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

Date: 10/8/21

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 10/8/21 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.

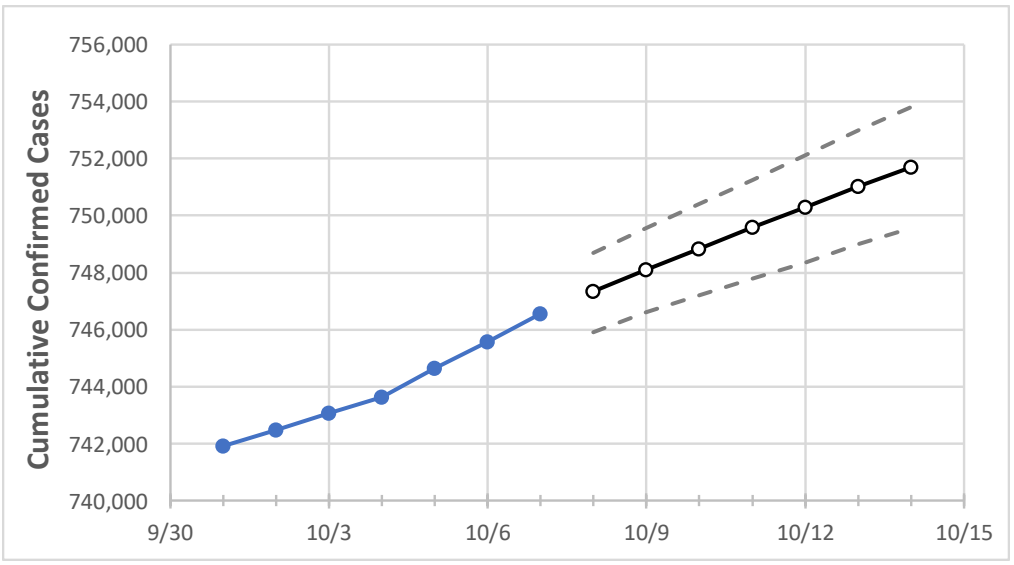
IEM's Modeling Lead

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:						
	10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14
Louisiana	743,631	744,651	745,571	746,542	747,338	748,102	748,840	749,590	750,299	751,027	751,708

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:						
	10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14
Ascension Parish	21,449	21,481	21,493	21,512	21,530	21,549	21,566	21,584	21,601	21,618	21,634
Bossier Parish	21,231	21,263	21,294	21,318	21,346	21,374	21,400	21,427	21,454	21,479	21,506
Caddo Parish	38,531	38,587	38,657	38,710	38,766	38,820	38,874	38,928	38,980	39,034	39,084
Calcasieu Parish	33,622	33,685	33,742	33,791	33,832	33,871	33,910	33,949	33,987	34,026	34,061
East Baton Rouge Parish	62,790	62,891	62,935	62,992	63,049	63,105	63,159	63,213	63,266	63,319	63,369
Jefferson Parish	68,664	68,718	68,772	68,806	68,852	68,896	68,939	68,981	69,023	69,064	69,103
Lafayette Parish	37,969	38,030	38,059	38,140	38,174	38,205	38,238	38,270	38,302	38,333	38,363
Lafourche Parish	17,604	17,608	17,620	17,636	17,648	17,659	17,670	17,680	17,691	17,701	17,710
Orleans Parish	46,003	46,030	46,074	46,124	46,157	46,190	46,221	46,252	46,283	46,312	46,340
Ouachita Parish	30,656	30,733	30,824	30,874	30,940	31,002	31,063	31,126	31,185	31,247	31,304
Rapides Parish	20,806	20,843	20,865	20,888	20,907	20,927	20,945	20,963	20,981	20,998	21,016
St. Bernard Parish	6,776	6,778	6,788	6,799	6,805	6,811	6,816	6,822	6,828	6,833	6,839
St. Charles Parish	8,739	8,744	8,750	8,752	8,757	8,761	8,765	8,770	8,774	8,778	8,782
St. James Parish	3,400	3,411	3,412	3,424	3,427	3,430	3,433	3,436	3,438	3,442	3,444
St. John the Baptist Parish	6,217	6,222	6,226	6,232	6,236	6,240	6,244	6,248	6,252	6,255	6,259
St. Tammany Parish	42,795	42,833	42,897	42,958	43,001	43,046	43,088	43,130	43,173	43,214	43,253

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:		
	10/4	10/5	10/6	10/7	10/9	10/11	10/13
Ascension Parish	21,449	21,481	21,493	21,512	21,549 (4,310) [1,034] {517}	21,584 (4,317) [1,036] {518}	21,618 (4,324) [1,038] {519}
Bossier Parish	21,231	21,263	21,294	21,318	21,374 (4,275) [1,026] {513}	21,427 (4,285) [1,029] {514}	21,479 (4,296) [1,031] {516}
Caddo Parish	38,531	38,587	38,657	38,710	38,820 (7,764) [1,863] {932}	38,928 (7,786) [1,869] {934}	39,034 (7,807) [1,874] {937}
Calcasieu Parish	33,622	33,685	33,742	33,791	33,871 (6,774) [1,626] {813}	33,949 (6,790) [1,630] {815}	34,026 (6,805) [1,633] {817}
East Baton Rouge Parish	62,790	62,891	62,935	62,992	63,105 (12,621) [3,029] {1,515}	63,213 (12,643) [3,034] {1,517}	63,319 (12,664) [3,039] {1,520}
Jefferson Parish	68,664	68,718	68,772	68,806	68,896 (13,779) [3,307] {1,654}	68,981 (13,796) [3,311] {1,656}	69,064 (13,813) [3,315] {1,658}
Lafayette Parish	37,969	38,030	38,059	38,140	38,205 (7,641) [1,834] {917}	38,270 (7,654) [1,837] {918}	38,333 (7,667) [1,840] {920}
Lafourche Parish	17,604	17,608	17,620	17,636	17,659 (3,532) [848] {424}	17,680 (3,536) [849] {424}	17,701 (3,540) [850] {425}
Orleans Parish	46,003	46,030	46,074	46,124	46,190 (9,238) [2,217] {1,109}	46,252 (9,250) [2,220] {1,110}	46,312 (9,262) [2,223] {1,111}
Ouachita Parish	30,656	30,733	30,824	30,874	31,002 (6,200) [1,488] {744}	31,126 (6,225) [1,494] {747}	31,247 (6,249) [1,500] {750}
Rapides Parish	20,806	20,843	20,865	20,888	20,927 (4,185) [1,004] {502}	20,963 (4,193) [1,006] {503}	20,998 (4,200) [1,008] {504}
St. Bernard Parish	6,776	6,778	6,788	6,799	6,811 (1,362) [327] {163}	6,822 (1,364) [327] {164}	6,833 (1,367) [328] {164}
St. Charles Parish	8,739	8,744	8,750	8,752	8,761 (1,752) [421] {210}	8,770 (1,754) [421] {210}	8,778 (1,756) [421] {211}
St. James Parish	3,400	3,411	3,412	3,424	3,430 (686) [165] {82}	3,436 (687) [165] {82}	3,442 (688) [165] {83}
St. John the Baptist Parish	6,217	6,222	6,226	6,232	6,240 (1,248) [300] {150}	6,248 (1,250) [300] {150}	6,255 (1,251) [300] {150}
St. Tammany Parish	42,795	42,833	42,897	42,958	43,046 (8,609) [2,066] {1,033}	43,130 (8,626) [2,070] {1,035}	43,214 (8,643) [2,074] {1,037}

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.