

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

Date: 7/2/21

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 7/2/21 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.

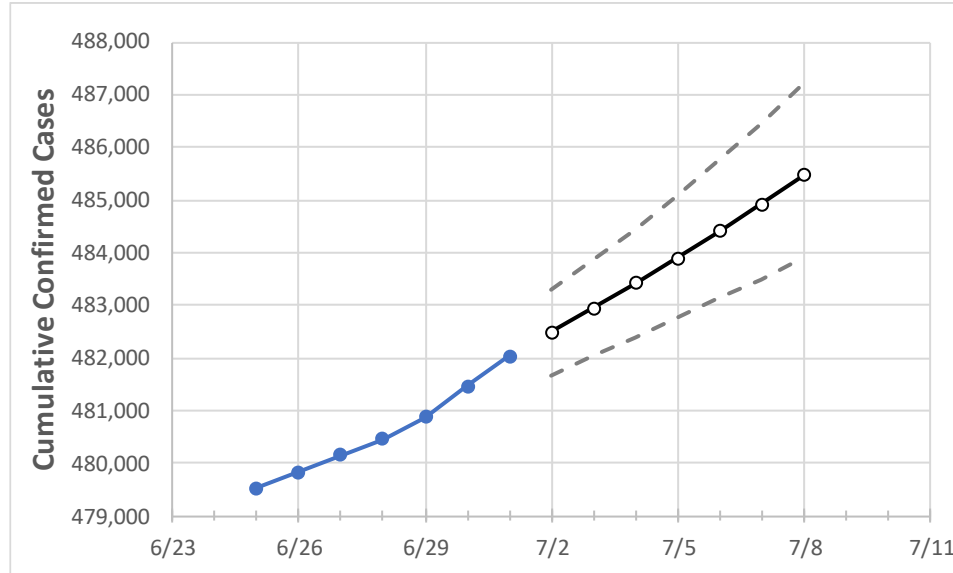
IEM's Modeling Lead

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:						
	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8
Louisiana	480,463	480,876	481,467	482,035	482,485	482,945	483,420	483,898	484,402	484,917	485,461

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:						
	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8
Ascension Parish	12,881	12,898	12,936	12,953	12,968	12,984	13,000	13,017	13,033	13,051	13,069
Bossier Parish	14,438	14,464	14,478	14,485	14,496	14,507	14,519	14,531	14,543	14,555	14,568
Caddo Parish	27,223	27,240	27,253	27,264	27,276	27,287	27,298	27,310	27,321	27,332	27,342
Calcasieu Parish	23,232	23,239	23,263	23,279	23,296	23,312	23,329	23,346	23,364	23,381	23,399
East Baton Rouge Parish	41,063	41,108	41,204	41,251	41,304	41,362	41,422	41,487	41,554	41,625	41,701
Jefferson Parish	47,526	47,551	47,582	47,640	47,672	47,706	47,740	47,777	47,814	47,854	47,894
Lafayette Parish	24,519	24,535	24,566	24,596	24,618	24,642	24,667	24,691	24,717	24,742	24,769
Lafourche Parish	10,169	10,187	10,211	10,222	10,240	10,258	10,277	10,296	10,317	10,338	10,359
Orleans Parish	31,041	31,068	31,094	31,117	31,137	31,158	31,179	31,201	31,223	31,246	31,269
Ouachita Parish	19,073	19,081	19,096	19,108	19,120	19,133	19,145	19,158	19,171	19,184	19,197
Rapides Parish	12,720	12,726	12,748	12,757	12,764	12,771	12,779	12,786	12,793	12,801	12,808
St. Bernard Parish	4,135	4,138	4,141	4,150	4,152	4,155	4,158	4,161	4,163	4,166	4,169
St. Charles Parish	5,629	5,636	5,642	5,648	5,652	5,655	5,659	5,663	5,667	5,671	5,675
St. James Parish	2,036	2,039	2,038	2,045	2,047	2,050	2,052	2,054	2,057	2,060	2,062
St. John the Baptist Parish	3,881	3,880	3,882	3,889	3,892	3,896	3,899	3,902	3,906	3,909	3,912
St. Tammany Parish	26,408	26,444	26,464	26,506	26,532	26,559	26,588	26,618	26,649	26,681	26,714

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:											
	6/28	6/29	6/30	7/1	7/3				7/5				7/7			
Ascension Parish	12,881	12,898	12,936	12,953	12,984	(2,597)	[623]	{312}	13,017	(2,603)	[625]	{312}	13,051	(2,610)	[626]	{313}
Bossier Parish	14,438	14,464	14,478	14,485	14,507	(2,901)	[696]	{348}	14,531	(2,906)	[697]	{349}	14,555	(2,911)	[699]	{349}
Caddo Parish	27,223	27,240	27,253	27,264	27,287	(5,457)	[1,310]	{655}	27,310	(5,462)	[1,311]	{655}	27,332	(5,466)	[1,312]	{656}
Calcasieu Parish	23,232	23,239	23,263	23,279	23,312	(4,662)	[1,119]	{559}	23,346	(4,669)	[1,121]	{560}	23,381	(4,676)	[1,122]	{561}
East Baton Rouge Parish	41,063	41,108	41,204	41,251	41,362	(8,272)	[1,985]	{993}	41,487	(8,297)	[1,991]	{996}	41,625	(8,325)	[1,998]	{999}
Jefferson Parish	47,526	47,551	47,582	47,640	47,706	(9,541)	[2,290]	{1,145}	47,777	(9,555)	[2,293]	{1,147}	47,854	(9,571)	[2,297]	{1,148}
Lafayette Parish	24,519	24,535	24,566	24,596	24,642	(4,928)	[1,183]	{591}	24,691	(4,938)	[1,185]	{593}	24,742	(4,948)	[1,188]	{594}
Lafourche Parish	10,169	10,187	10,211	10,222	10,258	(2,052)	[492]	{246}	10,296	(2,059)	[494]	{247}	10,338	(2,068)	[496]	{248}
Orleans Parish	31,041	31,068	31,094	31,117	31,158	(6,232)	[1,496]	{748}	31,201	(6,240)	[1,498]	{749}	31,246	(6,249)	[1,500]	{750}
Ouachita Parish	19,073	19,081	19,096	19,108	19,133	(3,827)	[918]	{459}	19,158	(3,832)	[920]	{460}	19,184	(3,837)	[921]	{460}
Rapides Parish	12,720	12,726	12,748	12,757	12,771	(2,554)	[613]	{307}	12,786	(2,557)	[614]	{307}	12,801	(2,560)	[614]	{307}
St. Bernard Parish	4,135	4,138	4,141	4,150	4,155	(831)	[199]	{100}	4,161	(832)	[200]	{100}	4,166	(833)	[200]	{100}
St. Charles Parish	5,629	5,636	5,642	5,648	5,655	(1,131)	[271]	{136}	5,663	(1,133)	[272]	{136}	5,671	(1,134)	[272]	{136}
St. James Parish	2,036	2,039	2,038	2,045	2,050	(410)	[98]	{49}	2,054	(411)	[99]	{49}	2,060	(412)	[99]	{49}
St. John the Baptist Parish	3,881	3,880	3,882	3,889	3,896	(779)	[187]	{93}	3,902	(780)	[187]	{94}	3,909	(782)	[188]	{94}
St. Tammany Parish	26,408	26,444	26,464	26,506	26,559	(5,312)	[1,275]	{637}	26,618	(5,324)	[1,278]	{639}	26,681	(5,336)	[1,281]	{640}

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.