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

Date: 11/19/21

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 11/19/21 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.

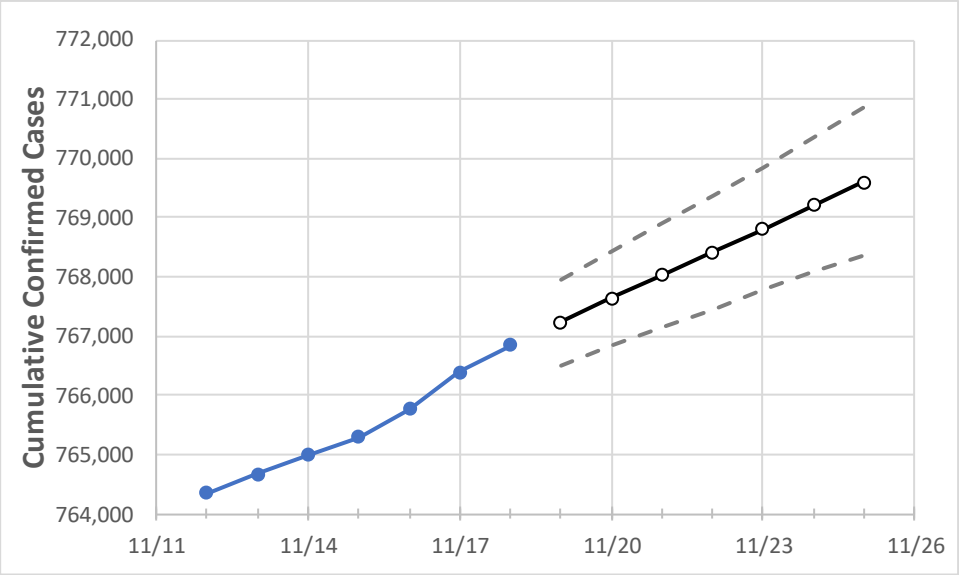
IEM's Modeling Lead

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:						
	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23	11/24	11/25
Louisiana	765,296	765,766	766,391	766,849	767,239	767,640	768,023	768,411	768,806	769,208	769,592

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:						
	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23	11/24	11/25
Ascension Parish	21,933	21,947	21,950	21,966	21,976	21,986	21,995	22,005	22,015	22,026	22,035
Bossier Parish	21,904	21,921	21,935	21,951	21,964	21,977	21,990	22,004	22,017	22,030	22,044
Caddo Parish	39,766	39,799	39,875	39,896	39,920	39,943	39,967	39,992	40,017	40,042	40,066
Calcasieu Parish	34,709	34,732	34,759	34,780	34,797	34,815	34,832	34,850	34,868	34,886	34,904
East Baton Rouge Parish	64,247	64,281	64,318	64,362	64,391	64,422	64,453	64,484	64,515	64,547	64,579
Jefferson Parish	70,040	70,067	70,092	70,127	70,155	70,186	70,214	70,242	70,274	70,304	70,333
Lafayette Parish	39,322	39,350	39,377	39,399	39,413	39,428	39,443	39,456	39,471	39,484	39,498
Lafourche Parish	18,062	18,069	18,081	18,087	18,094	18,101	18,107	18,114	18,121	18,127	18,133
Orleans Parish	47,237	47,259	47,280	47,307	47,335	47,362	47,387	47,416	47,443	47,471	47,499
Ouachita Parish	31,822	31,851	31,888	31,929	31,955	31,981	32,009	32,035	32,063	32,093	32,120
Rapides Parish	21,395	21,403	21,436	21,441	21,451	21,461	21,472	21,482	21,492	21,502	21,512
St. Bernard Parish	6,949	6,956	6,991	6,992	6,999	7,005	7,012	7,019	7,029	7,036	7,045
St. Charles Parish	8,923	8,925	8,927	8,933	8,935	8,937	8,939	8,941	8,944	8,946	8,948
St. James Parish	3,540	3,541	3,541	3,541	3,541	3,542	3,542	3,543	3,543	3,543	3,544
St. John the Baptist Parish	6,344	6,348	6,355	6,359	6,362	6,364	6,367	6,369	6,372	6,375	6,378
St. Tammany Parish	43,973	44,003	44,026	44,049	44,071	44,093	44,114	44,137	44,159	44,181	44,202

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:		
	11/15	11/16	11/17	11/18	11/20	11/22	11/24
Ascension Parish	21,933	21,947	21,950	21,966	21,986 (4,397) [1,055] {528}	22,005 (4,401) [1,056] {528}	22,026 (4,405) [1,057] {529}
Bossier Parish	21,904	21,921	21,935	21,951	21,977 (4,395) [1,055] {527}	22,004 (4,401) [1,056] {528}	22,030 (4,406) [1,057] {529}
Caddo Parish	39,766	39,799	39,875	39,896	39,943 (7,989) [1,917] {959}	39,992 (7,998) [1,920] {960}	40,042 (8,008) [1,922] {961}
Calcasieu Parish	34,709	34,732	34,759	34,780	34,815 (6,963) [1,671] {836}	34,850 (6,970) [1,673] {836}	34,886 (6,977) [1,675] {837}
East Baton Rouge Parish	64,247	64,281	64,318	64,362	64,422 (12,884) [3,092] {1,546}	64,484 (12,897) [3,095] {1,548}	64,547 (12,909) [3,098] {1,549}
Jefferson Parish	70,040	70,067	70,092	70,127	70,186 (14,037) [3,369] {1,684}	70,242 (14,048) [3,372] {1,686}	70,304 (14,061) [3,375] {1,687}
Lafayette Parish	39,322	39,350	39,377	39,399	39,428 (7,886) [1,893] {946}	39,456 (7,891) [1,894] {947}	39,484 (7,897) [1,895] {948}
Lafourche Parish	18,062	18,069	18,081	18,087	18,101 (3,620) [869] {434}	18,114 (3,623) [869] {435}	18,127 (3,625) [870] {435}
Orleans Parish	47,237	47,259	47,280	47,307	47,362 (9,472) [2,273] {1,137}	47,416 (9,483) [2,276] {1,138}	47,471 (9,494) [2,279] {1,139}
Ouachita Parish	31,822	31,851	31,888	31,929	31,981 (6,396) [1,535] {768}	32,035 (6,407) [1,538] {769}	32,093 (6,419) [1,540] {770}
Rapides Parish	21,395	21,403	21,436	21,441	21,461 (4,292) [1,030] {515}	21,482 (4,296) [1,031] {516}	21,502 (4,300) [1,032] {516}
St. Bernard Parish	6,949	6,956	6,991	6,992	7,005 (1,401) [336] {168}	7,019 (1,404) [337] {168}	7,036 (1,407) [338] {169}
St. Charles Parish	8,923	8,925	8,927	8,933	8,937 (1,787) [429] {214}	8,941 (1,788) [429] {215}	8,946 (1,789) [429] {215}
St. James Parish	3,540	3,541	3,541	3,541	3,542 (708) [170] {85}	3,543 (709) [170] {85}	3,543 (709) [170] {85}
St. John the Baptist Parish	6,344	6,348	6,355	6,359	6,364 (1,273) [305] {153}	6,369 (1,274) [306] {153}	6,375 (1,275) [306] {153}
St. Tammany Parish	43,973	44,003	44,026	44,049	44,093 (8,819) [2,116] {1,058}	44,137 (8,827) [2,119] {1,059}	44,181 (8,836) [2,121] {1,060}

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.