

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 12/2/20**

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 12/2/20 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.

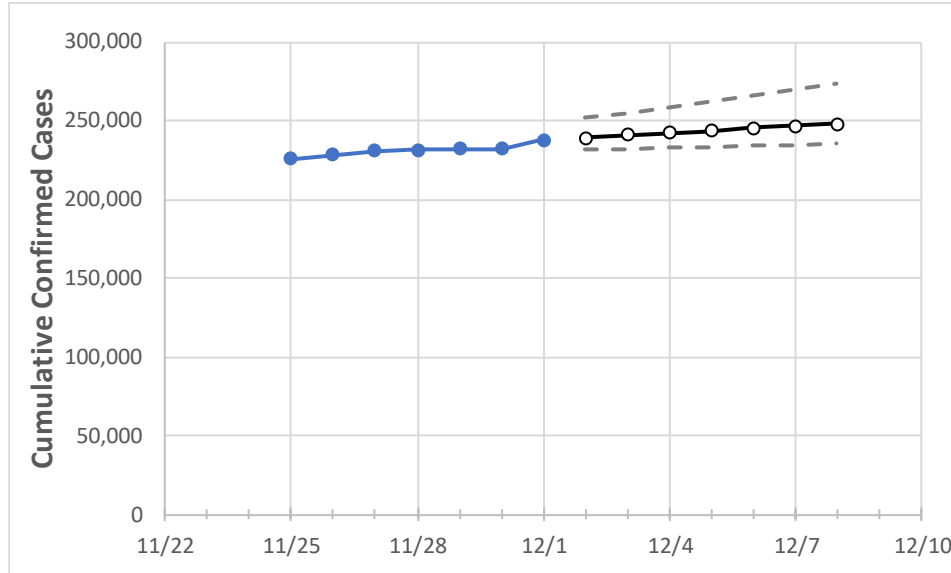
IEM's Modeling Lead

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:						
	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8
Louisiana	231,424	232,245	232,414	237,740	239,192	240,654	242,126	243,609	245,102	246,606	248,119

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:						
	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8
Ascension Parish	5,633	5,651	5,655	5,837	5,861	5,884	5,906	5,928	5,949	5,969	5,989
Bossier Parish	6,265	6,286	6,289	6,410	6,443	6,475	6,506	6,536	6,565	6,594	6,621
Caddo Parish	13,215	13,247	13,254	13,539	13,598	13,655	13,712	13,768	13,823	13,877	13,931
Calcasieu Parish	10,421	10,449	10,460	10,730	10,779	10,829	10,879	10,930	10,982	11,034	11,086
East Baton Rouge Parish	19,782	19,853	19,868	20,385	20,489	20,594	20,702	20,812	20,925	21,040	21,157
Jefferson Parish	22,496	22,603	22,609	23,160	23,315	23,474	23,636	23,802	23,972	24,146	24,324
Lafayette Parish	12,077	12,118	12,113	12,430	12,573	12,722	12,878	13,041	13,212	13,389	13,575
Lafourche Parish	4,701	4,730	4,754	4,852	4,898	4,946	4,997	5,051	5,107	5,166	5,229
Orleans Parish	15,775	15,834	15,838	16,077	16,147	16,218	16,288	16,358	16,428	16,498	16,568
Ouachita Parish	9,979	10,020	10,028	10,160	10,219	10,278	10,336	10,394	10,452	10,510	10,567
Rapides Parish	6,265	6,277	6,274	6,425	6,466	6,507	6,549	6,593	6,636	6,681	6,727
St. Bernard Parish	1,805	1,809	1,807	1,853	1,863	1,874	1,885	1,897	1,909	1,922	1,935
St. Charles Parish	2,569	2,575	2,618	2,669	2,693	2,719	2,745	2,773	2,802	2,833	2,865
St. James Parish	982	985	988	1,002	1,009	1,016	1,023	1,031	1,039	1,047	1,056
St. John the Baptist Parish	1,985	1,991	1,992	2,022	2,032	2,042	2,052	2,062	2,072	2,082	2,092
St. Tammany Parish	10,333	10,383	10,379	10,678	10,815	10,960	11,112	11,272	11,440	11,617	11,803

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:											
	11/28	11/29	11/30	12/1	12/3			12/5			12/7					
Ascension Parish	5,633	5,651	5,655	5,837	5,884	(1,177)	[282]	{141}	5,928	(1,186)	[285]	{142}	5,969	(1,194)	[287]	{143}
Bossier Parish	6,265	6,286	6,289	6,410	6,475	(1,295)	[311]	{155}	6,536	(1,307)	[314]	{157}	6,594	(1,319)	[316]	{158}
Caddo Parish	13,215	13,247	13,254	13,539	13,655	(2,731)	[655]	{328}	13,768	(2,754)	[661]	{330}	13,877	(2,775)	[666]	{333}
Calcasieu Parish	10,421	10,449	10,460	10,730	10,829	(2,166)	[520]	{260}	10,930	(2,186)	[525]	{262}	11,034	(2,207)	[530]	{265}
East Baton Rouge Parish	19,782	19,853	19,868	20,385	20,594	(4,119)	[989]	{494}	20,812	(4,162)	[999]	{499}	21,040	(4,208)	[1,010]	{505}
Jefferson Parish	22,496	22,603	22,609	23,160	23,474	(4,695)	[1,127]	{563}	23,802	(4,760)	[1,142]	{571}	24,146	(4,829)	[1,159]	{580}
Lafayette Parish	12,077	12,118	12,113	12,430	12,722	(2,544)	[611]	{305}	13,041	(2,608)	[626]	{313}	13,389	(2,678)	[643]	{321}
Lafourche Parish	4,701	4,730	4,754	4,852	4,946	(989)	[237]	{119}	5,051	(1,010)	[242]	{121}	5,166	(1,033)	[248]	{124}
Orleans Parish	15,775	15,834	15,838	16,077	16,218	(3,244)	[778]	{389}	16,358	(3,272)	[785]	{393}	16,498	(3,300)	[792]	{396}
Ouachita Parish	9,979	10,020	10,028	10,160	10,278	(2,056)	[493]	{247}	10,394	(2,079)	[499]	{249}	10,510	(2,102)	[504]	{252}
Rapides Parish	6,265	6,277	6,274	6,425	6,507	(1,301)	[312]	{156}	6,593	(1,319)	[316]	{158}	6,681	(1,336)	[321]	{160}
St. Bernard Parish	1,805	1,809	1,807	1,853	1,874	(375)	[90]	{45}	1,897	(379)	[91]	{46}	1,922	(384)	[92]	{46}
St. Charles Parish	2,569	2,575	2,618	2,669	2,719	(544)	[130]	{65}	2,773	(555)	[133]	{67}	2,833	(567)	[136]	{68}
St. James Parish	982	985	988	1,002	1,016	(203)	[49]	{24}	1,031	(206)	[49]	{25}	1,047	(209)	[50]	{25}
St. John the Baptist Parish	1,985	1,991	1,992	2,022	2,042	(408)	[98]	{49}	2,062	(412)	[99]	{49}	2,082	(416)	[100]	{50}
St. Tammany Parish	10,333	10,383	10,379	10,678	10,960	(2,192)	[526]	{263}	11,272	(2,254)	[541]	{271}	11,617	(2,323)	[558]	{279}

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.