

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

Date: 2/16/22

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 2/16/22 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.**

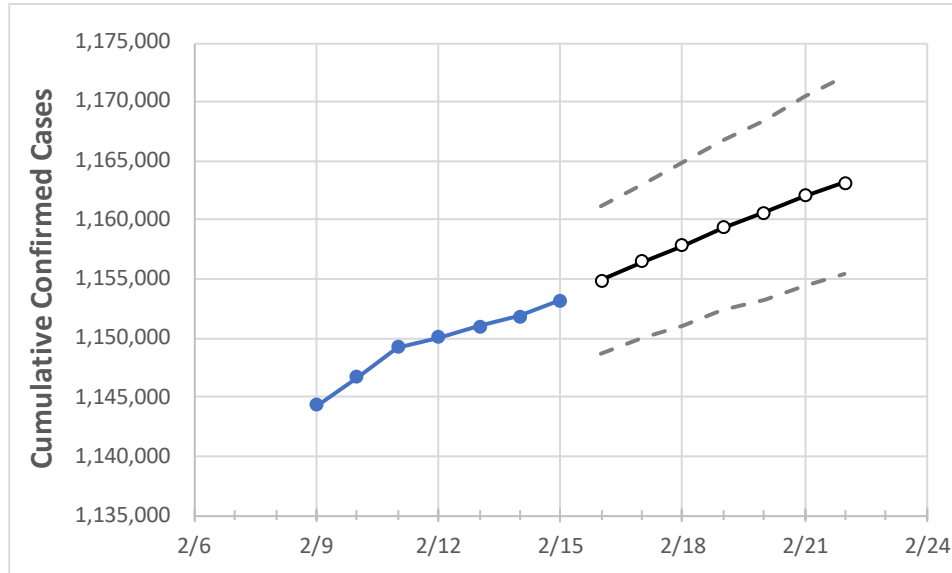
### IEM's Modeling Lead

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:						
	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22

Louisiana 1,150,109 1,150,983 1,151,858 1,153,232 1,154,861 1,156,452 1,157,857 1,159,350 1,160,612 1,162,029 1,163,171

**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:						
	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22
Ascension Parish	32,722	32,747	32,773	32,793	32,834	32,871	32,904	32,941	32,972	33,002	33,033
Bossier Parish	34,830	34,852	34,875	34,908	34,952	34,989	35,026	35,067	35,099	35,131	35,160
Caddo Parish	62,593	62,628	62,664	62,712	62,773	62,828	62,879	62,929	62,979	63,022	63,066
Calcasieu Parish	51,078	51,108	51,137	51,204	51,349	51,536	51,653	51,791	51,946	52,116	52,259
East Baton Rouge Parish	103,908	103,977	104,046	104,127	104,250	104,364	104,474	104,578	104,677	104,777	104,871
Jefferson Parish	106,625	106,700	106,774	106,899	106,990	107,080	107,160	107,238	107,314	107,385	107,454
Lafayette Parish	58,236	58,275	58,314	58,399	58,493	58,592	58,684	58,762	58,853	58,933	59,009
Lafourche Parish	25,814	25,836	25,857	25,880	25,920	25,957	25,993	26,030	26,064	26,099	26,127
Orleans Parish	81,873	81,960	82,047	82,111	82,217	82,322	82,414	82,512	82,601	82,691	82,771
Ouachita Parish	46,655	46,692	46,728	46,783	46,860	46,927	46,994	47,053	47,121	47,181	47,239
Rapides Parish	30,512	30,529	30,545	30,603	30,641	30,681	30,717	30,748	30,783	30,815	30,842
St. Bernard Parish	10,584	10,591	10,598	10,611	10,622	10,633	10,643	10,653	10,662	10,671	10,680
St. Charles Parish	13,009	13,016	13,023	13,033	13,045	13,057	13,067	13,078	13,088	13,097	13,106
St. James Parish	5,369	5,372	5,375	5,389	5,401	5,413	5,427	5,438	5,451	5,460	5,472
St. John the Baptist Parish	9,909	9,915	9,922	9,932	9,941	9,949	9,957	9,965	9,972	9,979	9,985
St. Tammany Parish	67,324	67,367	67,410	67,477	67,557	67,630	67,697	67,769	67,830	67,898	67,947

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:											
	2/12	2/13	2/14	2/15	2/17			2/19			2/21					
Ascension Parish	32,722	32,747	32,773	32,793	32,871	(6,574)	[1,578]	{789}	32,941	(6,588)	[1,581]	{791}	33,002	(6,600)	[1,584]	{792}
Bossier Parish	34,830	34,852	34,875	34,908	34,989	(6,998)	[1,679]	{840}	35,067	(7,013)	[1,683]	{842}	35,131	(7,026)	[1,686]	{843}
Caddo Parish	62,593	62,628	62,664	62,712	62,828	(12,566)	[3,016]	{1,508}	62,929	(12,586)	[3,021]	{1,510}	63,022	(12,604)	[3,025]	{1,513}
Calcasieu Parish	51,078	51,108	51,137	51,204	51,536	(10,307)	[2,474]	{1,237}	51,791	(10,358)	[2,486]	{1,243}	52,116	(10,423)	[2,502]	{1,251}
East Baton Rouge Parish	103,908	103,977	104,046	104,127	104,364	(20,873)	[5,009]	{2,505}	104,578	(20,916)	[5,020]	{2,510}	104,777	(20,955)	[5,029]	{2,515}
Jefferson Parish	106,625	106,700	106,774	106,899	107,080	(21,416)	[5,140]	{2,570}	107,238	(21,448)	[5,147]	{2,574}	107,385	(21,477)	[5,154]	{2,577}
Lafayette Parish	58,236	58,275	58,314	58,399	58,592	(11,718)	[2,812]	{1,406}	58,762	(11,752)	[2,821]	{1,410}	58,933	(11,787)	[2,829]	{1,414}
Lafourche Parish	25,814	25,836	25,857	25,880	25,957	(5,191)	[1,246]	{623}	26,030	(5,206)	[1,249]	{625}	26,099	(5,220)	[1,253]	{626}
Orleans Parish	81,873	81,960	82,047	82,111	82,322	(16,464)	[3,951]	{1,976}	82,512	(16,502)	[3,961]	{1,980}	82,691	(16,538)	[3,969]	{1,985}
Ouachita Parish	46,655	46,692	46,728	46,783	46,927	(9,385)	[2,253]	{1,126}	47,053	(9,411)	[2,259]	{1,129}	47,181	(9,436)	[2,265]	{1,132}
Rapides Parish	30,512	30,529	30,545	30,603	30,681	(6,136)	[1,473]	{736}	30,748	(6,150)	[1,476]	{738}	30,815	(6,163)	[1,479]	{740}
St. Bernard Parish	10,584	10,591	10,598	10,611	10,633	(2,127)	[510]	{255}	10,653	(2,131)	[511]	{256}	10,671	(2,134)	[512]	{256}
St. Charles Parish	13,009	13,016	13,023	13,033	13,057	(2,611)	[627]	{313}	13,078	(2,616)	[628]	{314}	13,097	(2,619)	[629]	{314}
St. James Parish	5,369	5,372	5,375	5,389	5,413	(1,083)	[260]	{130}	5,438	(1,088)	[261]	{131}	5,460	(1,092)	[262]	{131}
St. John the Baptist Parish	9,909	9,915	9,922	9,932	9,949	(1,990)	[478]	{239}	9,965	(1,993)	[478]	{239}	9,979	(1,996)	[479]	{239}
St. Tammany Parish	67,324	67,367	67,410	67,477	67,630	(13,526)	[3,246]	{1,623}	67,769	(13,554)	[3,253]	{1,626}	67,898	(13,580)	[3,259]	{1,630}

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966 or Stephanie Tennyson at [stephanie.tennyson@iem.com](mailto:stephanie.tennyson@iem.com) or 202-309-4257.