

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

Date: 1/14/22

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 1/14/22 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.

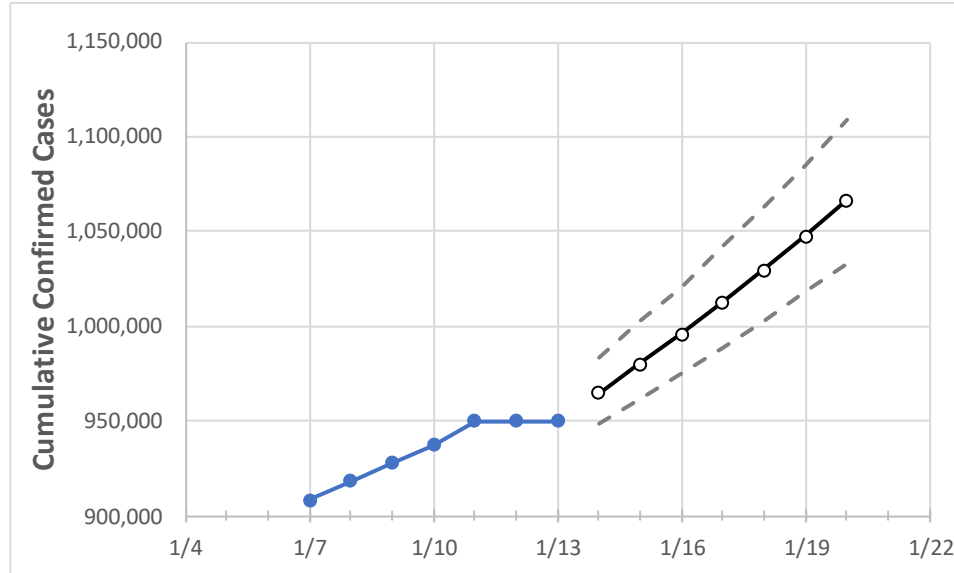
IEM's Modeling Lead

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:						
	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18	1/19	1/20
Louisiana	937,447	949,941	949,941	949,941	964,779	980,102	995,883	1,012,608	1,029,692	1,047,654	1,066,408

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:						
	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18	1/19	1/20
Ascension Parish	26,963	27,518	27,518	27,518	28,104	28,727	29,382	30,083	30,825	31,612	32,446
Bossier Parish	27,111	27,522	27,522	27,522	28,015	28,530	29,079	29,652	30,247	30,879	31,533
Caddo Parish	51,278	51,919	51,919	51,919	52,733	53,566	54,391	55,283	56,179	57,105	58,023
Calcasieu Parish	40,822	41,198	41,198	41,198	41,741	42,319	42,908	43,536	44,201	44,885	45,610
East Baton Rouge Parish	81,063	83,046	83,046	83,046	84,815	86,648	88,570	90,618	92,827	95,055	97,401
Jefferson Parish	91,870	92,879	92,879	92,879	94,491	96,138	97,865	99,605	101,410	103,298	105,186
Lafayette Parish	46,988	47,529	47,529	47,529	48,333	49,187	50,075	51,035	52,053	53,109	54,232
Lafourche Parish	20,929	21,140	21,140	21,140	21,372	21,612	21,869	22,125	22,399	22,685	22,979
Orleans Parish	69,534	70,360	70,360	70,360	72,033	73,776	75,519	77,370	79,219	81,226	83,229
Ouachita Parish	37,503	37,857	37,857	37,857	38,329	38,814	39,322	39,851	40,412	40,986	41,580
Rapides Parish	25,028	25,243	25,243	25,243	25,475	25,713	25,953	26,207	26,460	26,722	26,991
St. Bernard Parish	8,893	9,060	9,060	9,060	9,197	9,336	9,478	9,628	9,776	9,934	10,093
St. Charles Parish	11,150	11,238	11,238	11,238	11,405	11,578	11,754	11,936	12,125	12,321	12,524
St. James Parish	4,380	4,408	4,408	4,408	4,474	4,540	4,608	4,682	4,755	4,834	4,911
St. John the Baptist Parish	8,204	8,329	8,329	8,329	8,469	8,608	8,756	8,901	9,059	9,221	9,386
St. Tammany Parish	54,928	55,677	55,677	55,677	56,591	57,534	58,492	59,504	60,554	61,644	62,772

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:											
	1/10	1/11	1/12	1/13	1/15				1/17				1/19			
Ascension Parish	26,963	27,518	27,518	27,518	28,727	(5,745)	[1,379]	{689}	30,083	(6,017)	[1,444]	{722}	31,612	(6,322)	[1,517]	{759}
Bossier Parish	27,111	27,522	27,522	27,522	28,530	(5,706)	[1,369]	{685}	29,652	(5,930)	[1,423]	{712}	30,879	(6,176)	[1,482]	{741}
Caddo Parish	51,278	51,919	51,919	51,919	53,566	(10,713)	[2,571]	{1,286}	55,283	(11,057)	[2,654]	{1,327}	57,105	(11,421)	[2,741]	{1,371}
Calcasieu Parish	40,822	41,198	41,198	41,198	42,319	(8,464)	[2,031]	{1,016}	43,536	(8,707)	[2,090]	{1,045}	44,885	(8,977)	[2,154]	{1,077}
East Baton Rouge Parish	81,063	83,046	83,046	83,046	86,648	(17,330)	[4,159]	{2,080}	90,618	(18,124)	[4,350]	{2,175}	95,055	(19,011)	[4,563]	{2,281}
Jefferson Parish	91,870	92,879	92,879	92,879	96,138	(19,228)	[4,615]	{2,307}	99,605	(19,921)	[4,781]	{2,391}	103,298	(20,660)	[4,958]	{2,479}
Lafayette Parish	46,988	47,529	47,529	47,529	49,187	(9,837)	[2,361]	{1,180}	51,035	(10,207)	[2,450]	{1,225}	53,109	(10,622)	[2,549]	{1,275}
Lafourche Parish	20,929	21,140	21,140	21,140	21,612	(4,322)	[1,037]	{519}	22,125	(4,425)	[1,062]	{531}	22,685	(4,537)	[1,089]	{544}
Orleans Parish	69,534	70,360	70,360	70,360	73,776	(14,755)	[3,541]	{1,771}	77,370	(15,474)	[3,714]	{1,857}	81,226	(16,245)	[3,899]	{1,949}
Ouachita Parish	37,503	37,857	37,857	37,857	38,814	(7,763)	[1,863]	{932}	39,851	(7,970)	[1,913]	{956}	40,986	(8,197)	[1,967]	{984}
Rapides Parish	25,028	25,243	25,243	25,243	25,713	(5,143)	[1,234]	{617}	26,207	(5,241)	[1,258]	{629}	26,722	(5,344)	[1,283]	{641}
St. Bernard Parish	8,893	9,060	9,060	9,060	9,336	(1,867)	[448]	{224}	9,628	(1,926)	[462]	{231}	9,934	(1,987)	[477]	{238}
St. Charles Parish	11,150	11,238	11,238	11,238	11,578	(2,316)	[556]	{278}	11,936	(2,387)	[573]	{286}	12,321	(2,464)	[591]	{296}
St. James Parish	4,380	4,408	4,408	4,408	4,540	(908)	[218]	{109}	4,682	(936)	[225]	{112}	4,834	(967)	[232]	{116}
St. John the Baptist Parish	8,204	8,329	8,329	8,329	8,608	(1,722)	[413]	{207}	8,901	(1,780)	[427]	{214}	9,221	(1,844)	[443]	{221}
St. Tammany Parish	54,928	55,677	55,677	55,677	57,534	(11,507)	[2,762]	{1,381}	59,504	(11,901)	[2,856]	{1,428}	61,644	(12,329)	[2,959]	{1,479}

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.