

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

Date: 2/16/21

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 2/16/21 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.**

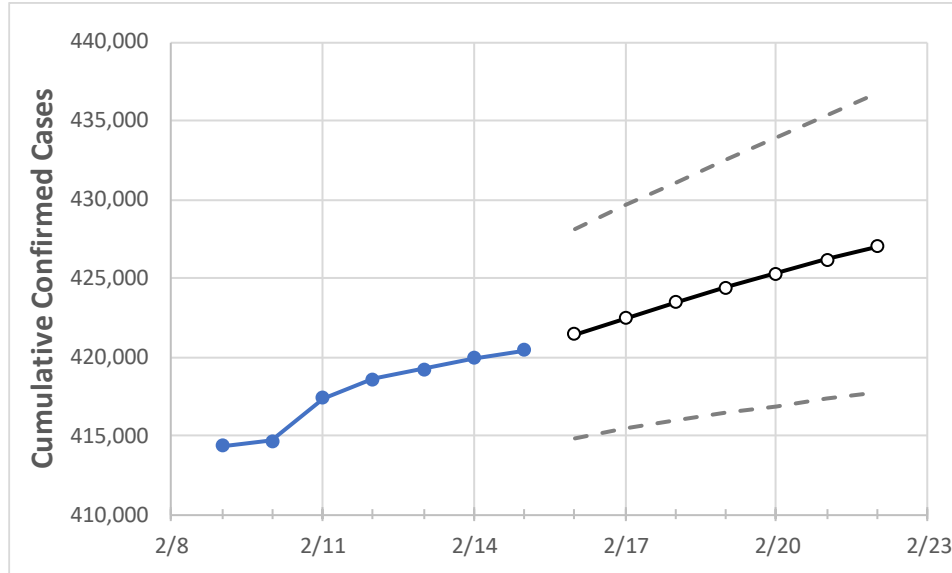
### IEM's Modeling Lead

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:						
	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22
Louisiana	418,585	419,238	419,891	420,394	421,447	422,474	423,451	424,404	425,318	426,183	426,986

**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:						
	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22
Ascension Parish	10,730	10,740	10,750	10,756	10,778	10,800	10,819	10,838	10,855	10,872	10,888
Bossier Parish	12,741	12,763	12,785	12,807	12,860	12,914	12,966	13,016	13,064	13,112	13,158
Caddo Parish	24,286	24,321	24,356	24,374	24,451	24,526	24,598	24,669	24,737	24,803	24,865
Calcasieu Parish	18,656	18,683	18,710	18,725	18,775	18,823	18,869	18,914	18,957	19,001	19,042
East Baton Rouge Parish	34,525	34,569	34,613	34,631	34,733	34,832	34,930	35,032	35,129	35,216	35,300
Jefferson Parish	42,766	42,830	42,894	42,947	43,031	43,111	43,188	43,262	43,328	43,392	43,455
Lafayette Parish	21,237	21,245	21,253	21,295	21,326	21,358	21,389	21,417	21,445	21,472	21,496
Lafourche Parish	8,828	8,842	8,855	8,861	8,891	8,919	8,947	8,973	9,000	9,026	9,052
Orleans Parish	27,625	27,666	27,706	27,744	27,810	27,872	27,932	27,989	28,046	28,100	28,158
Ouachita Parish	17,536	17,554	17,571	17,579	17,606	17,632	17,657	17,680	17,704	17,725	17,747
Rapides Parish	11,080	11,089	11,098	11,098	11,119	11,138	11,158	11,176	11,195	11,213	11,231
St. Bernard Parish	3,506	3,515	3,524	3,532	3,547	3,561	3,575	3,589	3,604	3,617	3,631
St. Charles Parish	4,970	4,986	5,002	4,998	5,012	5,025	5,038	5,051	5,063	5,076	5,088
St. James Parish	1,799	1,800	1,800	1,814	1,819	1,825	1,830	1,834	1,839	1,845	1,849
St. John the Baptist Parish	3,428	3,437	3,445	3,456	3,465	3,474	3,482	3,491	3,499	3,507	3,515
St. Tammany Parish	22,846	22,906	22,966	23,025	23,097	23,170	23,242	23,313	23,381	23,448	23,510

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:											
	2/12	2/13	2/14	2/15	2/17			2/19			2/21					
Ascension Parish	10,730	10,740	10,750	10,756	10,800	(2,160)	[518]	{259}	10,838	(2,168)	[520]	{260}	10,872	(2,174)	[522]	{261}
Bossier Parish	12,741	12,763	12,785	12,807	12,914	(2,583)	[620]	{310}	13,016	(2,603)	[625]	{312}	13,112	(2,622)	[629]	{315}
Caddo Parish	24,286	24,321	24,356	24,374	24,526	(4,905)	[1,177]	{589}	24,669	(4,934)	[1,184]	{592}	24,803	(4,961)	[1,191]	{595}
Calcasieu Parish	18,656	18,683	18,710	18,725	18,823	(3,765)	[903]	{452}	18,914	(3,783)	[908]	{454}	19,001	(3,800)	[912]	{456}
East Baton Rouge Parish	34,525	34,569	34,613	34,631	34,832	(6,966)	[1,672]	{836}	35,032	(7,006)	[1,682]	{841}	35,216	(7,043)	[1,690]	{845}
Jefferson Parish	42,766	42,830	42,894	42,947	43,111	(8,622)	[2,069]	{1,035}	43,262	(8,652)	[2,077]	{1,038}	43,392	(8,678)	[2,083]	{1,041}
Lafayette Parish	21,237	21,245	21,253	21,295	21,358	(4,272)	[1,025]	{513}	21,417	(4,283)	[1,028]	{514}	21,472	(4,294)	[1,031]	{515}
Lafourche Parish	8,828	8,842	8,855	8,861	8,919	(1,784)	[428]	{214}	8,973	(1,795)	[431]	{215}	9,026	(1,805)	[433]	{217}
Orleans Parish	27,625	27,666	27,706	27,744	27,872	(5,574)	[1,338]	{669}	27,989	(5,598)	[1,343]	{672}	28,100	(5,620)	[1,349]	{674}
Ouachita Parish	17,536	17,554	17,571	17,579	17,632	(3,526)	[846]	{423}	17,680	(3,536)	[849]	{424}	17,725	(3,545)	[851]	{425}
Rapides Parish	11,080	11,089	11,098	11,098	11,138	(2,228)	[535]	{267}	11,176	(2,235)	[536]	{268}	11,213	(2,243)	[538]	{269}
St. Bernard Parish	3,506	3,515	3,524	3,532	3,561	(712)	[171]	{85}	3,589	(718)	[172]	{86}	3,617	(723)	[174]	{87}
St. Charles Parish	4,970	4,986	5,002	4,998	5,025	(1,005)	[241]	{121}	5,051	(1,010)	[242]	{121}	5,076	(1,015)	[244]	{122}
St. James Parish	1,799	1,800	1,800	1,814	1,825	(365)	[88]	{44}	1,834	(367)	[88]	{44}	1,845	(369)	[89]	{44}
St. John the Baptist Parish	3,428	3,437	3,445	3,456	3,474	(695)	[167]	{83}	3,491	(698)	[168]	{84}	3,507	(701)	[168]	{84}
St. Tammany Parish	22,846	22,906	22,966	23,025	23,170	(4,634)	[1,112]	{556}	23,313	(4,663)	[1,119]	{560}	23,448	(4,690)	[1,126]	{563}

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.