

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

Date: 3/3/21

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 3/3/21 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.

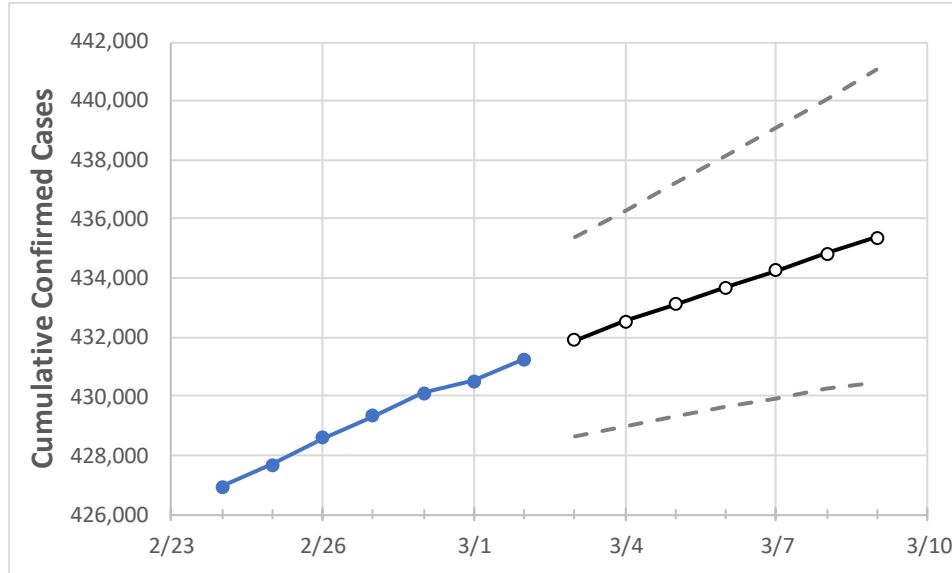
IEM's Modeling Lead

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:							
	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	3/9	
Louisiana	429,346	430,100	430,504	431,271	431,904	432,526	433,111	433,677	434,271	434,840	435,381	

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:							
	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	3/9	
Ascension Parish	10,947	10,956	10,963	11,012	11,029	11,044	11,061	11,076	11,091	11,106	11,120	
Bossier Parish	12,995	13,010	13,034	13,035	13,047	13,060	13,071	13,081	13,091	13,100	13,109	
Caddo Parish	24,701	24,726	24,751	24,780	24,799	24,817	24,834	24,850	24,866	24,882	24,896	
Calcasieu Parish	19,379	19,459	19,491	19,584	19,654	19,725	19,796	19,868	19,941	20,017	20,093	
East Baton Rouge Parish	35,550	35,628	35,673	35,727	35,784	35,841	35,897	35,949	36,000	36,051	36,098	
Jefferson Parish	43,829	43,898	43,936	44,014	44,071	44,127	44,178	44,231	44,281	44,330	44,378	
Lafayette Parish	21,568	21,588	21,602	21,617	21,634	21,650	21,666	21,681	21,696	21,711	21,724	
Lafourche Parish	9,113	9,124	9,128	9,155	9,169	9,184	9,197	9,210	9,222	9,234	9,246	
Orleans Parish	28,424	28,462	28,501	28,565	28,615	28,664	28,714	28,763	28,811	28,860	28,908	
Ouachita Parish	17,691	17,699	17,695	17,708	17,715	17,721	17,728	17,733	17,739	17,744	17,749	
Rapides Parish	11,264	11,283	11,276	11,284	11,295	11,305	11,316	11,326	11,336	11,346	11,355	
St. Bernard Parish	3,721	3,738	3,742	3,758	3,772	3,785	3,798	3,811	3,825	3,838	3,851	
St. Charles Parish	5,093	5,107	5,122	5,127	5,136	5,145	5,153	5,162	5,171	5,179	5,187	
St. James Parish	1,848	1,853	1,854	1,854	1,858	1,861	1,865	1,868	1,872	1,875	1,878	
St. John the Baptist Parish	3,524	3,530	3,531	3,536	3,540	3,544	3,548	3,552	3,555	3,559	3,562	
St. Tammany Parish	23,983	24,061	24,087	24,130	24,198	24,267	24,338	24,402	24,469	24,536	24,604	

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:											
	2/27	2/28	3/1	3/2	3/4			3/6			3/8					
Ascension Parish	10,947	10,956	10,963	11,012	11,044	(2,209)	[530]	{265}	11,076	(2,215)	[532]	{266}	11,106	(2,221)	[533]	{267}
Bossier Parish	12,995	13,010	13,034	13,035	13,060	(2,612)	[627]	{313}	13,081	(2,616)	[628]	{314}	13,100	(2,620)	[629]	{314}
Caddo Parish	24,701	24,726	24,751	24,780	24,817	(4,963)	[1,191]	{596}	24,850	(4,970)	[1,193]	{596}	24,882	(4,976)	[1,194]	{597}
Calcasieu Parish	19,379	19,459	19,491	19,584	19,725	(3,945)	[947]	{473}	19,868	(3,974)	[954]	{477}	20,017	(4,003)	[961]	{480}
East Baton Rouge Parish	35,550	35,628	35,673	35,727	35,841	(7,168)	[1,720]	{860}	35,949	(7,190)	[1,726]	{863}	36,051	(7,210)	[1,730]	{865}
Jefferson Parish	43,829	43,898	43,936	44,014	44,127	(8,825)	[2,118]	{1,059}	44,231	(8,846)	[2,123]	{1,062}	44,330	(8,866)	[2,128]	{1,064}
Lafayette Parish	21,568	21,588	21,602	21,617	21,650	(4,330)	[1,039]	{520}	21,681	(4,336)	[1,041]	{520}	21,711	(4,342)	[1,042]	{521}
Lafourche Parish	9,113	9,124	9,128	9,155	9,184	(1,837)	[441]	{220}	9,210	(1,842)	[442]	{221}	9,234	(1,847)	[443]	{222}
Orleans Parish	28,424	28,462	28,501	28,565	28,664	(5,733)	[1,376]	{688}	28,763	(5,753)	[1,381]	{690}	28,860	(5,772)	[1,385]	{693}
Ouachita Parish	17,691	17,699	17,695	17,708	17,721	(3,544)	[851]	{425}	17,733	(3,547)	[851]	{426}	17,744	(3,549)	[852]	{426}
Rapides Parish	11,264	11,283	11,276	11,284	11,305	(2,261)	[543]	{271}	11,326	(2,265)	[544]	{272}	11,346	(2,269)	[545]	{272}
St. Bernard Parish	3,721	3,738	3,742	3,758	3,785	(757)	[182]	{91}	3,811	(762)	[183]	{91}	3,838	(768)	[184]	{92}
St. Charles Parish	5,093	5,107	5,122	5,127	5,145	(1,029)	[247]	{123}	5,162	(1,032)	[248]	{124}	5,179	(1,036)	[249]	{124}
St. James Parish	1,848	1,853	1,854	1,854	1,861	(372)	[89]	{45}	1,868	(374)	[90]	{45}	1,875	(375)	[90]	{45}
St. John the Baptist Parish	3,524	3,530	3,531	3,536	3,544	(709)	[170]	{85}	3,552	(710)	[170]	{85}	3,559	(712)	[171]	{85}
St. Tammany Parish	23,983	24,061	24,087	24,130	24,267	(4,853)	[1,165]	{582}	24,402	(4,880)	[1,171]	{586}	24,536	(4,907)	[1,178]	{589}

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.