

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

Date: 1/19/21

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 1/19/21 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.**

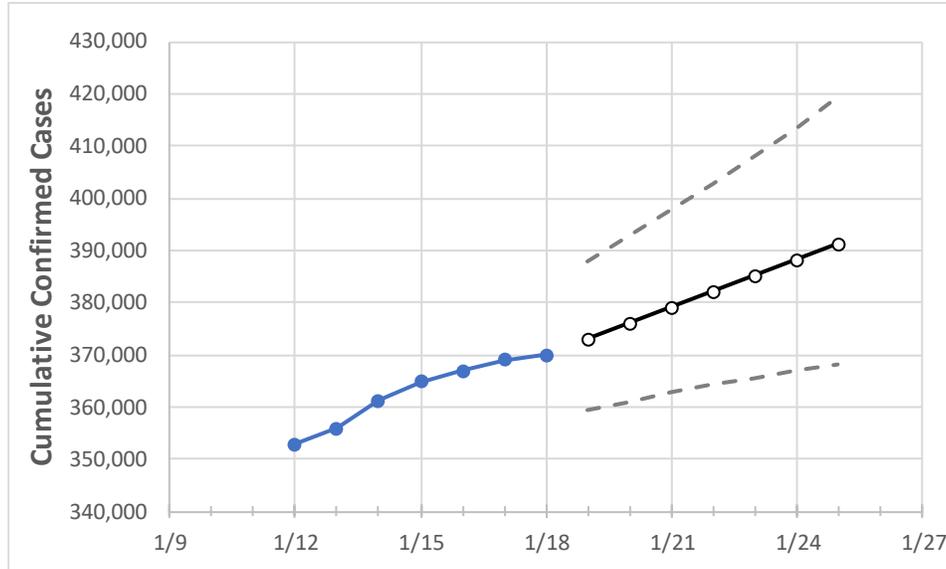
### IEM's Modeling Lead

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:						
	1/15	1/16	1/17	1/18	1/19	1/20	1/21	1/22	1/23	1/24	1/25
Louisiana	364,853	366,917	368,980	369,951	373,008	376,086	379,046	382,082	385,102	388,204	391,240

**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:						
	1/15	1/16	1/17	1/18	1/19	1/20	1/21	1/22	1/23	1/24	1/25
Ascension Parish	9,357	9,413	9,469	9,498	9,600	9,701	9,806	9,910	10,018	10,126	10,235
Bossier Parish	10,558	10,603	10,648	10,662	10,749	10,840	10,927	11,010	11,095	11,179	11,266
Caddo Parish	20,685	20,810	20,934	21,035	21,211	21,378	21,549	21,722	21,895	22,072	22,247
Calcasieu Parish	15,949	16,053	16,156	16,176	16,293	16,409	16,527	16,639	16,755	16,863	16,968
East Baton Rouge Parish	29,843	30,018	30,192	30,265	30,585	30,912	31,245	31,587	31,938	32,312	32,699
Jefferson Parish	37,200	37,442	37,684	37,813	38,153	38,512	38,859	39,199	39,535	39,885	40,223
Lafayette Parish	19,085	19,189	19,293	19,315	19,433	19,551	19,658	19,772	19,884	19,991	20,098
Lafourche Parish	7,309	7,344	7,378	7,416	7,483	7,553	7,620	7,690	7,755	7,823	7,894
Orleans Parish	24,170	24,323	24,476	24,571	24,766	24,957	25,144	25,326	25,514	25,697	25,879
Ouachita Parish	15,893	15,964	16,035	16,082	16,183	16,283	16,379	16,478	16,574	16,666	16,755
Rapides Parish	9,742	9,795	9,847	9,865	9,944	10,023	10,107	10,184	10,262	10,340	10,421
St. Bernard Parish	2,873	2,893	2,912	2,923	2,950	2,977	3,002	3,027	3,051	3,076	3,099
St. Charles Parish	4,353	4,376	4,399	4,418	4,466	4,515	4,565	4,614	4,666	4,717	4,768
St. James Parish	1,570	1,582	1,594	1,598	1,612	1,626	1,640	1,654	1,669	1,683	1,697
St. John the Baptist Parish	3,010	3,021	3,032	3,045	3,063	3,081	3,098	3,116	3,133	3,151	3,168
St. Tammany Parish	18,989	19,149	19,309	19,404	19,682	19,973	20,266	20,565	20,873	21,188	21,500

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:											
	1/15	1/16	1/17	1/18	1/20				1/22				1/24			
Ascension Parish	9,357	9,413	9,469	9,498	9,701	(1,940)	[466]	{233}	9,910	(1,982)	[476]	{238}	10,126	(2,025)	[486]	{243}
Bossier Parish	10,558	10,603	10,648	10,662	10,840	(2,168)	[520]	{260}	11,010	(2,202)	[528]	{264}	11,179	(2,236)	[537]	{268}
Caddo Parish	20,685	20,810	20,934	21,035	21,378	(4,276)	[1,026]	{513}	21,722	(4,344)	[1,043]	{521}	22,072	(4,414)	[1,059]	{530}
Calcasieu Parish	15,949	16,053	16,156	16,176	16,409	(3,282)	[788]	{394}	16,639	(3,328)	[799]	{399}	16,863	(3,373)	[809]	{405}
East Baton Rouge Parish	29,843	30,018	30,192	30,265	30,912	(6,182)	[1,484]	{742}	31,587	(6,317)	[1,516]	{758}	32,312	(6,462)	[1,551]	{775}
Jefferson Parish	37,200	37,442	37,684	37,813	38,512	(7,702)	[1,849]	{924}	39,199	(7,840)	[1,882]	{941}	39,885	(7,977)	[1,914]	{957}
Lafayette Parish	19,085	19,189	19,293	19,315	19,551	(3,910)	[938]	{469}	19,772	(3,954)	[949]	{475}	19,991	(3,998)	[960]	{480}
Lafourche Parish	7,309	7,344	7,378	7,416	7,553	(1,511)	[363]	{181}	7,690	(1,538)	[369]	{185}	7,823	(1,565)	[376]	{188}
Orleans Parish	24,170	24,323	24,476	24,571	24,957	(4,991)	[1,198]	{599}	25,326	(5,065)	[1,216]	{608}	25,697	(5,139)	[1,233]	{617}
Ouachita Parish	15,893	15,964	16,035	16,082	16,283	(3,257)	[782]	{391}	16,478	(3,296)	[791]	{395}	16,666	(3,333)	[800]	{400}
Rapides Parish	9,742	9,795	9,847	9,865	10,023	(2,005)	[481]	{241}	10,184	(2,037)	[489]	{244}	10,340	(2,068)	[496]	{248}
St. Bernard Parish	2,873	2,893	2,912	2,923	2,977	(595)	[143]	{71}	3,027	(605)	[145]	{73}	3,076	(615)	[148]	{74}
St. Charles Parish	4,353	4,376	4,399	4,418	4,515	(903)	[217]	{108}	4,614	(923)	[221]	{111}	4,717	(943)	[226]	{113}
St. James Parish	1,570	1,582	1,594	1,598	1,626	(325)	[78]	{39}	1,654	(331)	[79]	{40}	1,683	(337)	[81]	{40}
St. John the Baptist Parish	3,010	3,021	3,032	3,045	3,081	(616)	[148]	{74}	3,116	(623)	[150]	{75}	3,151	(630)	[151]	{76}
St. Tammany Parish	18,989	19,149	19,309	19,404	19,973	(3,995)	[959]	{479}	20,565	(4,113)	[987]	{494}	21,188	(4,238)	[1,017]	{509}

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.