

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 11/30/20**

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 11/30/20 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.

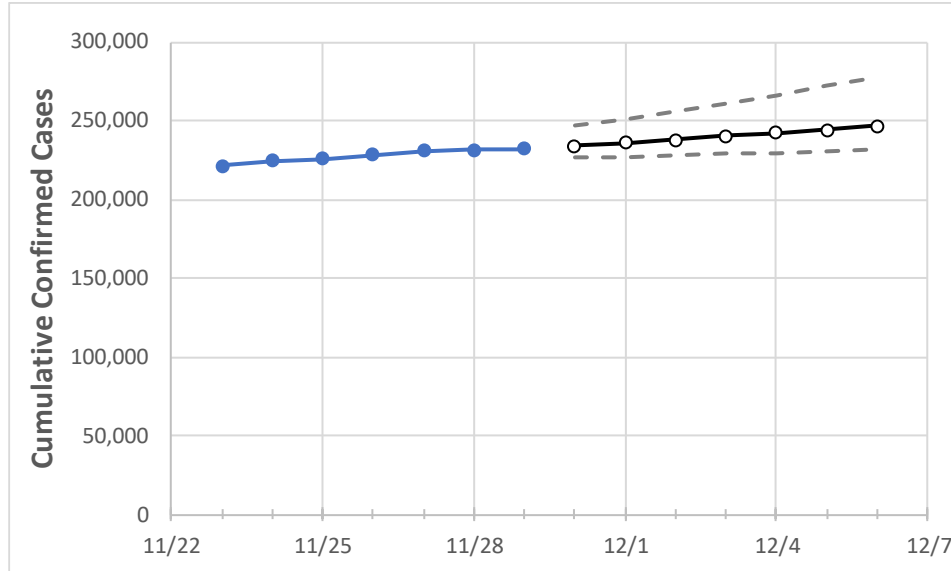
IEM's Modeling Lead

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:					
	11/26	11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6
Louisiana	228,120	230,602	231,424	232,245	234,146	236,095	238,093	240,142	242,242	244,394	246,601

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 20%, and are often within 10%, of actual confirmed cases.

Louisiana Parishes

	Actual Confirmed Cases On:					Projected Cases For:					
	11/26	11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6
Ascension Parish	5,571	5,614	5,633	5,651	5,677	5,703	5,728	5,752	5,775	5,798	5,820
Bossier Parish	6,162	6,244	6,265	6,286	6,334	6,380	6,425	6,470	6,513	6,555	6,595
Caddo Parish	13,031	13,183	13,215	13,247	13,336	13,424	13,512	13,599	13,686	13,772	13,858
Calcasieu Parish	10,324	10,393	10,421	10,449	10,499	10,549	10,597	10,645	10,692	10,737	10,782
East Baton Rouge Parish	19,553	19,710	19,782	19,853	19,980	20,108	20,237	20,367	20,497	20,627	20,759
Jefferson Parish	22,028	22,389	22,496	22,603	22,821	23,048	23,284	23,530	23,786	24,052	24,329
Lafayette Parish	11,907	12,035	12,077	12,118	12,225	12,332	12,441	12,551	12,661	12,772	12,885
Lafourche Parish	4,633	4,672	4,701	4,730	4,769	4,809	4,851	4,894	4,939	4,985	5,033
Orleans Parish	15,552	15,716	15,775	15,834	15,934	16,037	16,141	16,247	16,355	16,465	16,577
Ouachita Parish	9,813	9,938	9,979	10,020	10,108	10,196	10,284	10,372	10,461	10,550	10,638
Rapides Parish	6,210	6,252	6,265	6,277	6,305	6,333	6,359	6,385	6,409	6,433	6,456
St. Bernard Parish	1,789	1,800	1,805	1,809	1,818	1,828	1,837	1,846	1,855	1,864	1,873
St. Charles Parish	2,521	2,562	2,569	2,575	2,591	2,607	2,624	2,640	2,656	2,672	2,689
St. James Parish	972	979	982	985	990	996	1,002	1,009	1,015	1,022	1,029
St. John the Baptist Parish	1,950	1,978	1,985	1,991	2,004	2,017	2,030	2,044	2,058	2,072	2,087
St. Tammany Parish	10,107	10,283	10,333	10,383	10,492	10,605	10,721	10,840	10,963	11,090	11,221

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:											
	11/26	11/27	11/28	11/29	12/1				12/3				12/5			
Ascension Parish	5,571	5,614	5,633	5,651	5,703	(1,141)	[274]	{137}	5,752	(1,150)	[276]	{138}	5,798	(1,160)	[278]	{139}
Bossier Parish	6,162	6,244	6,265	6,286	6,380	(1,276)	[306]	{153}	6,470	(1,294)	[311]	{155}	6,555	(1,311)	[315]	{157}
Caddo Parish	13,031	13,183	13,215	13,247	13,424	(2,685)	[644]	{322}	13,599	(2,720)	[653]	{326}	13,772	(2,754)	[661]	{331}
Calcasieu Parish	10,324	10,393	10,421	10,449	10,549	(2,110)	[506]	{253}	10,645	(2,129)	[511]	{255}	10,737	(2,147)	[515]	{258}
East Baton Rouge Parish	19,553	19,710	19,782	19,853	20,108	(4,022)	[965]	{483}	20,367	(4,073)	[978]	{489}	20,627	(4,125)	[990]	{495}
Jefferson Parish	22,028	22,389	22,496	22,603	23,048	(4,610)	[1,106]	{553}	23,530	(4,706)	[1,129]	{565}	24,052	(4,810)	[1,155]	{577}
Lafayette Parish	11,907	12,035	12,077	12,118	12,332	(2,466)	[592]	{296}	12,551	(2,510)	[602]	{301}	12,772	(2,554)	[613]	{307}
Lafourche Parish	4,633	4,672	4,701	4,730	4,809	(962)	[231]	{115}	4,894	(979)	[235]	{117}	4,985	(997)	[239]	{120}
Orleans Parish	15,552	15,716	15,775	15,834	16,037	(3,207)	[770]	{385}	16,247	(3,249)	[780]	{390}	16,465	(3,293)	[790]	{395}
Ouachita Parish	9,813	9,938	9,979	10,020	10,196	(2,039)	[489]	{245}	10,372	(2,074)	[498]	{249}	10,550	(2,110)	[506]	{253}
Rapides Parish	6,210	6,252	6,265	6,277	6,333	(1,267)	[304]	{152}	6,385	(1,277)	[306]	{153}	6,433	(1,287)	[309]	{154}
St. Bernard Parish	1,789	1,800	1,805	1,809	1,828	(366)	[88]	{44}	1,846	(369)	[89]	{44}	1,864	(373)	[89]	{45}
St. Charles Parish	2,521	2,562	2,569	2,575	2,607	(521)	[125]	{63}	2,640	(528)	[127]	{63}	2,672	(534)	[128]	{64}
St. James Parish	972	979	982	985	996	(199)	[48]	{24}	1,009	(202)	[48]	{24}	1,022	(204)	[49]	{25}
St. John the Baptist Parish	1,950	1,978	1,985	1,991	2,017	(403)	[97]	{48}	2,044	(409)	[98]	{49}	2,072	(414)	[99]	{50}
St. Tammany Parish	10,107	10,283	10,333	10,383	10,605	(2,121)	[509]	{255}	10,840	(2,168)	[520]	{260}	11,090	(2,218)	[532]	{266}

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.