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

Date: 6/29/21

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 6/29/21 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.

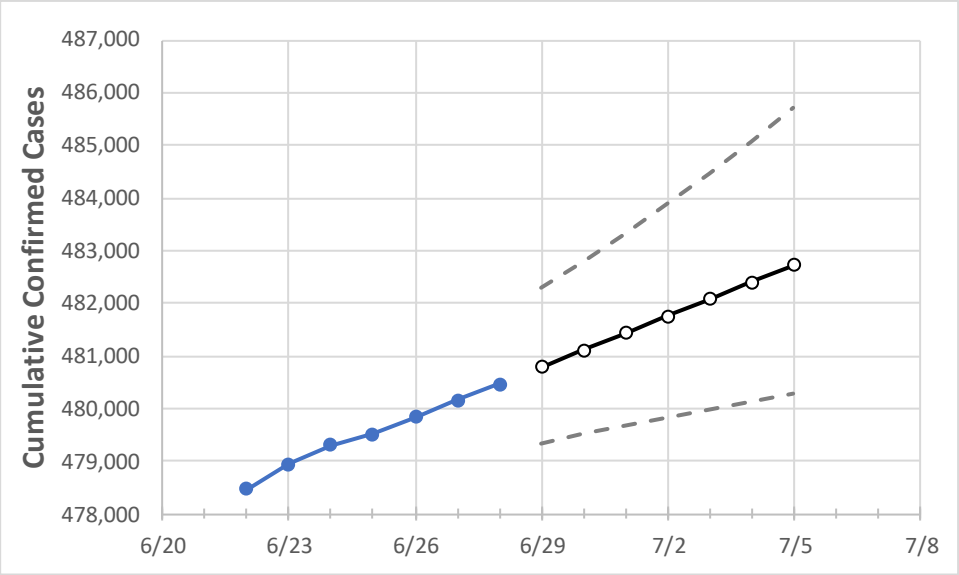
IEM's Modeling Lead

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:						
	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5
Louisiana	479,521	479,835	480,149	480,463	480,782	481,101	481,421	481,745	482,078	482,401	482,730

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:						
	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5
Ascension Parish	12,845	12,857	12,869	12,881	12,890	12,899	12,908	12,917	12,926	12,935	12,943
Bossier Parish	14,409	14,419	14,428	14,438	14,445	14,451	14,458	14,465	14,471	14,477	14,484
Caddo Parish	27,197	27,206	27,214	27,223	27,235	27,248	27,259	27,271	27,282	27,293	27,304
Calcasieu Parish	23,181	23,198	23,215	23,232	23,249	23,266	23,283	23,300	23,318	23,335	23,352
East Baton Rouge Parish	40,946	40,985	41,024	41,063	41,099	41,139	41,180	41,220	41,262	41,305	41,351
Jefferson Parish	47,459	47,481	47,504	47,526	47,544	47,563	47,580	47,597	47,614	47,632	47,649
Lafayette Parish	24,471	24,487	24,503	24,519	24,536	24,554	24,572	24,589	24,607	24,624	24,643
Lafourche Parish	10,122	10,138	10,153	10,169	10,186	10,204	10,222	10,240	10,259	10,278	10,298
Orleans Parish	30,996	31,011	31,026	31,041	31,054	31,068	31,081	31,095	31,109	31,123	31,137
Ouachita Parish	19,035	19,048	19,060	19,073	19,084	19,095	19,106	19,116	19,127	19,138	19,148
Rapides Parish	12,704	12,709	12,715	12,720	12,725	12,730	12,735	12,740	12,745	12,750	12,754
St. Bernard Parish	4,133	4,134	4,134	4,135	4,136	4,138	4,139	4,141	4,142	4,144	4,145
St. Charles Parish	5,622	5,624	5,627	5,629	5,631	5,634	5,636	5,638	5,641	5,643	5,645
St. James Parish	2,033	2,034	2,035	2,036	2,037	2,039	2,040	2,041	2,042	2,044	2,045
St. John the Baptist Parish	3,875	3,877	3,879	3,881	3,884	3,887	3,890	3,893	3,896	3,899	3,902
St. Tammany Parish	26,353	26,371	26,390	26,408	26,430	26,452	26,474	26,498	26,522	26,547	26,573

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:		
	6/25	6/26	6/27	6/28	6/30	7/2	7/4
Ascension Parish	12,845	12,857	12,869	12,881	12,899 (2,580) [619] {310}	12,917 (2,583) [620] {310}	12,935 (2,587) [621] {310}
Bossier Parish	14,409	14,419	14,428	14,438	14,451 (2,890) [694] {347}	14,465 (2,893) [694] {347}	14,477 (2,895) [695] {347}
Caddo Parish	27,197	27,206	27,214	27,223	27,248 (5,450) [1,308] {654}	27,271 (5,454) [1,309] {654}	27,293 (5,459) [1,310] {655}
Calcasieu Parish	23,181	23,198	23,215	23,232	23,266 (4,653) [1,117] {558}	23,300 (4,660) [1,118] {559}	23,335 (4,667) [1,120] {560}
East Baton Rouge Parish	40,946	40,985	41,024	41,063	41,139 (8,228) [1,975] {987}	41,220 (8,244) [1,979] {989}	41,305 (8,261) [1,983] {991}
Jefferson Parish	47,459	47,481	47,504	47,526	47,563 (9,513) [2,283] {1,142}	47,597 (9,519) [2,285] {1,142}	47,632 (9,526) [2,286] {1,143}
Lafayette Parish	24,471	24,487	24,503	24,519	24,554 (4,911) [1,179] {589}	24,589 (4,918) [1,180] {590}	24,624 (4,925) [1,182] {591}
Lafourche Parish	10,122	10,138	10,153	10,169	10,204 (2,041) [490] {245}	10,240 (2,048) [492] {246}	10,278 (2,056) [493] {247}
Orleans Parish	30,996	31,011	31,026	31,041	31,068 (6,214) [1,491] {746}	31,095 (6,219) [1,493] {746}	31,123 (6,225) [1,494] {747}
Ouachita Parish	19,035	19,048	19,060	19,073	19,095 (3,819) [917] {458}	19,116 (3,823) [918] {459}	19,138 (3,828) [919] {459}
Rapides Parish	12,704	12,709	12,715	12,720	12,730 (2,546) [611] {306}	12,740 (2,548) [612] {306}	12,750 (2,550) [612] {306}
St. Bernard Parish	4,133	4,134	4,134	4,135	4,138 (828) [199] {99}	4,141 (828) [199] {99}	4,144 (829) [199] {99}
St. Charles Parish	5,622	5,624	5,627	5,629	5,634 (1,127) [270] {135}	5,638 (1,128) [271] {135}	5,643 (1,129) [271] {135}
St. James Parish	2,033	2,034	2,035	2,036	2,039 (408) [98] {49}	2,041 (408) [98] {49}	2,044 (409) [98] {49}
St. John the Baptist Parish	3,875	3,877	3,879	3,881	3,887 (777) [187] {93}	3,893 (779) [187] {93}	3,899 (780) [187] {94}
St. Tammany Parish	26,353	26,371	26,390	26,408	26,452 (5,290) [1,270] {635}	26,498 (5,300) [1,272] {636}	26,547 (5,309) [1,274] {637}

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.