IEM's AI Modeling: Short-term COVID-19 Projections
Date: 8/2/21

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 8/2/21 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
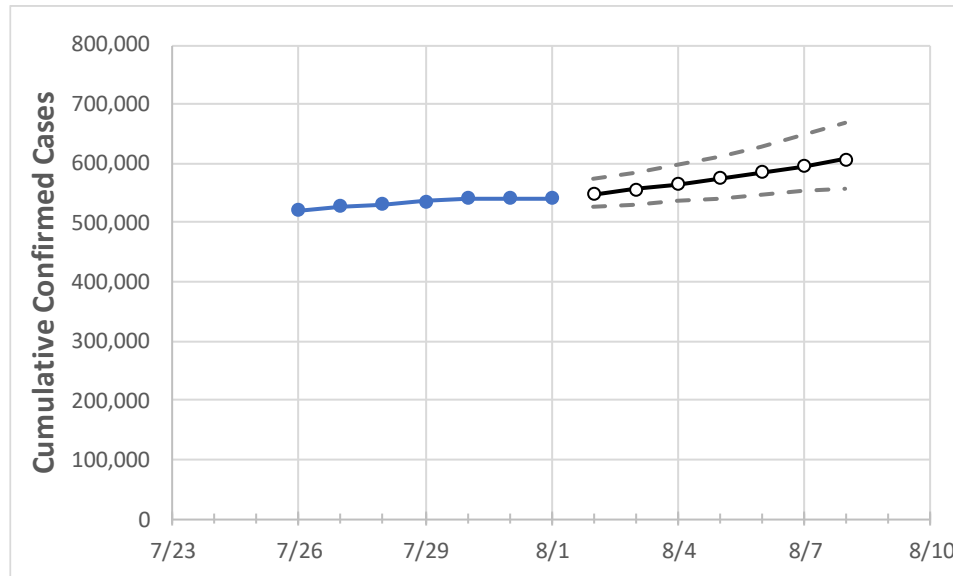
	Actual Confirmed Cases On:				Projected Cases For:						
	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8
Louisiana	536,366	541,679	541,679	541,679	548,767	556,562	565,016	574,353	584,479	595,619	607,906

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:						
	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8
Ascension Parish	15,360	15,552	15,552	15,552	15,877	16,235	16,629	17,060	17,536	18,046	18,627
Bossier Parish	15,549	15,657	15,657	15,657	15,756	15,864	15,980	16,109	16,243	16,385	16,539
Caddo Parish	29,005	29,190	29,190	29,190	29,418	29,664	29,934	30,234	30,557	30,913	31,313
Calcasieu Parish	24,679	24,824	24,824	24,824	25,002	25,198	25,404	25,628	25,880	26,151	26,444
East Baton Rouge Parish	46,806	47,277	47,277	47,277	48,009	48,842	49,771	50,798	51,895	53,087	54,485
Jefferson Parish	52,348	52,912	52,912	52,912	53,695	54,582	55,572	56,656	57,879	59,242	60,770
Lafayette Parish	27,382	27,666	27,666	27,666	28,046	28,454	28,916	29,421	29,968	30,589	31,268
Lafourche Parish	12,055	12,232	12,232	12,232	12,442	12,671	12,921	13,194	13,490	13,813	14,149
Orleans Parish	34,716	35,115	35,115	35,115	35,640	36,208	36,845	37,536	38,286	39,126	40,053
Ouachita Parish	20,747	20,915	20,915	20,915	21,170	21,459	21,775	22,132	22,530	22,971	23,458
Rapides Parish	14,111	14,181	14,181	14,181	14,330	14,495	14,676	14,871	15,087	15,317	15,566
St. Bernard Parish	4,753	4,808	4,808	4,808	4,894	4,990	5,095	5,212	5,343	5,489	5,647
St. Charles Parish	6,534	6,609	6,609	6,609	6,712	6,825	6,946	7,075	7,217	7,368	7,532
St. James Parish	2,301	2,346	2,346	2,346	2,391	2,441	2,501	2,563	2,638	2,721	2,815
St. John the Baptist Parish	4,454	4,524	4,524	4,524	4,618	4,723	4,839	4,969	5,112	5,273	5,450
St. Tammany Parish	30,397	30,769	30,769	30,769	31,193	31,658	32,157	32,700	33,279	33,898	34,572

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:		
	7/29	7/30	7/31	8/1	8/3	8/5	8/7
Ascension Parish	15,360	15,552	15,552	15,552	16,235 (3,247) [779] {390}	17,060 (3,412) [819] {409}	18,046 (3,609) [866] {433}
Bossier Parish	15,549	15,657	15,657	15,657	15,864 (3,173) [761] {381}	16,109 (3,222) [773] {387}	16,385 (3,277) [786] {393}
Caddo Parish	29,005	29,190	29,190	29,190	29,664 (5,933) [1,424] {712}	30,234 (6,047) [1,451] {726}	30,913 (6,183) [1,484] {742}
Calcasieu Parish	24,679	24,824	24,824	24,824	25,198 (5,040) [1,210] {605}	25,628 (5,126) [1,230] {615}	26,151 (5,230) [1,255] {628}
East Baton Rouge Parish	46,806	47,277	47,277	47,277	48,842 (9,768) [2,344] {1,172}	50,798 (10,160) [2,438] {1,219}	53,087 (10,617) [2,548] {1,274}
Jefferson Parish	52,348	52,912	52,912	52,912	54,582 (10,916) [2,620] {1,310}	56,656 (11,331) [2,719] {1,360}	59,242 (11,848) [2,844] {1,422}
Lafayette Parish	27,382	27,666	27,666	27,666	28,454 (5,691) [1,366] {683}	29,421 (5,884) [1,412] {706}	30,589 (6,118) [1,468] {734}
Lafourche Parish	12,055	12,232	12,232	12,232	12,671 (2,534) [608] {304}	13,194 (2,639) [633] {317}	13,813 (2,763) [663] {332}
Orleans Parish	34,716	35,115	35,115	35,115	36,208 (7,242) [1,738] {869}	37,536 (7,507) [1,802] {901}	39,126 (7,825) [1,878] {939}
Ouachita Parish	20,747	20,915	20,915	20,915	21,459 (4,292) [1,030] {515}	22,132 (4,426) [1,062] {531}	22,971 (4,594) [1,103] {551}
Rapides Parish	14,111	14,181	14,181	14,181	14,495 (2,899) [696] {348}	14,871 (2,974) [714] {357}	15,317 (3,063) [735] {368}
St. Bernard Parish	4,753	4,808	4,808	4,808	4,990 (998) [240] {120}	5,212 (1,042) [250] {125}	5,489 (1,098) [263] {132}
St. Charles Parish	6,534	6,609	6,609	6,609	6,825 (1,365) [328] {164}	7,075 (1,415) [340] {170}	7,368 (1,474) [354] {177}
St. James Parish	2,301	2,346	2,346	2,346	2,441 (488) [117] {59}	2,563 (513) [123] {62}	2,721 (544) [131] {65}
St. John the Baptist Parish	4,454	4,524	4,524	4,524	4,723 (945) [227] {113}	4,969 (994) [239] {119}	5,273 (1,055) [253] {127}
St. Tammany Parish	30,397	30,769	30,769	30,769	31,658 (6,332) [1,520] {760}	32,700 (6,540) [1,570] {785}	33,898 (6,780) [1,627] {814}

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.