

IEM's AI Modeling: Short-term COVID-19 Projections

Date: 1/26/21

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 1/26/21 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.

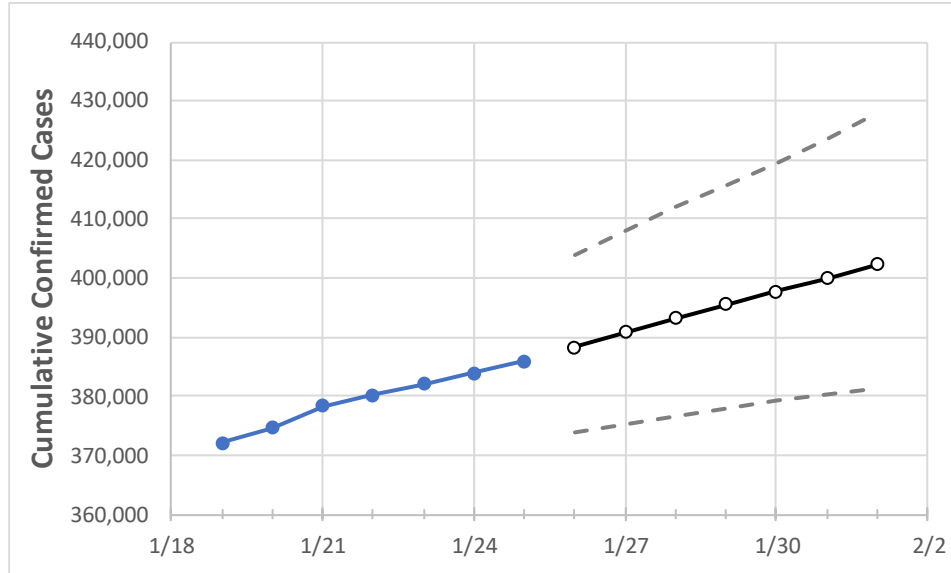
IEM's Modeling Lead

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:						
	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1
Louisiana	380,255	382,059	383,862	385,942	388,365	390,804	393,147	395,479	397,763	400,030	402,336

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:						
	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1
Ascension Parish	9,741	9,785	9,829	9,874	9,945	10,011	10,079	10,150	10,214	10,279	10,342
Bossier Parish	11,031	11,131	11,230	11,278	11,355	11,434	11,511	11,584	11,658	11,737	11,811
Caddo Parish	21,669	21,793	21,916	22,074	22,221	22,366	22,514	22,657	22,798	22,937	23,073
Calcasieu Parish	16,736	16,832	16,928	16,970	17,082	17,192	17,300	17,404	17,510	17,610	17,718
East Baton Rouge Parish	30,908	31,044	31,179	31,369	31,592	31,807	32,028	32,254	32,487	32,712	32,938
Jefferson Parish	38,873	39,071	39,268	39,564	39,832	40,102	40,369	40,627	40,885	41,130	41,369
Lafayette Parish	19,824	19,884	19,943	20,020	20,120	20,212	20,304	20,396	20,484	20,576	20,656
Lafourche Parish	7,700	7,747	7,794	7,848	7,908	7,970	8,033	8,093	8,151	8,213	8,275
Orleans Parish	25,178	25,268	25,358	25,559	25,700	25,839	25,978	26,109	26,237	26,362	26,484
Ouachita Parish	16,469	16,516	16,563	16,639	16,714	16,784	16,855	16,924	16,990	17,052	17,114
Rapides Parish	10,193	10,237	10,280	10,317	10,377	10,438	10,496	10,553	10,608	10,662	10,711
St. Bernard Parish	3,050	3,071	3,092	3,107	3,131	3,156	3,179	3,202	3,225	3,249	3,272
St. Charles Parish	4,577	4,593	4,608	4,629	4,663	4,699	4,733	4,767	4,800	4,833	4,865
St. James Parish	1,648	1,657	1,666	1,670	1,680	1,691	1,702	1,713	1,723	1,734	1,745
St. John the Baptist Parish	3,130	3,142	3,153	3,190	3,208	3,226	3,243	3,260	3,278	3,296	3,313
St. Tammany Parish	20,085	20,175	20,264	20,484	20,695	20,908	21,120	21,334	21,549	21,758	21,980

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:											
	1/22	1/23	1/24	1/25	1/27				1/29				1/31			
Ascension Parish	9,741	9,785	9,829	9,874	10,011	(2,002)	[481]	{240}	10,150	(2,030)	[487]	{244}	10,279	(2,056)	[493]	{247}
Bossier Parish	11,031	11,131	11,230	11,278	11,434	(2,287)	[549]	{274}	11,584	(2,317)	[556]	{278}	11,737	(2,347)	[563]	{282}
Caddo Parish	21,669	21,793	21,916	22,074	22,366	(4,473)	[1,074]	{537}	22,657	(4,531)	[1,088]	{544}	22,937	(4,587)	[1,101]	{550}
Calcasieu Parish	16,736	16,832	16,928	16,970	17,192	(3,438)	[825]	{413}	17,404	(3,481)	[835]	{418}	17,610	(3,522)	[845]	{423}
East Baton Rouge Parish	30,908	31,044	31,179	31,369	31,807	(6,361)	[1,527]	{763}	32,254	(6,451)	[1,548]	{774}	32,712	(6,542)	[1,570]	{785}
Jefferson Parish	38,873	39,071	39,268	39,564	40,102	(8,020)	[1,925]	{962}	40,627	(8,125)	[1,950]	{975}	41,130	(8,226)	[1,974]	{987}
Lafayette Parish	19,824	19,884	19,943	20,020	20,212	(4,042)	[970]	{485}	20,396	(4,079)	[979]	{490}	20,576	(4,115)	[988]	{494}
Lafourche Parish	7,700	7,747	7,794	7,848	7,970	(1,594)	[383]	{191}	8,093	(1,619)	[388]	{194}	8,213	(1,643)	[394]	{197}
Orleans Parish	25,178	25,268	25,358	25,559	25,839	(5,168)	[1,240]	{620}	26,109	(5,222)	[1,253]	{627}	26,362	(5,272)	[1,265]	{633}
Ouachita Parish	16,469	16,516	16,563	16,639	16,784	(3,357)	[806]	{403}	16,924	(3,385)	[812]	{406}	17,052	(3,410)	[819]	{409}
Rapides Parish	10,193	10,237	10,280	10,317	10,438	(2,088)	[501]	{251}	10,553	(2,111)	[507]	{253}	10,662	(2,132)	[512]	{256}
St. Bernard Parish	3,050	3,071	3,092	3,107	3,156	(631)	[151]	{76}	3,202	(640)	[154]	{77}	3,249	(650)	[156]	{78}
St. Charles Parish	4,577	4,593	4,608	4,629	4,699	(940)	[226]	{113}	4,767	(953)	[229]	{114}	4,833	(967)	[232]	{116}
St. James Parish	1,648	1,657	1,666	1,670	1,691	(338)	[81]	{41}	1,713	(343)	[82]	{41}	1,734	(347)	[83]	{42}
St. John the Baptist Parish	3,130	3,142	3,153	3,190	3,226	(645)	[155]	{77}	3,260	(652)	[156]	{78}	3,296	(659)	[158]	{79}
St. Tammany Parish	20,085	20,175	20,264	20,484	20,908	(4,182)	[1,004]	{502}	21,334	(4,267)	[1,024]	{512}	21,758	(4,352)	[1,044]	{522}

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.