

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

Date: 12/1/20

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 12/1/20 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.

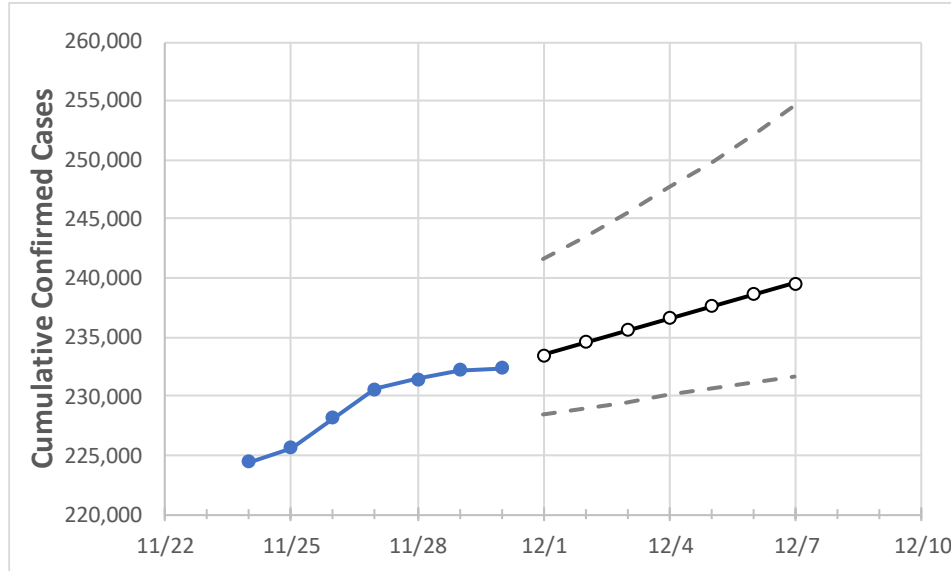
IEM's Modeling Lead

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:						
	11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7
Louisiana	230,602	231,424	232,245	232,414	233,501	234,567	235,611	236,634	237,636	238,617	239,577

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:						
	11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7
Ascension Parish	5,614	5,633	5,651	5,655	5,675	5,693	5,711	5,728	5,744	5,759	5,774
Bossier Parish	6,244	6,265	6,286	6,289	6,320	6,349	6,377	6,404	6,430	6,455	6,479
Caddo Parish	13,183	13,215	13,247	13,254	13,306	13,356	13,404	13,451	13,496	13,540	13,582
Calcasieu Parish	10,393	10,421	10,449	10,460	10,499	10,537	10,575	10,611	10,646	10,681	10,714
East Baton Rouge Parish	19,710	19,782	19,853	19,868	19,962	20,056	20,149	20,242	20,334	20,426	20,517
Jefferson Parish	22,389	22,496	22,603	22,609	22,733	22,859	22,985	23,112	23,241	23,370	23,499
Lafayette Parish	12,035	12,077	12,118	12,113	12,226	12,340	12,457	12,575	12,695	12,817	12,941
Lafourche Parish	4,672	4,701	4,730	4,754	4,790	4,828	4,866	4,906	4,947	4,989	5,032
Orleans Parish	15,716	15,775	15,834	15,838	15,893	15,947	15,999	16,050	16,100	16,149	16,197
Ouachita Parish	9,938	9,979	10,020	10,028	10,085	10,140	10,195	10,248	10,300	10,351	10,400
Rapides Parish	6,252	6,265	6,277	6,274	6,303	6,332	6,360	6,388	6,415	6,443	6,469
St. Bernard Parish	1,800	1,805	1,809	1,807	1,817	1,828	1,838	1,849	1,860	1,871	1,883
St. Charles Parish	2,562	2,569	2,575	2,618	2,638	2,658	2,678	2,699	2,721	2,743	2,766
St. James Parish	979	982	985	988	993	999	1,004	1,010	1,016	1,022	1,028
St. John the Baptist Parish	1,978	1,985	1,991	1,992	2,000	2,008	2,015	2,023	2,030	2,038	2,045
St. Tammany Parish	10,283	10,333	10,383	10,379	10,485	10,594	10,707	10,825	10,946	11,073	11,203

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:											
	11/27	11/28	11/29	11/30	12/2				12/4				12/6			
Ascension Parish	5,614	5,633	5,651	5,655	5,693	(1,139)	[273]	{137}	5,728	(1,146)	[275]	{137}	5,759	(1,152)	[276]	{138}
Bossier Parish	6,244	6,265	6,286	6,289	6,349	(1,270)	[305]	{152}	6,404	(1,281)	[307]	{154}	6,455	(1,291)	[310]	{155}
Caddo Parish	13,183	13,215	13,247	13,254	13,356	(2,671)	[641]	{321}	13,451	(2,690)	[646]	{323}	13,540	(2,708)	[650]	{325}
Calcasieu Parish	10,393	10,421	10,449	10,460	10,537	(2,107)	[506]	{253}	10,611	(2,122)	[509]	{255}	10,681	(2,136)	[513]	{256}
East Baton Rouge Parish	19,710	19,782	19,853	19,868	20,056	(4,011)	[963]	{481}	20,242	(4,048)	[972]	{486}	20,426	(4,085)	[980]	{490}
Jefferson Parish	22,389	22,496	22,603	22,609	22,859	(4,572)	[1,097]	{549}	23,112	(4,622)	[1,109]	{555}	23,370	(4,674)	[1,122]	{561}
Lafayette Parish	12,035	12,077	12,118	12,113	12,340	(2,468)	[592]	{296}	12,575	(2,515)	[604]	{302}	12,817	(2,563)	[615]	{308}
Lafourche Parish	4,672	4,701	4,730	4,754	4,828	(966)	[232]	{116}	4,906	(981)	[235]	{118}	4,989	(998)	[239]	{120}
Orleans Parish	15,716	15,775	15,834	15,838	15,947	(3,189)	[765]	{383}	16,050	(3,210)	[770]	{385}	16,149	(3,230)	[775]	{388}
Ouachita Parish	9,938	9,979	10,020	10,028	10,140	(2,028)	[487]	{243}	10,248	(2,050)	[492]	{246}	10,351	(2,070)	[497]	{248}
Rapides Parish	6,252	6,265	6,277	6,274	6,332	(1,266)	[304]	{152}	6,388	(1,278)	[307]	{153}	6,443	(1,289)	[309]	{155}
St. Bernard Parish	1,800	1,805	1,809	1,807	1,828	(366)	[88]	{44}	1,849	(370)	[89]	{44}	1,871	(374)	[90]	{45}
St. Charles Parish	2,562	2,569	2,575	2,618	2,658	(532)	[128]	{64}	2,699	(540)	[130]	{65}	2,743	(549)	[132]	{66}
St. James Parish	979	982	985	988	999	(200)	[48]	{24}	1,010	(202)	[48]	{24}	1,022	(204)	[49]	{25}
St. John the Baptist Parish	1,978	1,985	1,991	1,992	2,008	(402)	[96]	{48}	2,023	(405)	[97]	{49}	2,038	(408)	[98]	{49}
St. Tammany Parish	10,283	10,333	10,383	10,379	10,594	(2,119)	[509]	{254}	10,825	(2,165)	[520]	{260}	11,073	(2,215)	[531]	{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.