

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

Date: 3/2/22

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 3/2/22 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.

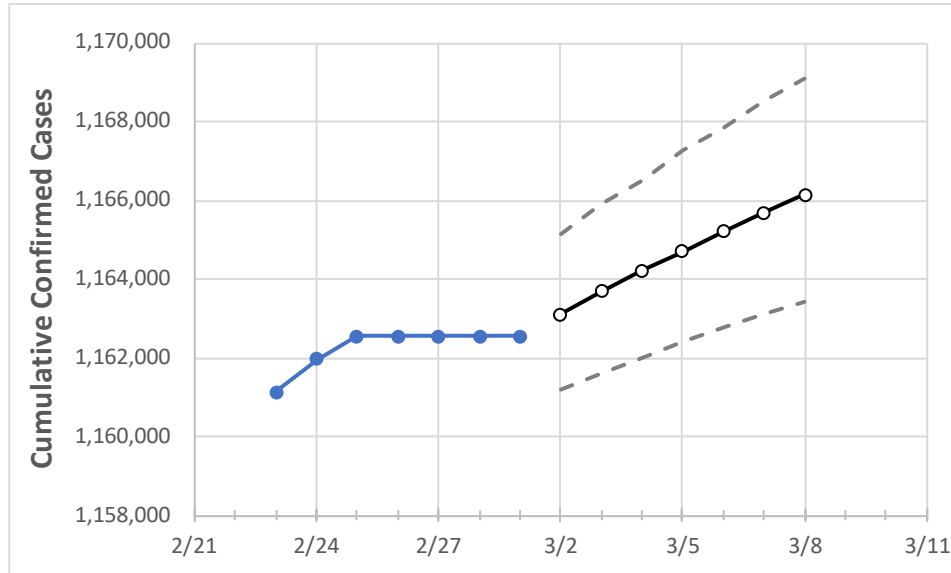
IEM's Modeling Lead

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:						
	2/26	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8
Louisiana	1,162,537	1,162,537	1,162,537	1,162,537	1,163,097	1,163,685	1,164,219	1,164,702	1,165,213	1,165,685	1,166,134

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:						
	2/26	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8
Ascension Parish	32,989	32,989	32,989	32,989	33,003	33,017	33,029	33,044	33,054	33,067	33,077
Bossier Parish	35,139	35,139	35,139	35,139	35,152	35,163	35,175	35,187	35,198	35,208	35,217
Caddo Parish	63,077	63,077	63,077	63,077	63,099	63,119	63,137	63,155	63,173	63,189	63,206
Calcasieu Parish	51,543	51,543	51,543	51,543	51,564	51,585	51,604	51,623	51,641	51,662	51,675
East Baton Rouge Parish	104,881	104,881	104,881	104,881	104,932	104,980	105,026	105,066	105,113	105,153	105,196
Jefferson Parish	107,816	107,816	107,816	107,816	107,892	107,962	108,031	108,102	108,177	108,241	108,311
Lafayette Parish	59,043	59,043	59,043	59,043	59,087	59,127	59,164	59,207	59,242	59,278	59,313
Lafourche Parish	26,092	26,092	26,092	26,092	26,104	26,117	26,128	26,140	26,151	26,162	26,172
Orleans Parish	82,756	82,756	82,756	82,756	82,801	82,845	82,886	82,928	82,964	83,003	83,039
Ouachita Parish	47,067	47,067	47,067	47,067	47,083	47,098	47,113	47,128	47,141	47,152	47,165
Rapides Parish	30,782	30,782	30,782	30,782	30,795	30,807	30,818	30,829	30,838	30,848	30,858
St. Bernard Parish	10,661	10,661	10,661	10,661	10,664	10,667	10,670	10,672	10,675	10,677	10,680
St. Charles Parish	13,114	13,114	13,114	13,114	13,119	13,124	13,129	13,134	13,138	13,143	13,148
St. James Parish	5,436	5,436	5,436	5,436	5,439	5,442	5,444	5,447	5,450	5,453	5,455
St. John the Baptist Parish	9,985	9,985	9,985	9,985	9,988	9,991	9,994	9,997	9,999	10,001	10,004
St. Tammany Parish	67,907	67,907	67,907	67,907	67,933	67,959	67,983	68,004	68,027	68,049	68,069

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:											
	2/26	2/27	2/28	3/1	3/3			3/5			3/7					
Ascension Parish	32,989	32,989	32,989	32,989	33,017	(6,603)	[1,585]	{792}	33,044	(6,609)	[1,586]	{793}	33,067	(6,613)	[1,587]	{794}
Bossier Parish	35,139	35,139	35,139	35,139	35,163	(7,033)	[1,688]	{844}	35,187	(7,037)	[1,689]	{844}	35,208	(7,042)	[1,690]	{845}
Caddo Parish	63,077	63,077	63,077	63,077	63,119	(12,624)	[3,030]	{1,515}	63,155	(12,631)	[3,031]	{1,516}	63,189	(12,638)	[3,033]	{1,517}
Calcasieu Parish	51,543	51,543	51,543	51,543	51,585	(10,317)	[2,476]	{1,238}	51,623	(10,325)	[2,478]	{1,239}	51,662	(10,332)	[2,480]	{1,240}
East Baton Rouge Parish	104,881	104,881	104,881	104,881	104,980	(20,996)	[5,039]	{2,520}	105,066	(21,013)	[5,043]	{2,522}	105,153	(21,031)	[5,047]	{2,524}
Jefferson Parish	107,816	107,816	107,816	107,816	107,962	(21,592)	[5,182]	{2,591}	108,102	(21,620)	[5,189]	{2,594}	108,241	(21,648)	[5,196]	{2,598}
Lafayette Parish	59,043	59,043	59,043	59,043	59,127	(11,825)	[2,838]	{1,419}	59,207	(11,841)	[2,842]	{1,421}	59,278	(11,856)	[2,845]	{1,423}
Lafourche Parish	26,092	26,092	26,092	26,092	26,117	(5,223)	[1,254]	{627}	26,140	(5,228)	[1,255]	{627}	26,162	(5,232)	[1,256]	{628}
Orleans Parish	82,756	82,756	82,756	82,756	82,845	(16,569)	[3,977]	{1,988}	82,928	(16,586)	[3,981]	{1,990}	83,003	(16,601)	[3,984]	{1,992}
Ouachita Parish	47,067	47,067	47,067	47,067	47,098	(9,420)	[2,261]	{1,130}	47,128	(9,426)	[2,262]	{1,131}	47,152	(9,430)	[2,263]	{1,132}
Rapides Parish	30,782	30,782	30,782	30,782	30,807	(6,161)	[1,479]	{739}	30,829	(6,166)	[1,480]	{740}	30,848	(6,170)	[1,481]	{740}
St. Bernard Parish	10,661	10,661	10,661	10,661	10,667	(2,133)	[512]	{256}	10,672	(2,134)	[512]	{256}	10,677	(2,135)	[513]	{256}
St. Charles Parish	13,114	13,114	13,114	13,114	13,124	(2,625)	[630]	{315}	13,134	(2,627)	[630]	{315}	13,143	(2,629)	[631]	{315}
St. James Parish	5,436	5,436	5,436	5,436	5,442	(1,088)	[261]	{131}	5,447	(1,089)	[261]	{131}	5,453	(1,091)	[262]	{131}
St. John the Baptist Parish	9,985	9,985	9,985	9,985	9,991	(1,998)	[480]	{240}	9,997	(1,999)	[480]	{240}	10,001	(2,000)	[480]	{240}
St. Tammany Parish	67,907	67,907	67,907	67,907	67,959	(13,592)	[3,262]	{1,631}	68,004	(13,601)	[3,264]	{1,632}	68,049	(13,610)	[3,266]	{1,633}

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.