

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

Date: 11/23/20

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 11/23/20 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.

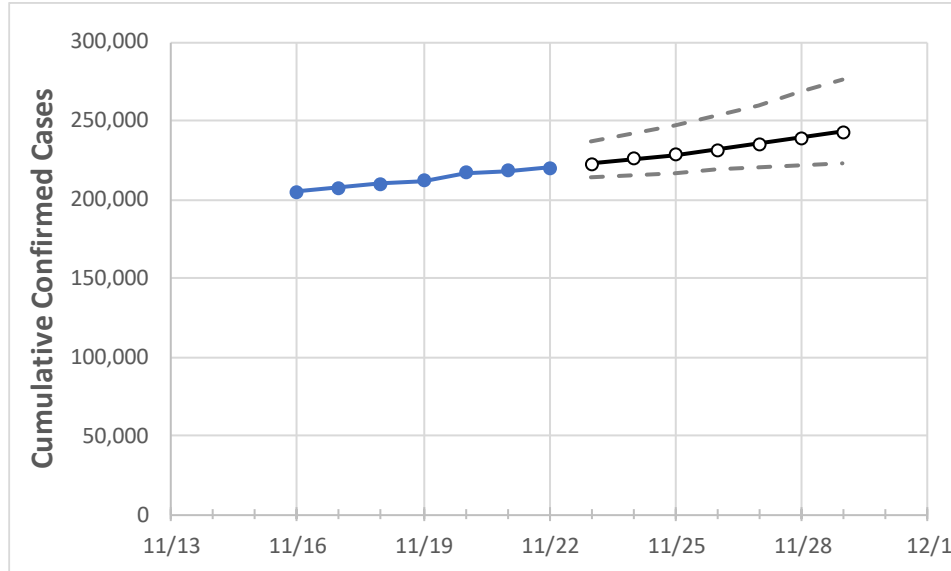
IEM's Modeling Lead

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:						
	11/19	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29
Louisiana	211,966	216,709	218,451	220,192	222,778	225,550	228,521	231,704	235,114	238,767	242,680

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:						
	11/19	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29
Ascension Parish	5,228	5,325	5,357	5,388	5,485	5,589	5,701	5,823	5,953	6,094	6,246
Bossier Parish	5,625	5,774	5,837	5,900	6,037	6,184	6,342	6,511	6,694	6,889	7,099
Caddo Parish	11,928	12,329	12,448	12,566	12,735	12,914	13,103	13,303	13,514	13,737	13,973
Calcasieu Parish	9,826	9,924	9,978	10,032	10,169	10,319	10,484	10,665	10,864	11,083	11,324
East Baton Rouge Parish	18,416	18,764	18,898	19,031	19,269	19,529	19,815	20,128	20,471	20,847	21,259
Jefferson Parish	20,680	20,927	21,059	21,190	21,441	21,715	22,014	22,341	22,696	23,084	23,507
Lafayette Parish	10,963	11,146	11,272	11,398	11,633	11,899	12,199	12,538	12,919	13,350	13,835
Lafourche Parish	4,399	4,455	4,481	4,507	4,568	4,636	4,712	4,797	4,892	4,999	5,117
Orleans Parish	14,874	14,978	15,050	15,121	15,263	15,416	15,582	15,760	15,952	16,159	16,382
Ouachita Parish	8,727	9,267	9,365	9,463	9,668	9,893	10,140	10,411	10,709	11,036	11,394
Rapides Parish	5,825	5,948	5,972	5,996	6,093	6,201	6,320	6,451	6,595	6,754	6,930
St. Bernard Parish	1,704	1,715	1,723	1,731	1,742	1,754	1,767	1,781	1,796	1,813	1,830
St. Charles Parish	2,320	2,391	2,407	2,423	2,451	2,483	2,518	2,557	2,601	2,649	2,702
St. James Parish	927	934	941	947	955	964	973	984	996	1,009	1,023
St. John the Baptist Parish	1,844	1,873	1,883	1,892	1,907	1,923	1,940	1,958	1,977	1,998	2,019
St. Tammany Parish	9,255	9,514	9,593	9,672	9,858	10,065	10,295	10,550	10,834	11,149	11,498

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:											
	11/19	11/20	11/21	11/22	11/24				11/26				11/28			
Ascension Parish	5,228	5,325	5,357	5,388	5,589	(1,118)	[268]	{134}	5,823	(1,165)	[279]	{140}	6,094	(1,219)	[293]	{146}
Bossier Parish	5,625	5,774	5,837	5,900	6,184	(1,237)	[297]	{148}	6,511	(1,302)	[313]	{156}	6,889	(1,378)	[331]	{165}
Caddo Parish	11,928	12,329	12,448	12,566	12,914	(2,583)	[620]	{310}	13,303	(2,661)	[639]	{319}	13,737	(2,747)	[659]	{330}
Calcasieu Parish	9,826	9,924	9,978	10,032	10,319	(2,064)	[495]	{248}	10,665	(2,133)	[512]	{256}	11,083	(2,217)	[532]	{266}
East Baton Rouge Parish	18,416	18,764	18,898	19,031	19,529	(3,906)	[937]	{469}	20,128	(4,026)	[966]	{483}	20,847	(4,169)	[1,001]	{500}
Jefferson Parish	20,680	20,927	21,059	21,190	21,715	(4,343)	[1,042]	{521}	22,341	(4,468)	[1,072]	{536}	23,084	(4,617)	[1,108]	{554}
Lafayette Parish	10,963	11,146	11,272	11,398	11,899	(2,380)	[571]	{286}	12,538	(2,508)	[602]	{301}	13,350	(2,670)	[641]	{320}
Lafourche Parish	4,399	4,455	4,481	4,507	4,636	(927)	[223]	{111}	4,797	(959)	[230]	{115}	4,999	(1,000)	[240]	{120}
Orleans Parish	14,874	14,978	15,050	15,121	15,416	(3,083)	[740]	{370}	15,760	(3,152)	[756]	{378}	16,159	(3,232)	[776]	{388}
Ouachita Parish	8,727	9,267	9,365	9,463	9,893	(1,979)	[475]	{237}	10,411	(2,082)	[500]	{250}	11,036	(2,207)	[530]	{265}
Rapides Parish	5,825	5,948	5,972	5,996	6,201	(1,240)	[298]	{149}	6,451	(1,290)	[310]	{155}	6,754	(1,351)	[324]	{162}
St. Bernard Parish	1,704	1,715	1,723	1,731	1,754	(351)	[84]	{42}	1,781	(356)	[86]	{43}	1,813	(363)	[87]	{44}
St. Charles Parish	2,320	2,391	2,407	2,423	2,483	(497)	[119]	{60}	2,557	(511)	[123]	{61}	2,649	(530)	[127]	{64}
St. James Parish	927	934	941	947	964	(193)	[46]	{23}	984	(197)	[47]	{24}	1,009	(202)	[48]	{24}
St. John the Baptist Parish	1,844	1,873	1,883	1,892	1,923	(385)	[92]	{46}	1,958	(392)	[94]	{47}	1,998	(400)	[96]	{48}
St. Tammany Parish	9,255	9,514	9,593	9,672	10,065	(2,013)	[483]	{242}	10,550	(2,110)	[506]	{253}	11,149	(2,230)	[535]	{268}

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.