

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

Date: 2/14/22

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 2/14/22 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.

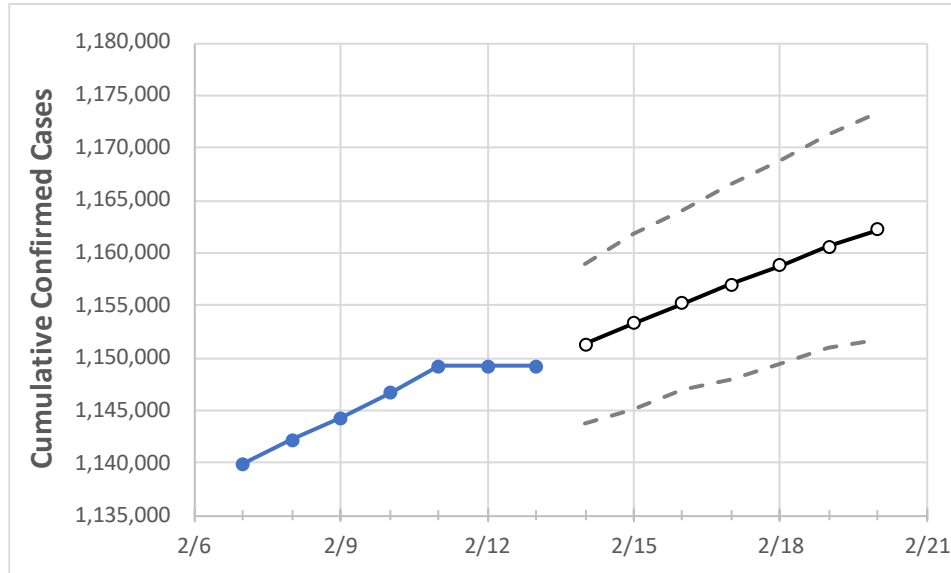
IEM's Modeling Lead

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:						
	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20
Louisiana	1,146,660	1,149,234	1,149,234	1,149,234	1,151,276	1,153,246	1,155,151	1,157,020	1,158,829	1,160,600	1,162,205

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:						
	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20
Ascension Parish	32,572	32,696	32,696	32,696	32,741	32,788	32,829	32,871	32,911	32,951	32,985
Bossier Parish	34,774	34,807	34,807	34,807	34,863	34,908	34,960	35,000	35,049	35,097	35,132
Caddo Parish	62,476	62,557	62,557	62,557	62,635	62,707	62,776	62,840	62,902	62,965	63,019
Calcasieu Parish	50,911	51,049	51,049	51,049	51,269	51,487	51,627	51,827	52,037	52,244	52,472
East Baton Rouge Parish	103,525	103,839	103,839	103,839	104,002	104,155	104,298	104,437	104,573	104,709	104,829
Jefferson Parish	106,417	106,551	106,551	106,551	106,662	106,767	106,867	106,962	107,053	107,144	107,231
Lafayette Parish	58,062	58,197	58,197	58,197	58,329	58,457	58,580	58,702	58,819	58,940	59,045
Lafourche Parish	25,738	25,793	25,793	25,793	25,845	25,894	25,936	25,983	26,030	26,075	26,116
Orleans Parish	81,619	81,786	81,786	81,786	81,920	82,042	82,161	82,279	82,388	82,500	82,607
Ouachita Parish	46,518	46,619	46,619	46,619	46,713	46,790	46,873	46,958	47,031	47,110	47,182
Rapides Parish	30,395	30,496	30,496	30,496	30,545	30,594	30,640	30,687	30,730	30,772	30,809
St. Bernard Parish	10,553	10,577	10,577	10,577	10,591	10,605	10,617	10,630	10,642	10,654	10,665
St. Charles Parish	12,980	13,002	13,002	13,002	13,018	13,032	13,047	13,060	13,074	13,087	13,099
St. James Parish	5,356	5,366	5,366	5,366	5,384	5,399	5,414	5,429	5,444	5,460	5,475
St. John the Baptist Parish	9,895	9,902	9,902	9,902	9,914	9,925	9,935	9,945	9,955	9,964	9,973
St. Tammany Parish	67,190	67,281	67,281	67,281	67,384	67,478	67,573	67,658	67,745	67,818	67,901

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:											
	2/10	2/11	2/12	2/13	2/15				2/17				2/19			
Ascension Parish	32,572	32,696	32,696	32,696	32,788	(6,558)	[1,574]	{787}	32,871	(6,574)	[1,578]	{789}	32,951	(6,590)	[1,582]	{791}
Bossier Parish	34,774	34,807	34,807	34,807	34,908	(6,982)	[1,676]	{838}	35,000	(7,000)	[1,680]	{840}	35,097	(7,019)	[1,685]	{842}
Caddo Parish	62,476	62,557	62,557	62,557	62,707	(12,541)	[3,010]	{1,505}	62,840	(12,568)	[3,016]	{1,508}	62,965	(12,593)	[3,022]	{1,511}
Calcasieu Parish	50,911	51,049	51,049	51,049	51,487	(10,297)	[2,471]	{1,236}	51,827	(10,365)	[2,488]	{1,244}	52,244	(10,449)	[2,508]	{1,254}
East Baton Rouge Parish	103,525	103,839	103,839	103,839	104,155	(20,831)	[4,999]	{2,500}	104,437	(20,887)	[5,013]	{2,506}	104,709	(20,942)	[5,026]	{2,513}
Jefferson Parish	106,417	106,551	106,551	106,551	106,767	(21,353)	[5,125]	{2,562}	106,962	(21,392)	[5,134]	{2,567}	107,144	(21,429)	[5,143]	{2,571}
Lafayette Parish	58,062	58,197	58,197	58,197	58,457	(11,691)	[2,806]	{1,403}	58,702	(11,740)	[2,818]	{1,409}	58,940	(11,788)	[2,829]	{1,415}
Lafourche Parish	25,738	25,793	25,793	25,793	25,894	(5,179)	[1,243]	{621}	25,983	(5,197)	[1,247]	{624}	26,075	(5,215)	[1,252]	{626}
Orleans Parish	81,619	81,786	81,786	81,786	82,042	(16,408)	[3,938]	{1,969}	82,279	(16,456)	[3,949]	{1,975}	82,500	(16,500)	[3,960]	{1,980}
Ouachita Parish	46,518	46,619	46,619	46,619	46,790	(9,358)	[2,246]	{1,123}	46,958	(9,392)	[2,254]	{1,127}	47,110	(9,422)	[2,261]	{1,131}
Rapides Parish	30,395	30,496	30,496	30,496	30,594	(6,119)	[1,469]	{734}	30,687	(6,137)	[1,473]	{736}	30,772	(6,154)	[1,477]	{739}
St. Bernard Parish	10,553	10,577	10,577	10,577	10,605	(2,121)	[509]	{255}	10,630	(2,126)	[510]	{255}	10,654	(2,131)	[511]	{256}
St. Charles Parish	12,980	13,002	13,002	13,002	13,032	(2,606)	[626]	{313}	13,060	(2,612)	[627]	{313}	13,087	(2,617)	[628]	{314}
St. James Parish	5,356	5,366	5,366	5,366	5,399	(1,080)	[259]	{130}	5,429	(1,086)	[261]	{130}	5,460	(1,092)	[262]	{131}
St. John the Baptist Parish	9,895	9,902	9,902	9,902	9,925	(1,985)	[476]	{238}	9,945	(1,989)	[477]	{239}	9,964	(1,993)	[478]	{239}
St. Tammany Parish	67,190	67,281	67,281	67,281	67,478	(13,496)	[3,239]	{1,619}	67,658	(13,532)	[3,248]	{1,624}	67,818	(13,564)	[3,255]	{1,628}

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.