

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

Date: 2/11/21

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 2/11/21 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.

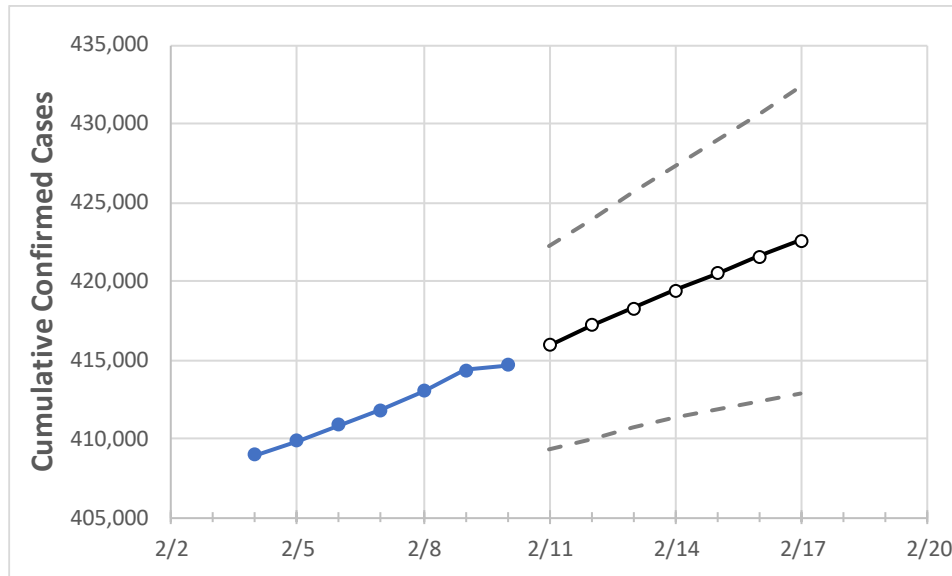
IEM's Modeling Lead

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:						
	2/7	2/8	2/9	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17
Louisiana	411,812	412,989	414,354	414,687	415,958	417,166	418,296	419,407	420,513	421,577	422,597

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:						
	2/7	2/8	2/9	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17
Ascension Parish	10,601	10,624	10,665	10,665	10,699	10,730	10,762	10,794	10,823	10,852	10,881
Bossier Parish	12,489	12,547	12,604	12,608	12,677	12,748	12,819	12,888	12,954	13,020	13,088
Caddo Parish	23,954	24,031	24,100	24,115	24,224	24,329	24,435	24,536	24,635	24,731	24,828
Calcasieu Parish	18,292	18,327	18,436	18,443	18,501	18,556	18,609	18,660	18,708	18,756	18,805
East Baton Rouge Parish	33,882	33,958	34,088	34,096	34,221	34,346	34,463	34,580	34,693	34,811	34,924
Jefferson Parish	42,104	42,213	42,339	42,408	42,514	42,613	42,708	42,798	42,883	42,966	43,042
Lafayette Parish	21,020	21,078	21,106	21,133	21,179	21,222	21,264	21,305	21,341	21,380	21,415
Lafourche Parish	8,611	8,655	8,702	8,708	8,742	8,775	8,808	8,840	8,870	8,900	8,929
Orleans Parish	27,158	27,245	27,375	27,408	27,492	27,575	27,654	27,732	27,803	27,877	27,946
Ouachita Parish	17,347	17,382	17,406	17,401	17,429	17,458	17,485	17,510	17,535	17,559	17,582
Rapides Parish	10,931	10,951	10,988	10,998	11,020	11,042	11,064	11,084	11,102	11,121	11,139
St. Bernard Parish	3,394	3,408	3,431	3,441	3,456	3,471	3,485	3,499	3,513	3,527	3,540
St. Charles Parish	4,878	4,901	4,915	4,923	4,935	4,946	4,956	4,967	4,976	4,986	4,995
St. James Parish	1,770	1,774	1,786	1,783	1,789	1,794	1,799	1,804	1,810	1,814	1,819
St. John the Baptist Parish	3,373	3,385	3,394	3,397	3,406	3,415	3,424	3,433	3,441	3,449	3,457
St. Tammany Parish	22,312	22,423	22,507	22,543	22,627	22,705	22,778	22,851	22,924	22,989	23,057

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:											
	2/7	2/8	2/9	2/10	2/12				2/14				2/16			
Ascension Parish	10,601	10,624	10,665	10,665	10,730	(2,146)	[515]	{258}	10,794	(2,159)	[518]	{259}	10,852	(2,170)	[521]	{260}
Bossier Parish	12,489	12,547	12,604	12,608	12,748	(2,550)	[612]	{306}	12,888	(2,578)	[619]	{309}	13,020	(2,604)	[625]	{312}
Caddo Parish	23,954	24,031	24,100	24,115	24,329	(4,866)	[1,168]	{584}	24,536	(4,907)	[1,178]	{589}	24,731	(4,946)	[1,187]	{594}
Calcasieu Parish	18,292	18,327	18,436	18,443	18,556	(3,711)	[891]	{445}	18,660	(3,732)	[896]	{448}	18,756	(3,751)	[900]	{450}
East Baton Rouge Parish	33,882	33,958	34,088	34,096	34,346	(6,869)	[1,649]	{824}	34,580	(6,916)	[1,660]	{830}	34,811	(6,962)	[1,671]	{835}
Jefferson Parish	42,104	42,213	42,339	42,408	42,613	(8,523)	[2,045]	{1,023}	42,798	(8,560)	[2,054]	{1,027}	42,966	(8,593)	[2,062]	{1,031}
Lafayette Parish	21,020	21,078	21,106	21,133	21,222	(4,244)	[1,019]	{509}	21,305	(4,261)	[1,023]	{511}	21,380	(4,276)	[1,026]	{513}
Lafourche Parish	8,611	8,655	8,702	8,708	8,775	(1,755)	[421]	{211}	8,840	(1,768)	[424]	{212}	8,900	(1,780)	[427]	{214}
Orleans Parish	27,158	27,245	27,375	27,408	27,575	(5,515)	[1,324]	{662}	27,732	(5,546)	[1,331]	{666}	27,877	(5,575)	[1,338]	{669}
Ouachita Parish	17,347	17,382	17,406	17,401	17,458	(3,492)	[838]	{419}	17,510	(3,502)	[841]	{420}	17,559	(3,512)	[843]	{421}
Rapides Parish	10,931	10,951	10,988	10,998	11,042	(2,208)	[530]	{265}	11,084	(2,217)	[532]	{266}	11,121	(2,224)	[534]	{267}
St. Bernard Parish	3,394	3,408	3,431	3,441	3,471	(694)	[167]	{83}	3,499	(700)	[168]	{84}	3,527	(705)	[169]	{85}
St. Charles Parish	4,878	4,901	4,915	4,923	4,946	(989)	[237]	{119}	4,967	(993)	[238]	{119}	4,986	(997)	[239]	{120}
St. James Parish	1,770	1,774	1,786	1,783	1,794	(359)	[86]	{43}	1,804	(361)	[87]	{43}	1,814	(363)	[87]	{44}
St. John the Baptist Parish	3,373	3,385	3,394	3,397	3,415	(683)	[164]	{82}	3,433	(687)	[165]	{82}	3,449	(690)	[166]	{83}
St. Tammany Parish	22,312	22,423	22,507	22,543	22,705	(4,541)	[1,090]	{545}	22,851	(4,570)	[1,097]	{548}	22,989	(4,598)	[1,103]	{552}

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