IEM's AI Modeling: Short-term COVID-19 Projections
Date: 7/19/21

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 <u>not</u> 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 7/19/21 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.

Louisiana State Projections
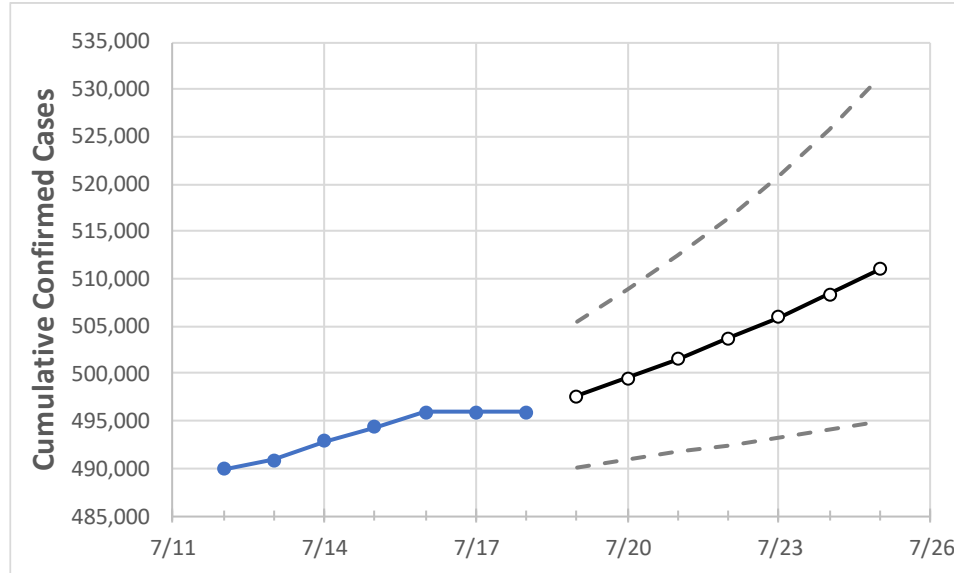
	Actual Confirmed Cases On:				Projected Cases For:						
	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25
Louisiana	494,340	495,945	495,945	495,945	497,675	499,517	501,546	503,714	505,989	508,426	511,050

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:						
	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25
Ascension Parish	13,458	13,523	13,523	13,523	13,607	13,696	13,794	13,902	14,016	14,146	14,286
Bossier Parish	14,796	14,860	14,860	14,860	14,917	14,979	15,045	15,119	15,201	15,290	15,388
Caddo Parish	27,629	27,682	27,682	27,682	27,734	27,788	27,845	27,908	27,975	28,046	28,122
Calcasieu Parish	23,580	23,638	23,638	23,638	23,676	23,716	23,757	23,801	23,848	23,896	23,946
East Baton Rouge Parish	42,450	42,601	42,601	42,601	42,787	42,990	43,213	43,453	43,716	43,996	44,302
Jefferson Parish	48,442	48,570	48,570	48,570	48,683	48,804	48,934	49,070	49,218	49,380	49,551
Lafayette Parish	25,234	25,304	25,304	25,304	25,390	25,480	25,574	25,678	25,790	25,910	26,038
Lafourche Parish	10,656	10,705	10,705	10,705	10,765	10,830	10,902	10,978	11,058	11,142	11,233
Orleans Parish	31,801	31,933	31,933	31,933	32,063	32,208	32,367	32,544	32,741	32,954	33,189
Ouachita Parish	19,417	19,470	19,470	19,470	19,517	19,567	19,620	19,678	19,738	19,804	19,873
Rapides Parish	13,070	13,121	13,121	13,121	13,177	13,240	13,308	13,386	13,470	13,561	13,661
St. Bernard Parish	4,262	4,274	4,274	4,274	4,293	4,312	4,335	4,359	4,386	4,416	4,446
St. Charles Parish	5,877	5,903	5,903	5,903	5,936	5,970	6,008	6,050	6,095	6,144	6,197
St. James Parish	2,086	2,088	2,088	2,088	2,092	2,096	2,101	2,106	2,111	2,116	2,122
St. John the Baptist Parish	3,977	3,995	3,995	3,995	4,010	4,025	4,042	4,060	4,080	4,102	4,124
St. Tammany Parish	27,489	27,631	27,631	27,631	27,791	27,962	28,155	28,357	28,582	28,823	29,077

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:		
	7/15	7/16	7/17	7/18	7/20	7/22	7/24
Ascension Parish	13,458	13,523	13,523	13,523	13,696 (2,739) [657] {329}	13,902 (2,780) [667] {334}	14,146 (2,829) [679] {340}
Bossier Parish	14,796	14,860	14,860	14,860	14,979 (2,996) [719] {360}	15,119 (3,024) [726] {363}	15,290 (3,058) [734] {367}
Caddo Parish	27,629	27,682	27,682	27,682	27,788 (5,558) [1,334] {667}	27,908 (5,582) [1,340] {670}	28,046 (5,609) [1,346] {673}
Calcasieu Parish	23,580	23,638	23,638	23,638	23,716 (4,743) [1,138] {569}	23,801 (4,760) [1,142] {571}	23,896 (4,779) [1,147] {574}
East Baton Rouge Parish	42,450	42,601	42,601	42,601	42,990 (8,598) [2,064] {1,032}	43,453 (8,691) [2,086] {1,043}	43,996 (8,799) [2,112] {1,056}
Jefferson Parish	48,442	48,570	48,570	48,570	48,804 (9,761) [2,343] {1,171}	49,070 (9,814) [2,355] {1,178}	49,380 (9,876) [2,370] {1,185}
Lafayette Parish	25,234	25,304	25,304	25,304	25,480 (5,096) [1,223] {612}	25,678 (5,136) [1,233] {616}	25,910 (5,182) [1,244] {622}
Lafourche Parish	10,656	10,705	10,705	10,705	10,830 (2,166) [520] {260}	10,978 (2,196) [527] {263}	11,142 (2,228) [535] {267}
Orleans Parish	31,801	31,933	31,933	31,933	32,208 (6,442) [1,546] {773}	32,544 (6,509) [1,562] {781}	32,954 (6,591) [1,582] {791}
Ouachita Parish	19,417	19,470	19,470	19,470	19,567 (3,913) [939] {470}	19,678 (3,936) [945] {472}	19,804 (3,961) [951] {475}
Rapides Parish	13,070	13,121	13,121	13,121	13,240 (2,648) [636] {318}	13,386 (2,677) [643] {321}	13,561 (2,712) [651] {325}
St. Bernard Parish	4,262	4,274	4,274	4,274	4,312 (862) [207] {103}	4,359 (872) [209] {105}	4,416 (883) [212] {106}
St. Charles Parish	5,877	5,903	5,903	5,903	5,970 (1,194) [287] {143}	6,050 (1,210) [290] {145}	6,144 (1,229) [295] {147}
St. James Parish	2,086	2,088	2,088	2,088	2,096 (419) [101] {50}	2,106 (421) [101] {51}	2,116 (423) [102] {51}
St. John the Baptist Parish	3,977	3,995	3,995	3,995	4,025 (805) [193] {97}	4,060 (812) [195] {97}	4,102 (820) [197] {98}
St. Tammany Parish	27,489	27,631	27,631	27,631	27,962 (5,592) [1,342] {671}	28,357 (5,671) [1,361] {681}	28,823 (5,765) [1,384] {692}

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.