

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

Date: 3/5/21

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 3/5/21 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.**

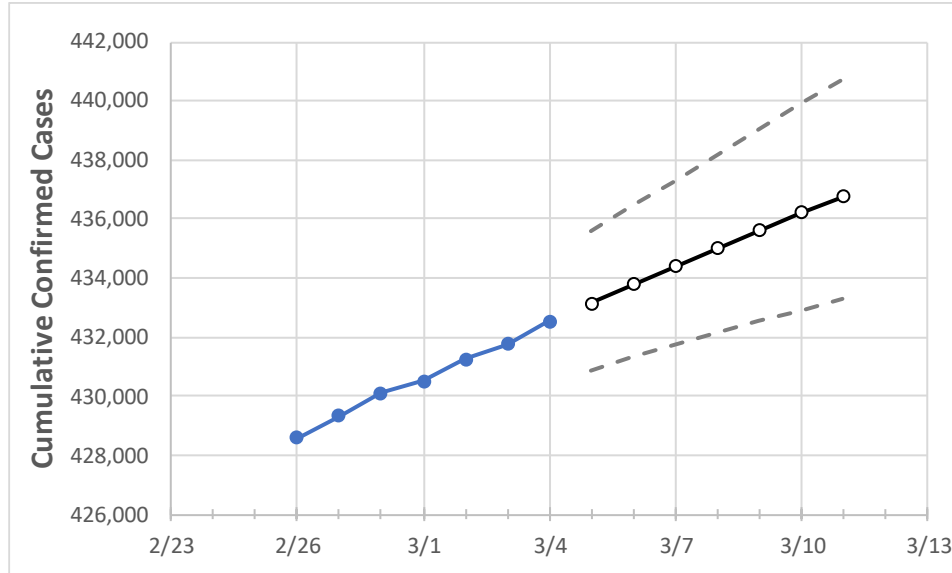
### IEM's Modeling Lead

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:						
	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	3/9	3/10	3/11
Louisiana	430,504	431,271	431,771	432,527	433,149	433,775	434,393	435,009	435,612	436,202	436,773

**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:						
	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	3/9	3/10	3/11
Ascension Parish	10,963	11,012	11,014	11,036	11,050	11,064	11,077	11,090	11,102	11,115	11,128
Bossier Parish	13,034	13,035	13,048	13,061	13,072	13,083	13,093	13,103	13,112	13,120	13,128
Caddo Parish	24,751	24,780	24,779	24,795	24,816	24,837	24,856	24,875	24,894	24,911	24,927
Calcasieu Parish	19,491	19,584	19,640	19,697	19,764	19,831	19,898	19,964	20,033	20,104	20,176
East Baton Rouge Parish	35,673	35,727	35,810	35,887	35,950	36,009	36,067	36,124	36,180	36,232	36,286
Jefferson Parish	43,936	44,014	44,057	44,128	44,182	44,236	44,289	44,340	44,390	44,438	44,487
Lafayette Parish	21,602	21,617	21,629	21,698	21,718	21,737	21,756	21,774	21,793	21,810	21,828
Lafourche Parish	9,128	9,155	9,181	9,193	9,208	9,223	9,237	9,251	9,265	9,278	9,291
Orleans Parish	28,501	28,565	28,581	28,624	28,667	28,711	28,752	28,792	28,831	28,871	28,909
Ouachita Parish	17,695	17,708	17,709	17,709	17,715	17,720	17,725	17,730	17,735	17,739	17,743
Rapides Parish	11,276	11,284	11,305	11,310	11,321	11,331	11,341	11,352	11,362	11,372	11,381
St. Bernard Parish	3,742	3,758	3,768	3,779	3,792	3,805	3,818	3,831	3,844	3,856	3,869
St. Charles Parish	5,122	5,127	5,133	5,144	5,153	5,161	5,170	5,178	5,186	5,193	5,201
St. James Parish	1,854	1,855	1,855	1,858	1,861	1,863	1,866	1,868	1,871	1,873	1,875
St. John the Baptist Parish	3,531	3,536	3,545	3,546	3,550	3,554	3,558	3,561	3,565	3,568	3,571
St. Tammany Parish	24,087	24,130	24,186	24,259	24,323	24,388	24,453	24,515	24,582	24,642	24,708

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:											
	3/1	3/2	3/3	3/4	3/6			3/8			3/10					
Ascension Parish	10,963	11,012	11,014	11,036	11,064	(2,213)	[531]	{266}	11,090	(2,218)	[532]	{266}	11,115	(2,223)	[534]	{267}
Bossier Parish	13,034	13,035	13,048	13,061	13,083	(2,617)	[628]	{314}	13,103	(2,621)	[629]	{314}	13,120	(2,624)	[630]	{315}
Caddo Parish	24,751	24,780	24,779	24,795	24,837	(4,967)	[1,192]	{596}	24,875	(4,975)	[1,194]	{597}	24,911	(4,982)	[1,196]	{598}
Calcasieu Parish	19,491	19,584	19,640	19,697	19,831	(3,966)	[952]	{476}	19,964	(3,993)	[958]	{479}	20,104	(4,021)	[965]	{482}
East Baton Rouge Parish	35,673	35,727	35,810	35,887	36,009	(7,202)	[1,728]	{864}	36,124	(7,225)	[1,734]	{867}	36,232	(7,246)	[1,739]	{870}
Jefferson Parish	43,936	44,014	44,057	44,128	44,236	(8,847)	[2,123]	{1,062}	44,340	(8,868)	[2,128]	{1,064}	44,438	(8,888)	[2,133]	{1,067}
Lafayette Parish	21,602	21,617	21,629	21,698	21,737	(4,347)	[1,043]	{522}	21,774	(4,355)	[1,045]	{523}	21,810	(4,362)	[1,047]	{523}
Lafourche Parish	9,128	9,155	9,181	9,193	9,223	(1,845)	[443]	{221}	9,251	(1,850)	[444]	{222}	9,278	(1,856)	[445]	{223}
Orleans Parish	28,501	28,565	28,581	28,624	28,711	(5,742)	[1,378]	{689}	28,792	(5,758)	[1,382]	{691}	28,871	(5,774)	[1,386]	{693}
Ouachita Parish	17,695	17,708	17,709	17,709	17,720	(3,544)	[851]	{425}	17,730	(3,546)	[851]	{426}	17,739	(3,548)	[851]	{426}
Rapides Parish	11,276	11,284	11,305	11,310	11,331	(2,266)	[544]	{272}	11,352	(2,270)	[545]	{272}	11,372	(2,274)	[546]	{273}
St. Bernard Parish	3,742	3,758	3,768	3,779	3,805	(761)	[183]	{91}	3,831	(766)	[184]	{92}	3,856	(771)	[185]	{93}
St. Charles Parish	5,122	5,127	5,133	5,144	5,161	(1,032)	[248]	{124}	5,178	(1,036)	[249]	{124}	5,193	(1,039)	[249]	{125}
St. James Parish	1,854	1,855	1,855	1,858	1,863	(373)	[89]	{45}	1,868	(374)	[90]	{45}	1,873	(375)	[90]	{45}
St. John the Baptist Parish	3,531	3,536	3,545	3,546	3,554	(711)	[171]	{85}	3,561	(712)	[171]	{85}	3,568	(714)	[171]	{86}
St. Tammany Parish	24,087	24,130	24,186	24,259	24,388	(4,878)	[1,171]	{585}	24,515	(4,903)	[1,177]	{588}	24,642	(4,928)	[1,183]	{591}

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.