

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

Date: 2/23/22

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 2/23/22 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.

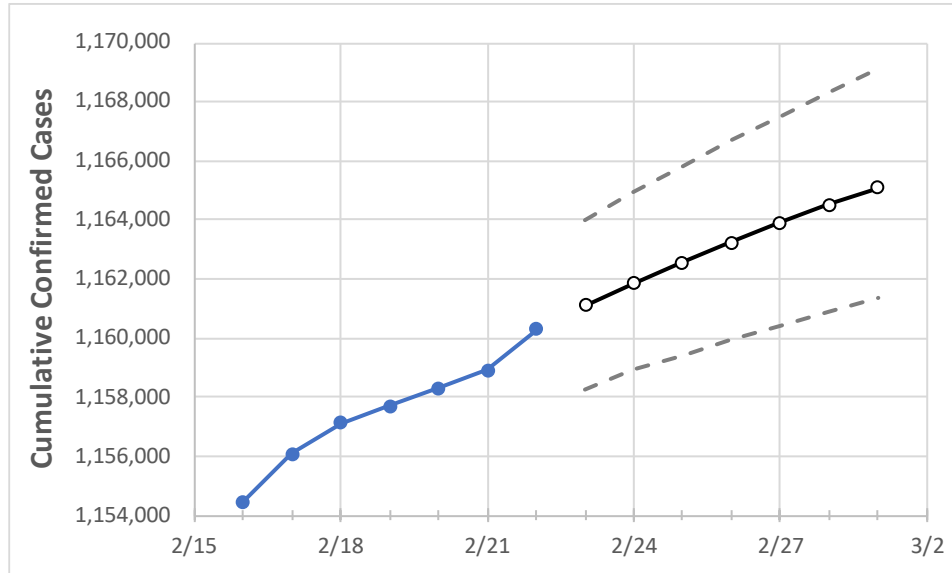
IEM's Modeling Lead

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:						
	2/19	2/20	2/21	2/22	2/23	2/24	2/25	2/26	2/27	2/28	3/1

Louisiana 1,157,717 1,158,318 1,158,918 1,160,293 1,161,116 1,161,853 1,162,572 1,163,248 1,163,906 1,164,516 1,165,102

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:						
	2/19	2/20	2/21	2/22	2/23	2/24	2/25	2/26	2/27	2/28	3/1
Ascension Parish	32,860	32,869	32,879	32,959	32,977	33,001	33,017	33,038	33,057	33,074	33,089
Bossier Parish	35,049	35,061	35,074	35,094	35,111	35,128	35,144	35,159	35,173	35,186	35,198
Caddo Parish	62,923	62,948	62,972	62,992	63,021	63,049	63,074	63,102	63,124	63,146	63,167
Calcasieu Parish	51,355	51,372	51,388	51,479	51,510	51,540	51,568	51,595	51,619	51,644	51,665
East Baton Rouge Parish	104,444	104,491	104,537	104,727	104,794	104,861	104,929	104,985	105,044	105,100	105,151
Jefferson Parish	107,212	107,251	107,290	107,356	107,415	107,473	107,524	107,574	107,624	107,669	107,716
Lafayette Parish	58,659	58,746	58,834	58,947	58,999	59,043	59,087	59,133	59,175	59,218	59,255
Lafourche Parish	25,998	26,008	26,017	26,057	26,077	26,098	26,116	26,133	26,152	26,166	26,182
Orleans Parish	82,403	82,450	82,496	82,555	82,621	82,680	82,737	82,794	82,848	82,898	82,952
Ouachita Parish	46,922	46,938	46,955	47,000	47,026	47,049	47,072	47,093	47,112	47,130	47,148
Rapides Parish	30,672	30,682	30,692	30,752	30,772	30,790	30,808	30,827	30,842	30,860	30,875
St. Bernard Parish	10,635	10,638	10,641	10,646	10,651	10,656	10,661	10,665	10,669	10,674	10,678
St. Charles Parish	13,075	13,078	13,081	13,091	13,098	13,104	13,111	13,116	13,122	13,127	13,132
St. James Parish	5,412	5,414	5,415	5,419	5,427	5,435	5,440	5,446	5,453	5,459	5,465
St. John the Baptist Parish	9,960	9,964	9,968	9,973	9,978	9,982	9,986	9,990	9,994	9,998	10,001
St. Tammany Parish	67,682	67,713	67,744	67,790	67,823	67,855	67,885	67,913	67,940	67,965	67,989

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:											
	2/19	2/20	2/21	2/22	2/24			2/26			2/28					
Ascension Parish	32,860	32,869	32,879	32,959	33,001	(6,600)	[1,584]	{792}	33,038	(6,608)	[1,586]	{793}	33,074	(6,615)	[1,588]	{794}
Bossier Parish	35,049	35,061	35,074	35,094	35,128	(7,026)	[1,686]	{843}	35,159	(7,032)	[1,688]	{844}	35,186	(7,037)	[1,689]	{844}
Caddo Parish	62,923	62,948	62,972	62,992	63,049	(12,610)	[3,026]	{1,513}	63,102	(12,620)	[3,029]	{1,514}	63,146	(12,629)	[3,031]	{1,516}
Calcasieu Parish	51,355	51,372	51,388	51,479	51,540	(10,308)	[2,474]	{1,237}	51,595	(10,319)	[2,477]	{1,238}	51,644	(10,329)	[2,479]	{1,239}
East Baton Rouge Parish	104,444	104,491	104,537	104,727	104,861	(20,972)	[5,033]	{2,517}	104,985	(20,997)	[5,039]	{2,520}	105,100	(21,020)	[5,045]	{2,522}
Jefferson Parish	107,212	107,251	107,290	107,356	107,473	(21,495)	[5,159]	{2,579}	107,574	(21,515)	[5,164]	{2,582}	107,669	(21,534)	[5,168]	{2,584}
Lafayette Parish	58,659	58,746	58,834	58,947	59,043	(11,809)	[2,834]	{1,417}	59,133	(11,827)	[2,838]	{1,419}	59,218	(11,844)	[2,842]	{1,421}
Lafourche Parish	25,998	26,008	26,017	26,057	26,098	(5,220)	[1,253]	{626}	26,133	(5,227)	[1,254]	{627}	26,166	(5,233)	[1,256]	{628}
Orleans Parish	82,403	82,450	82,496	82,555	82,680	(16,536)	[3,969]	{1,984}	82,794	(16,559)	[3,974]	{1,987}	82,898	(16,580)	[3,979]	{1,990}
Ouachita Parish	46,922	46,938	46,955	47,000	47,049	(9,410)	[2,258]	{1,129}	47,093	(9,419)	[2,260]	{1,130}	47,130	(9,426)	[2,262]	{1,131}
Rapides Parish	30,672	30,682	30,692	30,752	30,790	(6,158)	[1,478]	{739}	30,827	(6,165)	[1,480]	{740}	30,860	(6,172)	[1,481]	{741}
St. Bernard Parish	10,635	10,638	10,641	10,646	10,656	(2,131)	[511]	{256}	10,665	(2,133)	[512]	{256}	10,674	(2,135)	[512]	{256}
St. Charles Parish	13,075	13,078	13,081	13,091	13,104	(2,621)	[629]	{315}	13,116	(2,623)	[630]	{315}	13,127	(2,625)	[630]	{315}
St. James Parish	5,412	5,414	5,415	5,419	5,435	(1,087)	[261]	{130}	5,446	(1,089)	[261]	{131}	5,459	(1,092)	[262]	{131}
St. John the Baptist Parish	9,960	9,964	9,968	9,973	9,982	(1,996)	[479]	{240}	9,990	(1,998)	[480]	{240}	9,998	(2,000)	[480]	{240}
St. Tammany Parish	67,682	67,713	67,744	67,790	67,855	(13,571)	[3,257]	{1,629}	67,913	(13,583)	[3,260]	{1,630}	67,965	(13,593)	[3,262]	{1,631}

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.