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

Date: 8/25/21

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 8/25/21 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.

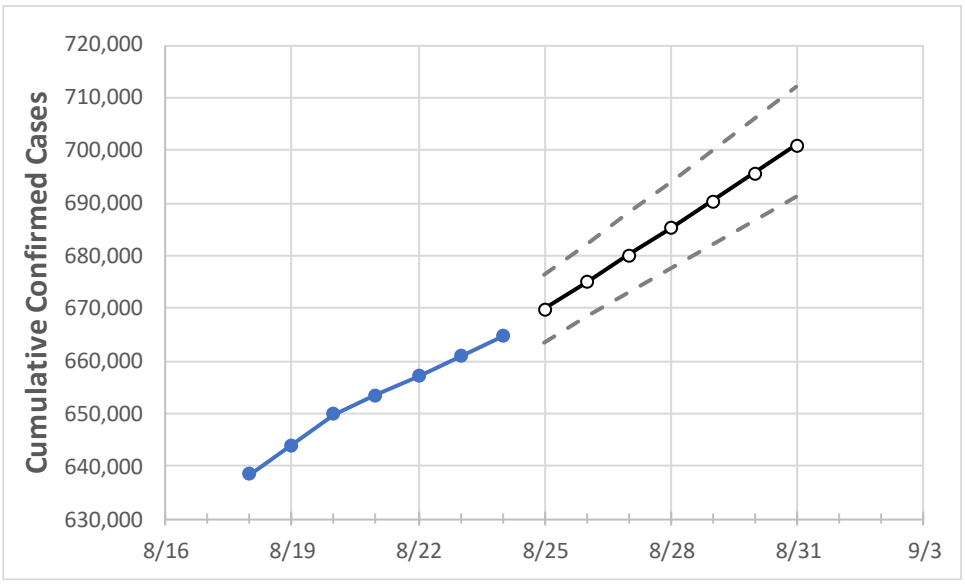
IEM's Modeling Lead

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:						
	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31
Louisiana	653,545	657,174	660,804	664,618	669,841	674,920	680,083	685,231	690,365	695,647	700,877

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:						
	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31
Ascension Parish	19,215	19,323	19,432	19,507	19,657	19,808	19,960	20,114	20,265	20,419	20,563
Bossier Parish	18,221	18,316	18,411	18,522	18,672	18,825	18,978	19,137	19,299	19,470	19,630
Caddo Parish	33,928	34,111	34,295	34,535	34,776	35,015	35,256	35,505	35,747	35,996	36,253
Calcasieu Parish	28,948	29,118	29,288	29,369	29,609	29,849	30,089	30,331	30,574	30,832	31,088
East Baton Rouge Parish	56,306	56,589	56,872	57,240	57,653	58,058	58,460	58,870	59,286	59,689	60,108
Jefferson Parish	63,122	63,452	63,783	64,111	64,519	64,921	65,319	65,714	66,111	66,503	66,901
Lafayette Parish	33,772	33,936	34,100	34,255	34,504	34,754	34,997	35,242	35,488	35,733	35,983
Lafourche Parish	15,667	15,768	15,869	15,923	16,053	16,183	16,312	16,443	16,571	16,698	16,825
Orleans Parish	41,949	42,166	42,383	42,579	42,837	43,087	43,340	43,590	43,834	44,082	44,328
Ouachita Parish	25,459	25,605	25,752	25,978	26,212	26,450	26,686	26,917	27,156	27,401	27,647
Rapides Parish	17,673	17,772	17,871	17,963	18,166	18,371	18,589	18,798	19,020	19,241	19,466
St. Bernard Parish	6,026	6,083	6,139	6,165	6,223	6,280	6,340	6,397	6,455	6,515	6,573
St. Charles Parish	8,003	8,048	8,094	8,154	8,208	8,259	8,309	8,359	8,410	8,460	8,510
St. James Parish	2,899	2,917	2,935	2,965	2,989	3,012	3,036	3,059	3,083	3,108	3,131
St. John the Baptist Parish	5,538	5,578	5,619	5,669	5,714	5,759	5,805	5,850	5,896	5,941	5,986
St. Tammany Parish	38,111	38,369	38,626	38,863	39,177	39,494	39,806	40,113	40,432	40,735	41,054

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:		
	8/21	8/22	8/23	8/24	8/26	8/28	8/30
Ascension Parish	19,215	19,323	19,432	19,507	19,808 (3,962) [951] {475}	20,114 (4,023) [965] {483}	20,419 (4,084) [980] {490}
Bossier Parish	18,221	18,316	18,411	18,522	18,825 (3,765) [904] {452}	19,137 (3,827) [919] {459}	19,470 (3,894) [935] {467}
Caddo Parish	33,928	34,111	34,295	34,535	35,015 (7,003) [1,681] {840}	35,505 (7,101) [1,704] {852}	35,996 (7,199) [1,728] {864}
Calcasieu Parish	28,948	29,118	29,288	29,369	29,849 (5,970) [1,433] {716}	30,331 (6,066) [1,456] {728}	30,832 (6,166) [1,480] {740}
East Baton Rouge Parish	56,306	56,589	56,872	57,240	58,058 (11,612) [2,787] {1,393}	58,870 (11,774) [2,826] {1,413}	59,689 (11,938) [2,865] {1,433}
Jefferson Parish	63,122	63,452	63,783	64,111	64,921 (12,984) [3,116] {1,558}	65,714 (13,143) [3,154] {1,577}	66,503 (13,301) [3,192] {1,596}
Lafayette Parish	33,772	33,936	34,100	34,255	34,754 (6,951) [1,668] {834}	35,242 (7,048) [1,692] {846}	35,733 (7,147) [1,715] {858}
Lafourche Parish	15,667	15,768	15,869	15,923	16,183 (3,237) [777] {388}	16,443 (3,289) [789] {395}	16,698 (3,340) [802] {401}
Orleans Parish	41,949	42,166	42,383	42,579	43,087 (8,617) [2,068] {1,034}	43,590 (8,718) [2,092] {1,046}	44,082 (8,816) [2,116] {1,058}
Ouachita Parish	25,459	25,605	25,752	25,978	26,450 (5,290) [1,270] {635}	26,917 (5,383) [1,292] {646}	27,401 (5,480) [1,315] {658}
Rapides Parish	17,673	17,772	17,871	17,963	18,371 (3,674) [882] {441}	18,798 (3,760) [902] {451}	19,241 (3,848) [924] {462}
St. Bernard Parish	6,026	6,083	6,139	6,165	6,280 (1,256) [301] {151}	6,397 (1,279) [307] {154}	6,515 (1,303) [313] {156}
St. Charles Parish	8,003	8,048	8,094	8,154	8,259 (1,652) [396] {198}	8,359 (1,672) [401] {201}	8,460 (1,692) [406] {203}
St. James Parish	2,899	2,917	2,935	2,965	3,012 (602) [145] {72}	3,059 (612) [147] {73}	3,108 (622) [149] {75}
St. John the Baptist Parish	5,538	5,578	5,619	5,669	5,759 (1,152) [276] {138}	5,850 (1,170) [281] {140}	5,941 (1,188) [285] {143}
St. Tammany Parish	38,111	38,369	38,626	38,863	39,494 (7,899) [1,896] {948}	40,113 (8,023) [1,925] {963}	40,735 (8,147) [1,955] {978}

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.