

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

Date: 4/29/21

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 4/29/21 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.

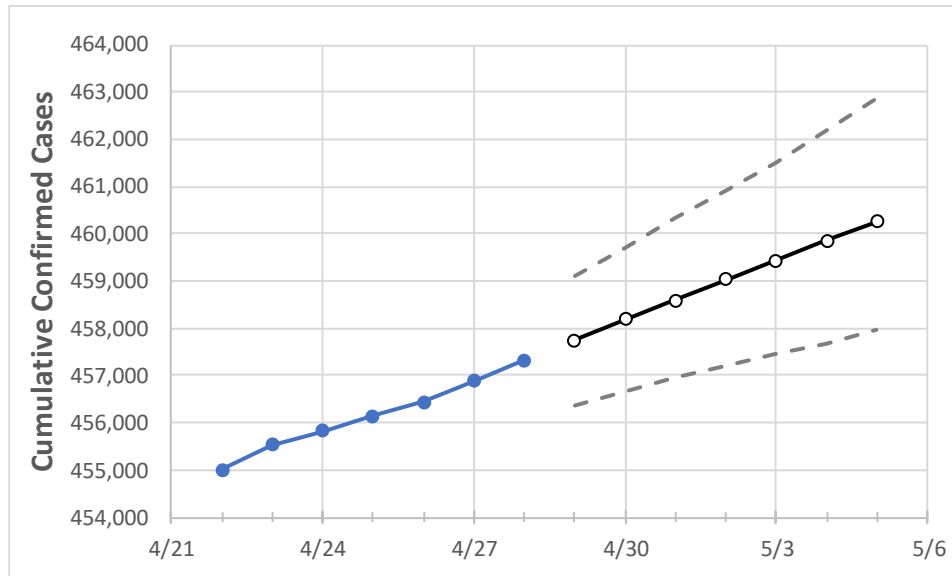
IEM's Modeling Lead

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:						
	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2	5/3	5/4	5/5
Louisiana	456,135	456,432	456,884	457,326	457,754	458,185	458,598	459,026	459,443	459,856	460,254

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:						
	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2	5/3	5/4	5/5
Ascension Parish	11,966	11,980	11,992	12,008	12,023	12,038	12,051	12,065	12,080	12,094	12,107
Bossier Parish	13,665	13,675	13,687	13,714	13,733	13,751	13,771	13,791	13,811	13,832	13,852
Caddo Parish	25,679	25,701	25,725	25,782	25,813	25,845	25,878	25,911	25,945	25,979	26,014
Calcasieu Parish	22,209	22,230	22,263	22,265	22,285	22,305	22,324	22,342	22,360	22,377	22,393
East Baton Rouge Parish	38,812	38,848	38,902	38,929	38,981	39,034	39,085	39,132	39,181	39,231	39,278
Jefferson Parish	45,742	45,766	45,803	45,841	45,874	45,907	45,941	45,975	46,011	46,046	46,082
Lafayette Parish	23,039	23,071	23,106	23,129	23,162	23,195	23,228	23,262	23,293	23,327	23,362
Lafourche Parish	9,484	9,489	9,495	9,494	9,501	9,508	9,515	9,523	9,530	9,538	9,547
Orleans Parish	29,757	29,775	29,807	29,830	29,852	29,873	29,895	29,917	29,939	29,962	29,986
Ouachita Parish	18,204	18,218	18,215	18,252	18,274	18,297	18,319	18,342	18,367	18,393	18,422
Rapides Parish	11,884	11,886	11,899	11,927	11,939	11,952	11,964	11,976	11,989	12,002	12,015
St. Bernard Parish	3,989	3,991	3,997	3,995	3,997	3,999	4,002	4,004	4,006	4,008	4,010
St. Charles Parish	5,358	5,361	5,360	5,366	5,369	5,373	5,376	5,380	5,383	5,386	5,390
St. James Parish	1,940	1,941	1,939	1,943	1,944	1,946	1,947	1,948	1,950	1,951	1,952
St. John the Baptist Parish	3,685	3,688	3,689	3,688	3,692	3,695	3,699	3,703	3,706	3,710	3,714
St. Tammany Parish	25,470	25,485	25,511	25,526	25,549	25,573	25,598	25,624	25,649	25,675	25,701

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:											
	4/25	4/26	4/27	4/28	4/30				5/2				5/4			
Ascension Parish	11,966	11,980	11,992	12,008	12,038	(2,408)	[578]	{289}	12,065	(2,413)	[579]	{290}	12,094	(2,419)	[580]	{290}
Bossier Parish	13,665	13,675	13,687	13,714	13,751	(2,750)	[660]	{330}	13,791	(2,758)	[662]	{331}	13,832	(2,766)	[664]	{332}
Caddo Parish	25,679	25,701	25,725	25,782	25,845	(5,169)	[1,241]	{620}	25,911	(5,182)	[1,244]	{622}	25,979	(5,196)	[1,247]	{623}
Calcasieu Parish	22,209	22,230	22,263	22,265	22,305	(4,461)	[1,071]	{535}	22,342	(4,468)	[1,072]	{536}	22,377	(4,475)	[1,074]	{537}
East Baton Rouge Parish	38,812	38,848	38,902	38,929	39,034	(7,807)	[1,874]	{937}	39,132	(7,826)	[1,878]	{939}	39,231	(7,846)	[1,883]	{942}
Jefferson Parish	45,742	45,766	45,803	45,841	45,907	(9,181)	[2,204]	{1,102}	45,975	(9,195)	[2,207]	{1,103}	46,046	(9,209)	[2,210]	{1,105}
Lafayette Parish	23,039	23,071	23,106	23,129	23,195	(4,639)	[1,113]	{557}	23,262	(4,652)	[1,117]	{558}	23,327	(4,665)	[1,120]	{560}
Lafourche Parish	9,484	9,489	9,495	9,494	9,508	(1,902)	[456]	{228}	9,523	(1,905)	[457]	{229}	9,538	(1,908)	[458]	{229}
Orleans Parish	29,757	29,775	29,807	29,830	29,873	(5,975)	[1,434]	{717}	29,917	(5,983)	[1,436]	{718}	29,962	(5,992)	[1,438]	{719}
Ouachita Parish	18,204	18,218	18,215	18,252	18,297	(3,659)	[878]	{439}	18,342	(3,668)	[880]	{440}	18,393	(3,679)	[883]	{441}
Rapides Parish	11,884	11,886	11,899	11,927	11,952	(2,390)	[574]	{287}	11,976	(2,395)	[575]	{287}	12,002	(2,400)	[576]	{288}
St. Bernard Parish	3,989	3,991	3,997	3,995	3,999	(800)	[192]	{96}	4,004	(801)	[192]	{96}	4,008	(802)	[192]	{96}
St. Charles Parish	5,358	5,361	5,360	5,366	5,373	(1,075)	[258]	{129}	5,380	(1,076)	[258]	{129}	5,386	(1,077)	[259]	{129}
St. James Parish	1,940	1,941	1,939	1,943	1,946	(389)	[93]	{47}	1,948	(390)	[94]	{47}	1,951	(390)	[94]	{47}
St. John the Baptist Parish	3,685	3,688	3,689	3,688	3,695	(739)	[177]	{89}	3,703	(741)	[178]	{89}	3,710	(742)	[178]	{89}
St. Tammany Parish	25,470	25,485	25,511	25,526	25,573	(5,115)	[1,228]	{614}	25,624	(5,125)	[1,230]	{615}	25,675	(5,135)	[1,232]	{616}

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.