

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

Date: 1/31/22

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 1/31/22 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.

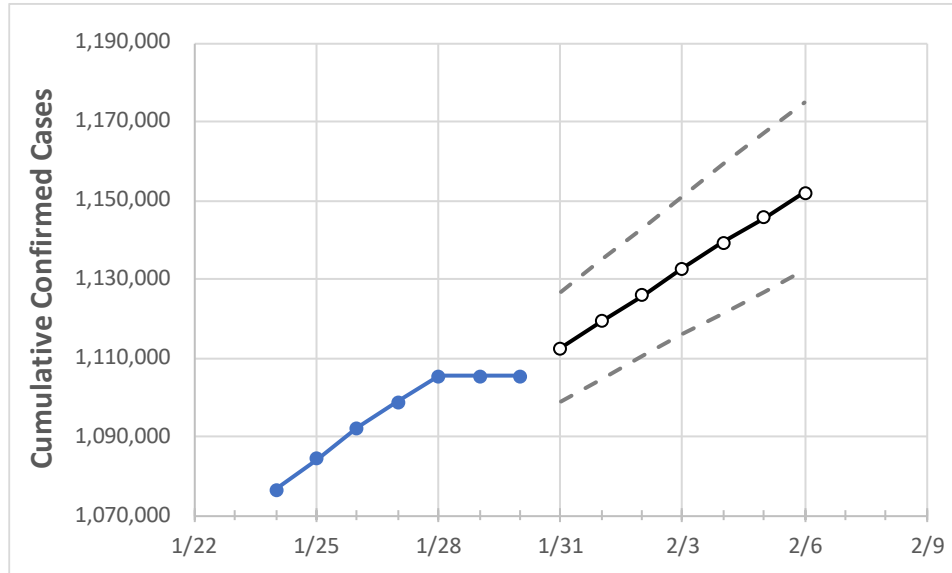
IEM's Modeling Lead

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:						
	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6

Louisiana 1,098,790 1,105,273 1,105,273 1,105,273 1,112,424 1,119,268 1,125,960 1,132,693 1,139,169 1,145,639 1,151,890

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:						
	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6
Ascension Parish	31,600	31,706	31,706	31,706	31,886	32,049	32,213	32,383	32,537	32,685	32,844
Bossier Parish	33,243	33,419	33,419	33,419	33,689	33,932	34,192	34,441	34,686	34,938	35,175
Caddo Parish	60,195	60,533	60,533	60,533	60,905	61,264	61,609	61,973	62,294	62,624	62,954
Calcasieu Parish	47,569	47,798	47,798	47,798	48,070	48,345	48,601	48,869	49,120	49,377	49,611
East Baton Rouge Parish	100,042	100,474	100,474	100,474	101,038	101,576	102,107	102,603	103,134	103,602	104,082
Jefferson Parish	103,289	103,995	103,995	103,995	104,406	104,803	105,207	105,558	105,933	106,279	106,622
Lafayette Parish	55,444	55,758	55,758	55,758	56,194	56,650	57,068	57,524	57,954	58,366	58,828
Lafourche Parish	24,666	24,776	24,776	24,776	24,962	25,139	25,314	25,491	25,666	25,843	26,011
Orleans Parish	78,656	79,255	79,255	79,255	79,568	79,874	80,151	80,437	80,711	80,981	81,228
Ouachita Parish	44,315	44,565	44,565	44,565	44,942	45,310	45,673	46,040	46,405	46,767	47,126
Rapides Parish	29,058	29,442	29,442	29,442	29,669	29,891	30,091	30,321	30,540	30,757	30,967
St. Bernard Parish	10,218	10,278	10,278	10,278	10,319	10,361	10,397	10,435	10,471	10,508	10,542
St. Charles Parish	12,640	12,678	12,678	12,678	12,731	12,782	12,831	12,881	12,926	12,972	13,014
St. James Parish	5,081	5,091	5,091	5,091	5,126	5,162	5,196	5,230	5,265	5,300	5,333
St. John the Baptist Parish	9,591	9,631	9,631	9,631	9,680	9,728	9,774	9,820	9,864	9,907	9,950
St. Tammany Parish	64,565	64,911	64,911	64,911	65,319	65,730	66,121	66,517	66,879	67,267	67,626

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:											
	1/27	1/28	1/29	1/30	2/1			2/3			2/5					
Ascension Parish	31,600	31,706	31,706	31,706	32,049	(6,410)	[1,538]	{769}	32,383	(6,477)	[1,554]	{777}	32,685	(6,537)	[1,569]	{784}
Bossier Parish	33,243	33,419	33,419	33,419	33,932	(6,786)	[1,629]	{814}	34,441	(6,888)	[1,653]	{827}	34,938	(6,988)	[1,677]	{839}
Caddo Parish	60,195	60,533	60,533	60,533	61,264	(12,253)	[2,941]	{1,470}	61,973	(12,395)	[2,975]	{1,487}	62,624	(12,525)	[3,006]	{1,503}
Calcasieu Parish	47,569	47,798	47,798	47,798	48,345	(9,669)	[2,321]	{1,160}	48,869	(9,774)	[2,346]	{1,173}	49,377	(9,875)	[2,370]	{1,185}
East Baton Rouge Parish	100,042	100,474	100,474	100,474	101,576	(20,315)	[4,876]	{2,438}	102,603	(20,521)	[4,925]	{2,462}	103,602	(20,720)	[4,973]	{2,486}
Jefferson Parish	103,289	103,995	103,995	103,995	104,803	(20,961)	[5,031]	{2,515}	105,558	(21,112)	[5,067]	{2,533}	106,279	(21,256)	[5,101]	{2,551}
Lafayette Parish	55,444	55,758	55,758	55,758	56,650	(11,330)	[2,719]	{1,360}	57,524	(11,505)	[2,761]	{1,381}	58,366	(11,673)	[2,802]	{1,401}
Lafourche Parish	24,666	24,776	24,776	24,776	25,139	(5,028)	[1,207]	{603}	25,491	(5,098)	[1,224]	{612}	25,843	(5,169)	[1,240]	{620}
Orleans Parish	78,656	79,255	79,255	79,255	79,874	(15,975)	[3,834]	{1,917}	80,437	(16,087)	[3,861]	{1,930}	80,981	(16,196)	[3,887]	{1,944}
Ouachita Parish	44,315	44,565	44,565	44,565	45,310	(9,062)	[2,175]	{1,087}	46,040	(9,208)	[2,210]	{1,105}	46,767	(9,353)	[2,245]	{1,122}
Rapides Parish	29,058	29,442	29,442	29,442	29,891	(5,978)	[1,435]	{717}	30,321	(6,064)	[1,455]	{728}	30,757	(6,151)	[1,476]	{738}
St. Bernard Parish	10,218	10,278	10,278	10,278	10,361	(2,072)	[497]	{249}	10,435	(2,087)	[501]	{250}	10,508	(2,102)	[504]	{252}
St. Charles Parish	12,640	12,678	12,678	12,678	12,782	(2,556)	[614]	{307}	12,881	(2,576)	[618]	{309}	12,972	(2,594)	[623]	{311}
St. James Parish	5,081	5,091	5,091	5,091	5,162	(1,032)	[248]	{124}	5,230	(1,046)	[251]	{126}	5,300	(1,060)	[254]	{127}
St. John the Baptist Parish	9,591	9,631	9,631	9,631	9,728	(1,946)	[467]	{233}	9,820	(1,964)	[471]	{236}	9,907	(1,981)	[476]	{238}
St. Tammany Parish	64,565	64,911	64,911	64,911	65,730	(13,146)	[3,155]	{1,578}	66,517	(13,303)	[3,193]	{1,596}	67,267	(13,453)	[3,229]	{1,614}

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.