

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

Date: 1/10/22

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 1/10/22 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.

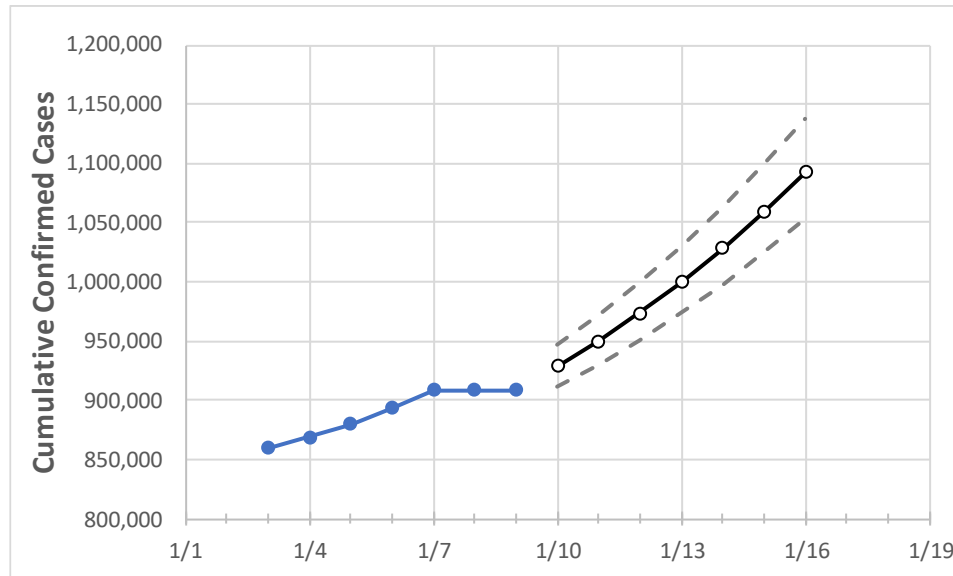
IEM's Modeling Lead

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:						
	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16
Louisiana	893,626	908,428	908,428	908,428	928,556	950,245	973,899	999,862	1,028,322	1,059,048	1,092,930

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:						
	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16
Ascension Parish	25,327	25,773	25,773	25,773	26,328	26,920	27,566	28,274	29,049	29,882	30,794
Bossier Parish	25,617	26,026	26,026	26,026	26,638	27,298	28,023	28,823	29,693	30,649	31,693
Caddo Parish	48,681	49,545	49,545	49,545	51,002	52,576	54,277	56,160	58,191	60,440	62,846
Calcasieu Parish	39,312	39,813	39,813	39,813	40,551	41,374	42,256	43,240	44,315	45,495	46,781
East Baton Rouge Parish	76,464	78,452	78,452	78,452	81,003	83,758	86,847	90,266	94,098	98,327	102,969
Jefferson Parish	86,247	87,861	87,861	87,861	90,515	93,344	96,442	99,817	103,475	107,557	111,904
Lafayette Parish	44,647	45,306	45,306	45,306	46,231	47,247	48,374	49,626	50,968	52,459	54,106
Lafourche Parish	20,294	20,549	20,549	20,549	20,894	21,275	21,681	22,129	22,609	23,150	23,717
Orleans Parish	64,034	66,153	66,153	66,153	68,276	70,561	72,970	75,554	78,337	81,282	84,470
Ouachita Parish	36,075	36,447	36,447	36,447	37,088	37,793	38,544	39,401	40,320	41,315	42,440
Rapides Parish	24,432	24,655	24,655	24,655	25,152	25,695	26,301	26,958	27,682	28,468	29,332
St. Bernard Parish	8,484	8,616	8,616	8,616	8,830	9,059	9,308	9,586	9,871	10,188	10,536
St. Charles Parish	10,594	10,784	10,784	10,784	11,013	11,263	11,528	11,812	12,127	12,463	12,827
St. James Parish	4,207	4,263	4,263	4,263	4,401	4,552	4,723	4,909	5,118	5,352	5,599
St. John the Baptist Parish	7,805	7,947	7,947	7,947	8,195	8,465	8,760	9,082	9,441	9,832	10,252
St. Tammany Parish	52,080	52,884	52,884	52,884	54,068	55,363	56,746	58,255	59,907	61,675	63,612

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:											
	1/6	1/7	1/8	1/9	1/11				1/13				1/15			
Ascension Parish	25,327	25,773	25,773	25,773	26,920	(5,384)	[1,292]	{646}	28,274	(5,655)	[1,357]	{679}	29,882	(5,976)	[1,434]	{717}
Bossier Parish	25,617	26,026	26,026	26,026	27,298	(5,460)	[1,310]	{655}	28,823	(5,765)	[1,384]	{692}	30,649	(6,130)	[1,471]	{736}
Caddo Parish	48,681	49,545	49,545	49,545	52,576	(10,515)	[2,524]	{1,262}	56,160	(11,232)	[2,696]	{1,348}	60,440	(12,088)	[2,901]	{1,451}
Calcasieu Parish	39,312	39,813	39,813	39,813	41,374	(8,275)	[1,986]	{993}	43,240	(8,648)	[2,076]	{1,038}	45,495	(9,099)	[2,184]	{1,092}
East Baton Rouge Parish	76,464	78,452	78,452	78,452	83,758	(16,752)	[4,020]	{2,010}	90,266	(18,053)	[4,333]	{2,166}	98,327	(19,665)	[4,720]	{2,360}
Jefferson Parish	86,247	87,861	87,861	87,861	93,344	(18,669)	[4,481]	{2,240}	99,817	(19,963)	[4,791]	{2,396}	107,557	(21,511)	[5,163]	{2,581}
Lafayette Parish	44,647	45,306	45,306	45,306	47,247	(9,449)	[2,268]	{1,134}	49,626	(9,925)	[2,382]	{1,191}	52,459	(10,492)	[2,518]	{1,259}
Lafourche Parish	20,294	20,549	20,549	20,549	21,275	(4,255)	[1,021]	{511}	22,129	(4,426)	[1,062]	{531}	23,150	(4,630)	[1,111]	{556}
Orleans Parish	64,034	66,153	66,153	66,153	70,561	(14,112)	[3,387]	{1,693}	75,554	(15,111)	[3,627]	{1,813}	81,282	(16,256)	[3,902]	{1,951}
Ouachita Parish	36,075	36,447	36,447	36,447	37,793	(7,559)	[1,814]	{907}	39,401	(7,880)	[1,891]	{946}	41,315	(8,263)	[1,983]	{992}
Rapides Parish	24,432	24,655	24,655	24,655	25,695	(5,139)	[1,233]	{617}	26,958	(5,392)	[1,294]	{647}	28,468	(5,694)	[1,366]	{683}
St. Bernard Parish	8,484	8,616	8,616	8,616	9,059	(1,812)	[435]	{217}	9,586	(1,917)	[460]	{230}	10,188	(2,038)	[489]	{245}
St. Charles Parish	10,594	10,784	10,784	10,784	11,263	(2,253)	[541]	{270}	11,812	(2,362)	[567]	{283}	12,463	(2,493)	[598]	{299}
St. James Parish	4,207	4,263	4,263	4,263	4,552	(910)	[218]	{109}	4,909	(982)	[236]	{118}	5,352	(1,070)	[257]	{128}
St. John the Baptist Parish	7,805	7,947	7,947	7,947	8,465	(1,693)	[406]	{203}	9,082	(1,816)	[436]	{218}	9,832	(1,966)	[472]	{236}
St. Tammany Parish	52,080	52,884	52,884	52,884	55,363	(11,073)	[2,657]	{1,329}	58,255	(11,651)	[2,796]	{1,398}	61,675	(12,335)	[2,960]	{1,480}

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.