

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

Date: 1/28/21

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 1/28/21 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.**

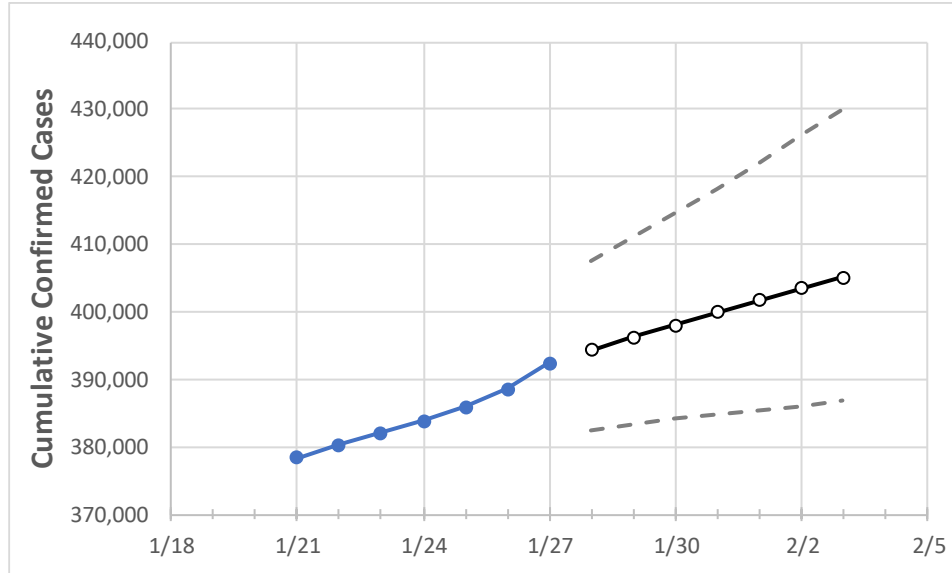
### IEM's Modeling Lead

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:						
	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3
Louisiana	383,862	385,942	388,562	392,416	394,350	396,203	398,054	399,868	401,690	403,426	405,149

**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:						
	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3
Ascension Parish	9,829	9,874	9,922	10,107	10,162	10,219	10,269	10,322	10,375	10,426	10,474
Bossier Parish	11,230	11,278	11,383	11,514	11,594	11,675	11,757	11,838	11,917	12,003	12,087
Caddo Parish	21,916	22,074	22,197	22,380	22,514	22,647	22,779	22,909	23,038	23,165	23,287
Calcasieu Parish	16,928	16,970	17,076	17,385	17,505	17,620	17,740	17,865	17,985	18,102	18,218
East Baton Rouge Parish	31,179	31,369	31,505	31,914	32,034	32,154	32,265	32,373	32,472	32,567	32,659
Jefferson Parish	39,268	39,564	39,845	40,200	40,418	40,622	40,829	41,027	41,209	41,393	41,569
Lafayette Parish	19,943	20,020	20,094	20,287	20,369	20,450	20,529	20,605	20,686	20,761	20,833
Lafourche Parish	7,794	7,848	7,966	8,059	8,128	8,198	8,271	8,343	8,414	8,485	8,557
Orleans Parish	25,358	25,559	25,754	25,893	26,010	26,119	26,228	26,332	26,433	26,532	26,628
Ouachita Parish	16,563	16,639	16,729	16,838	16,902	16,968	17,034	17,092	17,147	17,201	17,259
Rapides Parish	10,280	10,317	10,368	10,566	10,626	10,691	10,757	10,823	10,895	10,960	11,030
St. Bernard Parish	3,092	3,107	3,142	3,189	3,214	3,239	3,265	3,290	3,315	3,340	3,365
St. Charles Parish	4,608	4,629	4,658	4,691	4,712	4,734	4,756	4,776	4,798	4,816	4,836
St. James Parish	1,666	1,670	1,684	1,697	1,705	1,713	1,720	1,727	1,734	1,741	1,748
St. John the Baptist Parish	3,153	3,190	3,202	3,222	3,238	3,255	3,270	3,286	3,302	3,318	3,333
St. Tammany Parish	20,264	20,484	20,736	20,888	21,031	21,159	21,289	21,419	21,524	21,626	21,733

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:											
	1/24	1/25	1/26	1/27	1/29			1/31			2/2					
Ascension Parish	9,829	9,874	9,922	10,107	10,219	(2,044)	[491]	{245}	10,322	(2,064)	[495]	{248}	10,426	(2,085)	[500]	{250}
Bossier Parish	11,230	11,278	11,383	11,514	11,675	(2,335)	[560]	{280}	11,838	(2,368)	[568]	{284}	12,003	(2,401)	[576]	{288}
Caddo Parish	21,916	22,074	22,197	22,380	22,647	(4,529)	[1,087]	{544}	22,909	(4,582)	[1,100]	{550}	23,165	(4,633)	[1,112]	{556}
Calcasieu Parish	16,928	16,970	17,076	17,385	17,620	(3,524)	[846]	{423}	17,865	(3,573)	[858]	{429}	18,102	(3,620)	[869]	{434}
East Baton Rouge Parish	31,179	31,369	31,505	31,914	32,154	(6,431)	[1,543]	{772}	32,373	(6,475)	[1,554]	{777}	32,567	(6,513)	[1,563]	{782}
Jefferson Parish	39,268	39,564	39,845	40,200	40,622	(8,124)	[1,950]	{975}	41,027	(8,205)	[1,969]	{985}	41,393	(8,279)	[1,987]	{993}
Lafayette Parish	19,943	20,020	20,094	20,287	20,450	(4,090)	[982]	{491}	20,605	(4,121)	[989]	{495}	20,761	(4,152)	[997]	{498}
Lafourche Parish	7,794	7,848	7,966	8,059	8,198	(1,640)	[394]	{197}	8,343	(1,669)	[400]	{200}	8,485	(1,697)	[407]	{204}
Orleans Parish	25,358	25,559	25,754	25,893	26,119	(5,224)	[1,254]	{627}	26,332	(5,266)	[1,264]	{632}	26,532	(5,306)	[1,274]	{637}
Ouachita Parish	16,563	16,639	16,729	16,838	16,968	(3,394)	[814]	{407}	17,092	(3,418)	[820]	{410}	17,201	(3,440)	[826]	{413}
Rapides Parish	10,280	10,317	10,368	10,566	10,691	(2,138)	[513]	{257}	10,823	(2,165)	[520]	{260}	10,960	(2,192)	[526]	{263}
St. Bernard Parish	3,092	3,107	3,142	3,189	3,239	(648)	[155]	{78}	3,290	(658)	[158]	{79}	3,340	(668)	[160]	{80}
St. Charles Parish	4,608	4,629	4,658	4,691	4,734	(947)	[227]	{114}	4,776	(955)	[229]	{115}	4,816	(963)	[231]	{116}
St. James Parish	1,666	1,670	1,684	1,697	1,713	(343)	[82]	{41}	1,727	(345)	[83]	{41}	1,741	(348)	[84]	{42}
St. John the Baptist Parish	3,153	3,190	3,202	3,222	3,255	(651)	[156]	{78}	3,286	(657)	[158]	{79}	3,318	(664)	[159]	{80}
St. Tammany Parish	20,264	20,484	20,736	20,888	21,159	(4,232)	[1,016]	{508}	21,419	(4,284)	[1,028]	{514}	21,626	(4,325)	[1,038]	{519}

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966 or Stephanie Tennyson at [stephanie.tennyson@iem.com](mailto:stephanie.tennyson@iem.com) or 202-309-4257.