IEM's AI Modeling: Short-term COVID-19 Projections
Date: 1/28/22

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 1/28/22 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
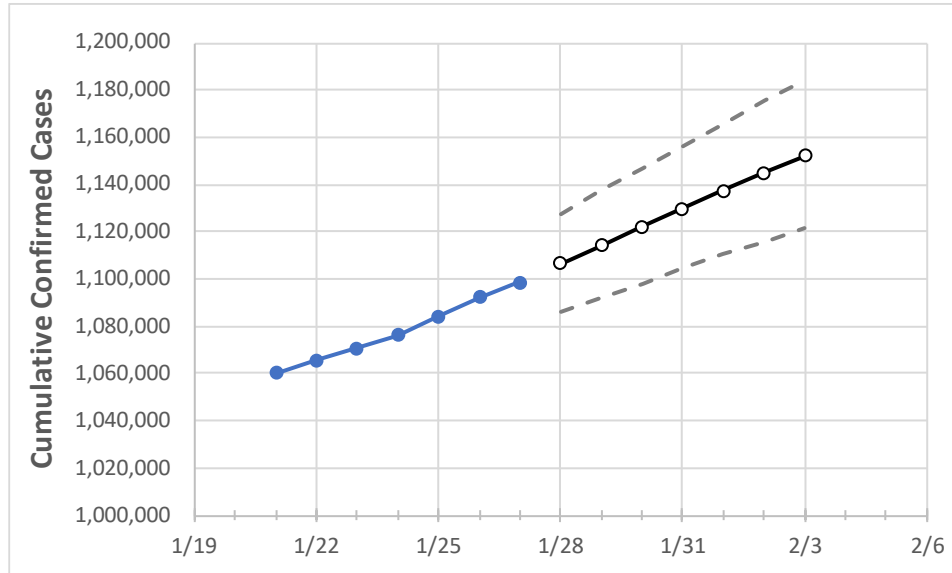
	Actual Confirmed Cases On:				Projected Cases For:						
	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3
Louisiana	1,076,385	1,084,448	1,092,161	1,098,790	1,106,675	1,114,351	1,122,139	1,130,034	1,137,307	1,144,939	1,152,355

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:						
	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3
Ascension Parish	31,118	31,287	31,422	31,600	31,806	32,015	32,211	32,413	32,603	32,790	32,969
Bossier Parish	32,429	32,630	32,893	33,243	33,554	33,850	34,154	34,462	34,748	35,054	35,339
Caddo Parish	59,117	59,432	59,810	60,195	60,624	61,022	61,427	61,828	62,208	62,613	62,980
Calcasieu Parish	46,676	46,983	47,324	47,569	47,896	48,216	48,522	48,843	49,144	49,448	49,765
East Baton Rouge Parish	98,398	98,966	99,525	100,042	100,788	101,525	102,228	102,927	103,573	104,283	104,906
Jefferson Parish	101,949	102,410	102,899	103,289	103,751	104,167	104,553	104,950	105,333	105,710	106,054
Lafayette Parish	53,650	54,807	55,100	55,444	55,906	56,385	56,855	57,325	57,795	58,251	58,707
Lafourche Parish	24,119	24,257	24,499	24,666	24,857	25,068	25,273	25,456	25,658	25,854	26,064
Orleans Parish	77,665	77,976	78,331	78,656	78,993	79,307	79,600	79,886	80,161	80,428	80,668
Ouachita Parish	43,143	43,493	43,906	44,315	44,716	45,104	45,493	45,871	46,265	46,663	47,051
Rapides Parish	28,590	28,767	28,914	29,058	29,271	29,485	29,683	29,894	30,084	30,315	30,515
St. Bernard Parish	10,064	10,123	10,185	10,218	10,265	10,314	10,357	10,403	10,448	10,488	10,531
St. Charles Parish	12,496	12,532	12,596	12,640	12,705	12,768	12,831	12,890	12,942	13,003	13,057
St. James Parish	4,965	4,991	5,038	5,081	5,121	5,160	5,199	5,237	5,277	5,316	5,355
St. John the Baptist Parish	9,436	9,477	9,546	9,591	9,647	9,706	9,760	9,812	9,868	9,917	9,967
St. Tammany Parish	63,365	63,760	64,187	64,565	65,044	65,509	65,962	66,412	66,852	67,304	67,717

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:		
	1/24	1/25	1/26	1/27	1/29	1/31	2/2
Ascension Parish	31,118	31,287	31,422	31,600	32,015 (6,403) [1,537] {768}	32,413 (6,483) [1,556] {778}	32,790 (6,558) [1,574] {787}
Bossier Parish	32,429	32,630	32,893	33,243	33,850 (6,770) [1,625] {812}	34,462 (6,892) [1,654] {827}	35,054 (7,011) [1,683] {841}
Caddo Parish	59,117	59,432	59,810	60,195	61,022 (12,204) [2,929] {1,465}	61,828 (12,366) [2,968] {1,484}	62,613 (12,523) [3,005] {1,503}
Calcasieu Parish	46,676	46,983	47,324	47,569	48,216 (9,643) [2,314] {1,157}	48,843 (9,769) [2,344] {1,172}	49,448 (9,890) [2,374] {1,187}
East Baton Rouge Parish	98,398	98,966	99,525	100,042	101,525 (20,305) [4,873] {2,437}	102,927 (20,585) [4,940] {2,470}	104,283 (20,857) [5,006] {2,503}
Jefferson Parish	101,949	102,410	102,899	103,289	104,167 (20,833) [5,000] {2,500}	104,950 (20,990) [5,038] {2,519}	105,710 (21,142) [5,074] {2,537}
Lafayette Parish	53,650	54,807	55,100	55,444	56,385 (11,277) [2,706] {1,353}	57,325 (11,465) [2,752] {1,376}	58,251 (11,650) [2,796] {1,398}
Lafourche Parish	24,119	24,257	24,499	24,666	25,068 (5,014) [1,203] {602}	25,456 (5,091) [1,222] {611}	25,854 (5,171) [1,241] {620}
Orleans Parish	77,665	77,976	78,331	78,656	79,307 (15,861) [3,807] {1,903}	79,886 (15,977) [3,835] {1,917}	80,428 (16,086) [3,861] {1,930}
Ouachita Parish	43,143	43,493	43,906	44,315	45,104 (9,021) [2,165] {1,083}	45,871 (9,174) [2,202] {1,101}	46,663 (9,333) [2,240] {1,120}
Rapides Parish	28,590	28,767	28,914	29,058	29,485 (5,897) [1,415] {708}	29,894 (5,979) [1,435] {717}	30,315 (6,063) [1,455] {728}
St. Bernard Parish	10,064	10,123	10,185	10,218	10,314 (2,063) [495] {248}	10,403 (2,081) [499] {250}	10,488 (2,098) [503] {252}
St. Charles Parish	12,496	12,532	12,596	12,640	12,768 (2,554) [613] {306}	12,890 (2,578) [619] {309}	13,003 (2,601) [624] {312}
St. James Parish	4,965	4,991	5,038	5,081	5,160 (1,032) [248] {124}	5,237 (1,047) [251] {126}	5,316 (1,063) [255] {128}
St. John the Baptist Parish	9,436	9,477	9,546	9,591	9,706 (1,941) [466] {233}	9,812 (1,962) [471] {235}	9,917 (1,983) [476] {238}
St. Tammany Parish	63,365	63,760	64,187	64,565	65,509 (13,102) [3,144] {1,572}	66,412 (13,282) [3,188] {1,594}	67,304 (13,461) [3,231] {1,615}

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.