IEM's AI Modeling: Short-term COVID-19 Projections
Date: 10/6/21

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 10/6/21 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
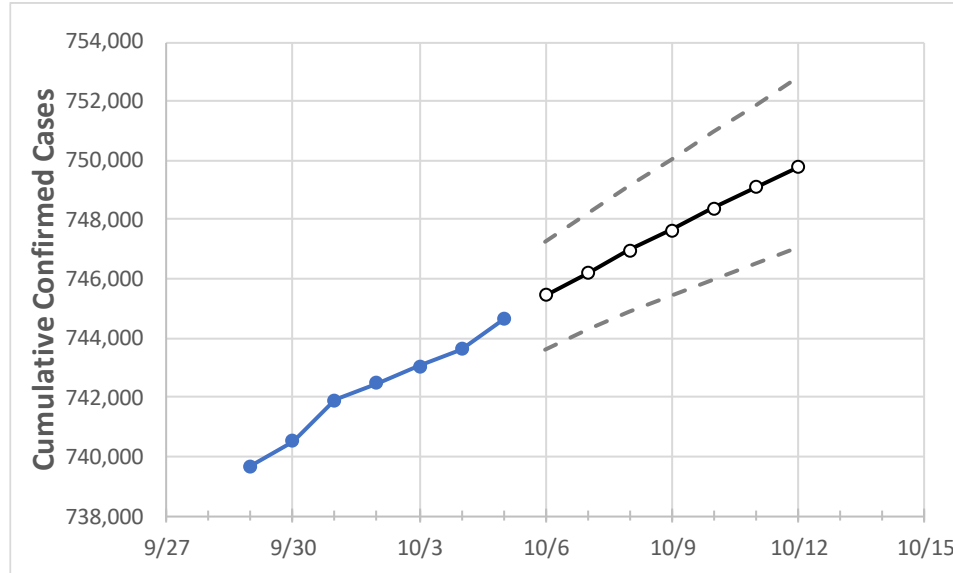
	Actual Confirmed Cases On:				Projected Cases For:						
	10/2	10/3	10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12
Louisiana	742,481	743,056	743,631	744,651	745,447	746,200	746,967	747,657	748,402	749,080	749,783

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:						
	10/2	10/3	10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12
Ascension Parish	21,418	21,433	21,449	21,481	21,501	21,521	21,539	21,558	21,577	21,596	21,614
Bossier Parish	21,181	21,206	21,231	21,263	21,293	21,323	21,352	21,381	21,409	21,437	21,463
Caddo Parish	38,427	38,479	38,531	38,587	38,642	38,695	38,748	38,800	38,851	38,901	38,950
Calcasieu Parish	33,569	33,595	33,622	33,685	33,728	33,766	33,802	33,841	33,877	33,915	33,948
East Baton Rouge Parish	62,713	62,752	62,790	62,891	62,950	63,009	63,069	63,126	63,182	63,240	63,293
Jefferson Parish	68,570	68,617	68,664	68,718	68,766	68,813	68,860	68,904	68,948	68,992	69,033
Lafayette Parish	37,926	37,947	37,969	38,030	38,062	38,091	38,120	38,149	38,178	38,205	38,230
Lafourche Parish	17,571	17,587	17,604	17,608	17,623	17,637	17,651	17,662	17,676	17,688	17,700
Orleans Parish	45,942	45,973	46,003	46,030	46,061	46,093	46,121	46,150	46,176	46,204	46,229
Ouachita Parish	30,583	30,620	30,656	30,733	30,798	30,861	30,928	30,987	31,048	31,107	31,168
Rapides Parish	20,781	20,793	20,806	20,843	20,864	20,884	20,906	20,925	20,943	20,963	20,979
St. Bernard Parish	6,762	6,769	6,776	6,778	6,783	6,788	6,793	6,798	6,803	6,808	6,812
St. Charles Parish	8,728	8,733	8,739	8,744	8,749	8,754	8,759	8,764	8,769	8,773	8,778
St. James Parish	3,399	3,399	3,400	3,411	3,414	3,416	3,419	3,421	3,423	3,426	3,428
St. John the Baptist Parish	6,208	6,213	6,217	6,222	6,226	6,230	6,234	6,238	6,242	6,245	6,249
St. Tammany Parish	42,722	42,758	42,795	42,833	42,876	42,918	42,959	43,000	43,039	43,077	43,114

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:		
	10/2	10/3	10/4	10/5	10/7	10/9	10/11
Ascension Parish	21,418	21,433	21,449	21,481	21,521 (4,304) [1,033] {516}	21,558 (4,312) [1,035] {517}	21,596 (4,319) [1,037] {518}
Bossier Parish	21,181	21,206	21,231	21,263	21,323 (4,265) [1,023] {512}	21,381 (4,276) [1,026] {513}	21,437 (4,287) [1,029] {514}
Caddo Parish	38,427	38,479	38,531	38,587	38,695 (7,739) [1,857] {929}	38,800 (7,760) [1,862] {931}	38,901 (7,780) [1,867] {934}
Calcasieu Parish	33,569	33,595	33,622	33,685	33,766 (6,753) [1,621] {810}	33,841 (6,768) [1,624] {812}	33,915 (6,783) [1,628] {814}
East Baton Rouge Parish	62,713	62,752	62,790	62,891	63,009 (12,602) [3,024] {1,512}	63,126 (12,625) [3,030] {1,515}	63,240 (12,648) [3,036] {1,518}
Jefferson Parish	68,570	68,617	68,664	68,718	68,813 (13,763) [3,303] {1,652}	68,904 (13,781) [3,307] {1,654}	68,992 (13,798) [3,312] {1,656}
Lafayette Parish	37,926	37,947	37,969	38,030	38,091 (7,618) [1,828] {914}	38,149 (7,630) [1,831] {916}	38,205 (7,641) [1,834] {917}
Lafourche Parish	17,571	17,587	17,604	17,608	17,637 (3,527) [847] {423}	17,662 (3,532) [848] {424}	17,688 (3,538) [849] {425}
Orleans Parish	45,942	45,973	46,003	46,030	46,093 (9,219) [2,212] {1,106}	46,150 (9,230) [2,215] {1,108}	46,204 (9,241) [2,218] {1,109}
Ouachita Parish	30,583	30,620	30,656	30,733	30,861 (6,172) [1,481] {741}	30,987 (6,197) [1,487] {744}	31,107 (6,221) [1,493] {747}
Rapides Parish	20,781	20,793	20,806	20,843	20,884 (4,177) [1,002] {501}	20,925 (4,185) [1,004] {502}	20,963 (4,193) [1,006] {503}
St. Bernard Parish	6,762	6,769	6,776	6,778	6,788 (1,358) [326] {163}	6,798 (1,360) [326] {163}	6,808 (1,362) [327] {163}
St. Charles Parish	8,728	8,733	8,739	8,744	8,754 (1,751) [420] {210}	8,764 (1,753) [421] {210}	8,773 (1,755) [421] {211}
St. James Parish	3,399	3,399	3,400	3,411	3,416 (683) [164] {82}	3,421 (684) [164] {82}	3,426 (685) [164] {82}
St. John the Baptist Parish	6,208	6,213	6,217	6,222	6,230 (1,246) [299] {150}	6,238 (1,248) [299] {150}	6,245 (1,249) [300] {150}
St. Tammany Parish	42,722	42,758	42,795	42,833	42,918 (8,584) [2,060] {1,030}	43,000 (8,600) [2,064] {1,032}	43,077 (8,615) [2,068] {1,034}

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.