

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

Date: 3/29/22

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 3/29/22 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.

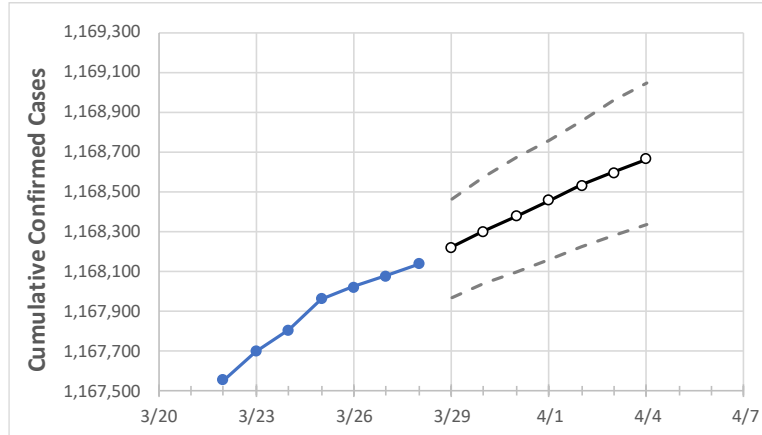
IEM's Modeling Lead

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:						
	3/25	3/26	3/27	3/28	3/29	3/30	3/31	4/1	4/2	4/3	4/4
Louisiana	1,167,962	1,168,020	1,168,078	1,168,136	1,168,223	1,168,302	1,168,378	1,168,456	1,168,532	1,168,598	1,168,666

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:						
	3/25	3/26	3/27	3/28	3/29	3/30	3/31	4/1	4/2	4/3	4/4
Ascension Parish	33,098	33,098	33,099	33,099	33,100	33,101	33,102	33,103	33,104	33,105	33,105
Bossier Parish	35,313	35,316	35,319	35,322	35,324	35,327	35,329	35,330	35,333	35,335	35,337
Caddo Parish	63,309	63,310	63,311	63,312	63,315	63,317	63,319	63,321	63,323	63,325	63,327
Calcasieu Parish	51,726	51,727	51,727	51,728	51,731	51,733	51,735	51,738	51,740	51,742	51,744
East Baton Rouge Parish	105,349	105,358	105,368	105,377	105,385	105,393	105,401	105,408	105,415	105,422	105,429
Jefferson Parish	108,264	108,273	108,282	108,291	108,299	108,307	108,315	108,322	108,330	108,337	108,344
Lafayette Parish	59,338	59,339	59,339	59,340	59,346	59,352	59,357	59,362	59,367	59,373	59,377
Lafourche Parish	26,193	26,194	26,194	26,195	26,196	26,198	26,199	26,200	26,201	26,202	26,203
Orleans Parish	83,615	83,625	83,636	83,646	83,665	83,683	83,700	83,717	83,735	83,752	83,767
Ouachita Parish	47,286	47,287	47,289	47,290	47,292	47,294	47,296	47,299	47,300	47,302	47,304
Rapides Parish	30,895	30,896	30,897	30,898	30,900	30,902	30,904	30,906	30,907	30,909	30,911
St. Bernard Parish	10,702	10,703	10,703	10,704	10,705	10,706	10,708	10,709	10,710	10,711	10,712
St. Charles Parish	13,154	13,154	13,154	13,154	13,155	13,155	13,156	13,156	13,157	13,158	13,158
St. James Parish	0	0	0	0	0	0	0	0	0	0	0
St. John the Baptist Parish	10,021	10,023	10,026	10,028	10,029	10,030	10,031	10,032	10,033	10,035	10,036
St. Tammany Parish	68,141	68,144	68,147	68,150	68,153	68,156	68,159	68,162	68,165	68,167	68,170

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:											
	3/25	3/26	3/27	3/28	3/30				4/1				4/3			
Ascension Parish	33,098	33,098	33,099	33,099	33,101	(6,620)	[1,589]	{794}	33,103	(6,621)	[1,589]	{794}	33,105	(6,621)	[1,589]	{795}
Bossier Parish	35,313	35,316	35,319	35,322	35,327	(7,065)	[1,696]	{848}	35,330	(7,066)	[1,696]	{848}	35,335	(7,067)	[1,696]	{848}
Caddo Parish	63,309	63,310	63,311	63,312	63,317	(12,663)	[3,039]	{1,520}	63,321	(12,664)	[3,039]	{1,520}	63,325	(12,665)	[3,040]	{1,520}
Calcasieu Parish	51,726	51,727	51,727	51,728	51,733	(10,347)	[2,483]	{1,242}	51,738	(10,348)	[2,483]	{1,242}	51,742	(10,348)	[2,484]	{1,242}
East Baton Rouge Parish	105,349	105,358	105,368	105,377	105,393	(21,079)	[5,059]	{2,529}	105,408	(21,082)	[5,060]	{2,530}	105,422	(21,084)	[5,060]	{2,530}
Jefferson Parish	108,264	108,273	108,282	108,291	108,307	(21,661)	[5,199]	{2,599}	108,322	(21,664)	[5,199]	{2,600}	108,337	(21,667)	[5,200]	{2,600}
Lafayette Parish	59,338	59,339	59,339	59,340	59,352	(11,870)	[2,849]	{1,424}	59,362	(11,872)	[2,849]	{1,425}	59,373	(11,875)	[2,850]	{1,425}
Lafourche Parish	26,193	26,194	26,194	26,195	26,198	(5,240)	[1,257]	{629}	26,200	(5,240)	[1,258]	{629}	26,202	(5,240)	[1,258]	{629}
Orleans Parish	83,615	83,625	83,636	83,646	83,683	(16,737)	[4,017]	{2,008}	83,717	(16,743)	[4,018]	{2,009}	83,752	(16,750)	[4,020]	{2,010}
Ouachita Parish	47,286	47,287	47,289	47,290	47,294	(9,459)	[2,270]	{1,135}	47,299	(9,460)	[2,270]	{1,135}	47,302	(9,460)	[2,271]	{1,135}
Rapides Parish	30,895	30,896	30,897	30,898	30,902	(6,180)	[1,483]	{742}	30,906	(6,181)	[1,483]	{742}	30,909	(6,182)	[1,484]	{742}
St. Bernard Parish	10,702	10,703	10,703	10,704	10,706	(2,141)	[514]	{257}	10,709	(2,142)	[514]	{257}	10,711	(2,142)	[514]	{257}
St. Charles Parish	13,154	13,154	13,154	13,154	13,155	(2,631)	[631]	{316}	13,156	(2,631)	[632]	{316}	13,158	(2,632)	[632]	{316}
St. James Parish	0	0	0	0		()	[]	{}		()	[]	{}		()	[]	{}
St. John the Baptist Parish	10,021	10,023	10,026	10,028	10,030	(2,006)	[481]	{241}	10,032	(2,006)	[482]	{241}	10,035	(2,007)	[482]	{241}
St. Tammany Parish	68,141	68,144	68,147	68,150	68,156	(13,631)	[3,272]	{1,636}	68,162	(13,632)	[3,272]	{1,636}	68,167	(13,633)	[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.