

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

Date: 7/1/21

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 7/1/21 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.**

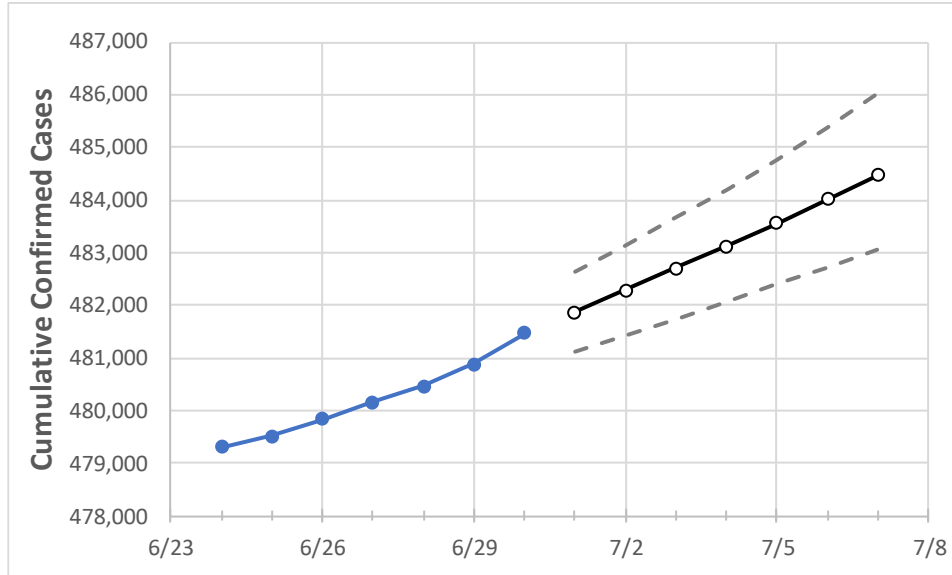
### IEM's Modeling Lead

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:						
	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7
Louisiana	480,149	480,463	480,876	481,467	481,866	482,279	482,702	483,124	483,553	484,016	484,476

**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:						
	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7
Ascension Parish	12,869	12,881	12,898	12,936	12,950	12,963	12,976	12,990	13,004	13,019	13,034
Bossier Parish	14,428	14,438	14,464	14,478	14,488	14,499	14,509	14,520	14,531	14,542	14,554
Caddo Parish	27,214	27,223	27,240	27,253	27,266	27,278	27,290	27,302	27,313	27,324	27,335
Calcasieu Parish	23,215	23,232	23,239	23,263	23,279	23,296	23,313	23,330	23,347	23,365	23,381
East Baton Rouge Parish	41,024	41,063	41,108	41,204	41,260	41,317	41,377	41,440	41,508	41,578	41,652
Jefferson Parish	47,504	47,526	47,551	47,582	47,604	47,627	47,649	47,672	47,695	47,717	47,741
Lafayette Parish	24,503	24,519	24,535	24,566	24,586	24,607	24,628	24,650	24,671	24,693	24,716
Lafourche Parish	10,153	10,169	10,187	10,211	10,230	10,250	10,271	10,291	10,313	10,336	10,359
Orleans Parish	31,026	31,041	31,068	31,094	31,113	31,133	31,153	31,174	31,196	31,219	31,242
Ouachita Parish	19,060	19,073	19,081	19,096	19,108	19,121	19,134	19,147	19,160	19,173	19,186
Rapides Parish	12,715	12,720	12,726	12,748	12,754	12,761	12,767	12,774	12,780	12,786	12,793
St. Bernard Parish	4,134	4,135	4,138	4,141	4,143	4,144	4,146	4,148	4,149	4,151	4,153
St. Charles Parish	5,627	5,629	5,636	5,642	5,645	5,649	5,652	5,655	5,658	5,661	5,665
St. James Parish	2,035	2,036	2,039	2,038	2,039	2,041	2,043	2,044	2,046	2,047	2,049
St. John the Baptist Parish	3,879	3,881	3,880	3,882	3,885	3,888	3,890	3,893	3,896	3,899	3,901
St. Tammany Parish	26,390	26,408	26,444	26,464	26,487	26,511	26,536	26,561	26,588	26,615	26,644

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:											
	6/27	6/28	6/29	6/30	7/2			7/4			7/6					
Ascension Parish	12,869	12,881	12,898	12,936	12,963	(2,593)	{622}	{311}	12,990	(2,598)	{624}	{312}	13,019	(2,604)	{625}	{312}
Bossier Parish	14,428	14,438	14,464	14,478	14,499	(2,900)	{696}	{348}	14,520	(2,904)	{697}	{348}	14,542	(2,908)	{698}	{349}
Caddo Parish	27,214	27,223	27,240	27,253	27,278	(5,456)	{1,309}	{655}	27,302	(5,460)	{1,310}	{655}	27,324	(5,465)	{1,312}	{656}
Calcasieu Parish	23,215	23,232	23,239	23,263	23,296	(4,659)	{1,118}	{559}	23,330	(4,666)	{1,120}	{560}	23,365	(4,673)	{1,122}	{561}
East Baton Rouge Parish	41,024	41,063	41,108	41,204	41,317	(8,263)	{1,983}	{992}	41,440	(8,288)	{1,989}	{995}	41,578	(8,316)	{1,996}	{998}
Jefferson Parish	47,504	47,526	47,551	47,582	47,627	(9,525)	{2,286}	{1,143}	47,672	(9,534)	{2,288}	{1,144}	47,717	(9,543)	{2,290}	{1,145}
Lafayette Parish	24,503	24,519	24,535	24,566	24,607	(4,921)	{1,181}	{591}	24,650	(4,930)	{1,183}	{592}	24,693	(4,939)	{1,185}	{593}
Lafourche Parish	10,153	10,169	10,187	10,211	10,250	(2,050)	{492}	{246}	10,291	(2,058)	{494}	{247}	10,336	(2,067)	{496}	{248}
Orleans Parish	31,026	31,041	31,068	31,094	31,133	(6,227)	{1,494}	{747}	31,174	(6,235)	{1,496}	{748}	31,219	(6,244)	{1,499}	{749}
Ouachita Parish	19,060	19,073	19,081	19,096	19,121	(3,824)	{918}	{459}	19,147	(3,829)	{919}	{460}	19,173	(3,835)	{920}	{460}
Rapides Parish	12,715	12,720	12,726	12,748	12,761	(2,552)	{613}	{306}	12,774	(2,555)	{613}	{307}	12,786	(2,557)	{614}	{307}
St. Bernard Parish	4,134	4,135	4,138	4,141	4,144	(829)	{199}	{99}	4,148	(830)	{199}	{100}	4,151	(830)	{199}	{100}
St. Charles Parish	5,627	5,629	5,636	5,642	5,649	(1,130)	{271}	{136}	5,655	(1,131)	{271}	{136}	5,661	(1,132)	{272}	{136}
St. James Parish	2,035	2,036	2,039	2,038	2,041	(408)	{98}	{49}	2,044	(409)	{98}	{49}	2,047	(409)	{98}	{49}
St. John the Baptist Parish	3,879	3,881	3,880	3,882	3,888	(778)	{187}	{93}	3,893	(779)	{187}	{93}	3,899	(780)	{187}	{94}
St. Tammany Parish	26,390	26,408	26,444	26,464	26,511	(5,302)	{1,273}	{636}	26,561	(5,312)	{1,275}	{637}	26,615	(5,323)	{1,278}	{639}

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.