 (393) [94] {47}	1,973 (395) [95] {47}	1,980 (396) [95] {48}
St. John the Baptist Parish	3,702	3,705	3,715	3,716	3,724 (745) [179] {89}	3,732 (746) [179] {90}	3,740 (748) [180] {90}
St. Tammany Parish	25,585	25,594	25,619	25,653	25,694 (5,139) [1,233] {617}	25,736 (5,147) [1,235] {618}	25,780 (5,156) [1,237] {619}

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.