

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

Date: 3/25/22

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 3/25/22 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.

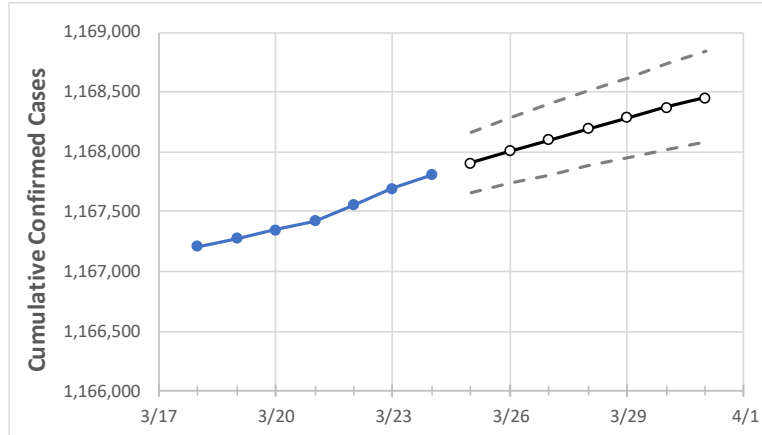
IEM's Modeling Lead

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:						
	3/21	3/22	3/23	3/24	3/25	3/26	3/27	3/28	3/29	3/30	3/31
Louisiana	1,167,421	1,167,553	1,167,697	1,167,806	1,167,910	1,168,007	1,168,103	1,168,194	1,168,284	1,168,372	1,168,455

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:						
	3/21	3/22	3/23	3/24	3/25	3/26	3/27	3/28	3/29	3/30	3/31
Ascension Parish	33,088	33,089	33,091	33,097	33,098	33,100	33,101	33,102	33,103	33,104	33,105
Bossier Parish	35,302	35,307	35,308	35,311	35,314	35,316	35,318	35,320	35,322	35,324	35,326
Caddo Parish	63,293	63,299	63,304	63,305	63,308	63,311	63,313	63,315	63,318	63,320	63,322
Calcasieu Parish	51,715	51,716	51,718	51,722	51,725	51,729	51,731	51,734	51,737	51,740	51,742
East Baton Rouge Parish	105,311	105,314	105,326	105,342	105,351	105,360	105,368	105,376	105,384	105,392	105,399
Jefferson Parish	108,222	108,227	108,244	108,250	108,259	108,269	108,278	108,286	108,295	108,302	108,311
Lafayette Parish	59,274	59,277	59,283	59,294	59,298	59,303	59,306	59,311	59,314	59,318	59,321
Lafourche Parish	26,181	26,183	26,187	26,190	26,191	26,193	26,194	26,195	26,196	26,197	26,198
Orleans Parish	83,523	83,553	83,580	83,591	83,617	83,640	83,664	83,686	83,710	83,731	83,753
Ouachita Parish	47,276	47,277	47,279	47,281	47,284	47,287	47,289	47,292	47,294	47,296	47,299
Rapides Parish	30,879	30,884	30,887	30,893	30,896	30,898	30,900	30,902	30,904	30,907	30,909
St. Bernard Parish	10,699	10,700	10,700	10,701	10,702	10,704	10,705	10,707	10,708	10,709	10,711
St. Charles Parish	13,150	13,151	13,151	13,152	13,152	13,153	13,153	13,154	13,154	13,155	13,155
St. James Parish	5,457	5,457	5,457	5,457	5,457	5,458	5,458	5,458	5,458	5,458	5,458
St. John the Baptist Parish	10,015	10,016	10,018	10,020	10,021	10,022	10,022	10,023	10,024	10,024	10,025
St. Tammany Parish	68,125	68,129	68,133	68,136	68,140	68,143	68,147	68,150	68,154	68,157	68,160

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:											
	3/21	3/22	3/23	3/24	3/26				3/28				3/30			
Ascension Parish	33,088	33,089	33,091	33,097	33,100	(6,620)	[1,589]	{794}	33,102	(6,620)	[1,589]	{794}	33,104	(6,621)	[1,589]	{795}
Bossier Parish	35,302	35,307	35,308	35,311	35,316	(7,063)	[1,695]	{848}	35,320	(7,064)	[1,695]	{848}	35,324	(7,065)	[1,696]	{848}
Caddo Parish	63,293	63,299	63,304	63,305	63,311	(12,662)	[3,039]	{1,519}	63,315	(12,663)	[3,039]	{1,520}	63,320	(12,664)	[3,039]	{1,520}
Calcasieu Parish	51,715	51,716	51,718	51,722	51,729	(10,346)	[2,483]	{1,241}	51,734	(10,347)	[2,483]	{1,242}	51,740	(10,348)	[2,483]	{1,242}
East Baton Rouge Parish	105,311	105,314	105,326	105,342	105,360	(21,072)	[5,057]	{2,529}	105,376	(21,075)	[5,058]	{2,529}	105,392	(21,078)	[5,059]	{2,529}
Jefferson Parish	108,222	108,227	108,244	108,250	108,269	(21,654)	[5,197]	{2,598}	108,286	(21,657)	[5,198]	{2,599}	108,302	(21,660)	[5,199]	{2,599}
Lafayette Parish	59,274	59,277	59,283	59,294	59,303	(11,861)	[2,847]	{1,423}	59,311	(11,862)	[2,847]	{1,423}	59,318	(11,864)	[2,847]	{1,424}
Lafourche Parish	26,181	26,183	26,187	26,190	26,193	(5,239)	[1,257]	{629}	26,195	(5,239)	[1,257]	{629}	26,197	(5,239)	[1,257]	{629}
Orleans Parish	83,523	83,553	83,580	83,591	83,640	(16,728)	[4,015]	{2,007}	83,686	(16,737)	[4,017]	{2,008}	83,731	(16,746)	[4,019]	{2,010}
Ouachita Parish	47,276	47,277	47,279	47,281	47,287	(9,457)	[2,270]	{1,135}	47,292	(9,458)	[2,270]	{1,135}	47,296	(9,459)	[2,270]	{1,135}
Rapides Parish	30,879	30,884	30,887	30,893	30,898	(6,180)	[1,483]	{742}	30,902	(6,180)	[1,483]	{742}	30,907	(6,181)	[1,484]	{742}
St. Bernard Parish	10,699	10,700	10,700	10,701	10,704	(2,141)	[514]	{257}	10,707	(2,141)	[514]	{257}	10,709	(2,142)	[514]	{257}
St. Charles Parish	13,150	13,151	13,151	13,152	13,153	(2,631)	[631]	{316}	13,154	(2,631)	[631]	{316}	13,155	(2,631)	[631]	{316}
St. James Parish	5,457	5,457	5,457	5,457	5,458	(1,092)	[262]	{131}	5,458	(1,092)	[262]	{131}	5,458	(1,092)	[262]	{131}
St. John the Baptist Parish	10,015	10,016	10,018	10,020	10,022	(2,004)	[481]	{241}	10,023	(2,005)	[481]	{241}	10,024	(2,005)	[481]	{241}
St. Tammany Parish	68,125	68,129	68,133	68,136	68,143	(13,629)	[3,271]	{1,635}	68,150	(13,630)	[3,271]	{1,636}	68,157	(13,631)	[3,272]	{1,636}

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.