

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 12/14/20**

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 12/14/20 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.

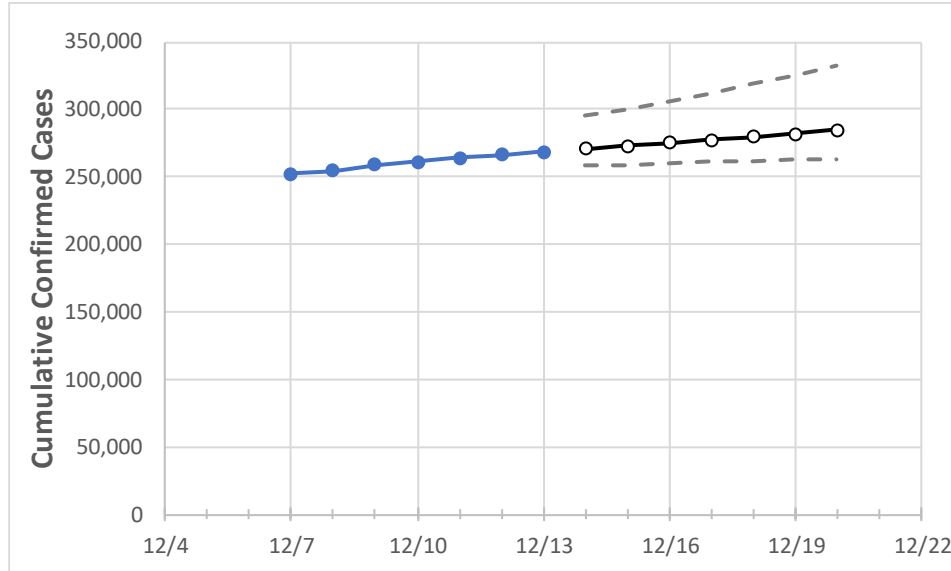
IEM's Modeling Lead

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:						
	12/10	12/11	12/12	12/13	12/14	12/15	12/16	12/17	12/18	12/19	12/20
Louisiana	261,329	264,191	266,402	268,613	270,740	272,919	275,152	277,439	279,783	282,184	284,644

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 20%, and are often within 10%, of actual confirmed cases.

Louisiana Parishes

	Actual Confirmed Cases On:				Projected Cases For:						
	12/10	12/11	12/12	12/13	12/14	12/15	12/16	12/17	12/18	12/19	12/20
Ascension Parish	6,550	6,605	6,670	6,734	6,792	6,852	6,914	6,978	7,044	7,112	7,183
Bossier Parish	7,145	7,237	7,311	7,384	7,441	7,499	7,558	7,618	7,678	7,740	7,802
Caddo Parish	14,879	15,070	15,158	15,245	15,336	15,429	15,522	15,616	15,711	15,806	15,903
Calcasieu Parish	11,532	11,677	11,750	11,822	11,911	12,003	12,098	12,197	12,300	12,406	12,516
East Baton Rouge Parish	21,866	22,061	22,265	22,468	22,624	22,785	22,950	23,120	23,295	23,475	23,661
Jefferson Parish	25,991	26,277	26,482	26,686	26,908	27,136	27,370	27,610	27,857	28,110	28,370
Lafayette Parish	13,688	13,855	14,028	14,200	14,337	14,478	14,622	14,769	14,919	15,073	15,230
Lafourche Parish	5,277	5,323	5,356	5,388	5,432	5,477	5,524	5,571	5,619	5,667	5,717
Orleans Parish	17,520	17,667	17,808	17,949	18,086	18,227	18,373	18,523	18,677	18,837	19,002
Ouachita Parish	11,295	11,426	11,538	11,649	11,767	11,888	12,013	12,143	12,276	12,413	12,554
Rapides Parish	6,923	7,007	7,054	7,101	7,152	7,204	7,257	7,312	7,368	7,425	7,483
St. Bernard Parish	1,997	2,014	2,025	2,036	2,050	2,065	2,080	2,095	2,110	2,126	2,142
St. Charles Parish	2,936	2,964	2,980	2,996	3,019	3,042	3,065	3,088	3,110	3,132	3,154
St. James Parish	1,117	1,121	1,128	1,135	1,146	1,158	1,171	1,184	1,197	1,212	1,227
St. John the Baptist Parish	2,180	2,198	2,215	2,231	2,245	2,259	2,274	2,288	2,303	2,319	2,335
St. Tammany Parish	11,920	12,029	12,143	12,257	12,391	12,528	12,669	12,812	12,959	13,109	13,263

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:											
	12/10	12/11	12/12	12/13	12/15				12/17				12/19			
Ascension Parish	6,550	6,605	6,670	6,734	6,852	(1,370)	[329]	{164}	6,978	(1,396)	[335]	{167}	7,112	(1,422)	[341]	{171}
Bossier Parish	7,145	7,237	7,311	7,384	7,499	(1,500)	[360]	{180}	7,618	(1,524)	[366]	{183}	7,740	(1,548)	[372]	{186}
Caddo Parish	14,879	15,070	15,158	15,245	15,429	(3,086)	[741]	{370}	15,616	(3,123)	[750]	{375}	15,806	(3,161)	[759]	{379}
Calcasieu Parish	11,532	11,677	11,750	11,822	12,003	(2,401)	[576]	{288}	12,197	(2,439)	[585]	{293}	12,406	(2,481)	[595]	{298}
East Baton Rouge Parish	21,866	22,061	22,265	22,468	22,785	(4,557)	[1,094]	{547}	23,120	(4,624)	[1,110]	{555}	23,475	(4,695)	[1,127]	{563}
Jefferson Parish	25,991	26,277	26,482	26,686	27,136	(5,427)	[1,303]	{651}	27,610	(5,522)	[1,325]	{663}	28,110	(5,622)	[1,349]	{675}
Lafayette Parish	13,688	13,855	14,028	14,200	14,478	(2,896)	[695]	{347}	14,769	(2,954)	[709]	{354}	15,073	(3,015)	[723]	{362}
Lafourche Parish	5,277	5,323	5,356	5,388	5,477	(1,095)	[263]	{131}	5,571	(1,114)	[267]	{134}	5,667	(1,133)	[272]	{136}
Orleans Parish	17,520	17,667	17,808	17,949	18,227	(3,645)	[875]	{437}	18,523	(3,705)	[889]	{445}	18,837	(3,767)	[904]	{452}
Ouachita Parish	11,295	11,426	11,538	11,649	11,888	(2,378)	[571]	{285}	12,143	(2,429)	[583]	{291}	12,413	(2,483)	[596]	{298}
Rapides Parish	6,923	7,007	7,054	7,101	7,204	(1,441)	[346]	{173}	7,312	(1,462)	[351]	{175}	7,425	(1,485)	[356]	{178}
St. Bernard Parish	1,997	2,014	2,025	2,036	2,065	(413)	[99]	{50}	2,095	(419)	[101]	{50}	2,126	(425)	[102]	{51}
St. Charles Parish	2,936	2,964	2,980	2,996	3,042	(608)	[146]	{73}	3,088	(618)	[148]	{74}	3,132	(626)	[150]	{75}
St. James Parish	1,117	1,121	1,128	1,135	1,158	(232)	[56]	{28}	1,184	(237)	[57]	{28}	1,212	(242)	[58]	{29}
St. John the Baptist Parish	2,180	2,198	2,215	2,231	2,259	(452)	[108]	{54}	2,288	(458)	[110]	{55}	2,319	(464)	[111]	{56}
St. Tammany Parish	11,920	12,029	12,143	12,257	12,528	(2,506)	[601]	{301}	12,812	(2,562)	[615]	{307}	13,109	(2,622)	[629]	{315}

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.