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

Date: 9/24/21

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 9/24/21 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.

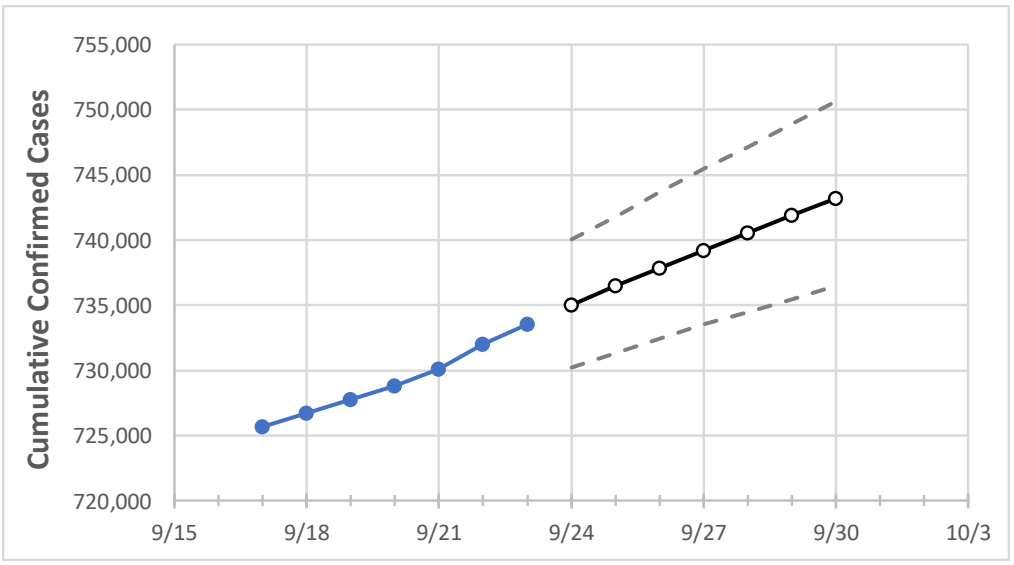
IEM's Modeling Lead

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:						
	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30
Louisiana	728,831	730,099	732,005	733,522	735,004	736,465	737,812	739,189	740,544	741,900	743,187

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:						
	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30
Ascension Parish	21,124	21,150	21,190	21,212	21,242	21,273	21,303	21,330	21,359	21,386	21,416
Bossier Parish	20,710	20,759	20,803	20,865	20,912	20,956	21,000	21,042	21,085	21,128	21,170
Caddo Parish	37,585	37,668	37,757	37,854	37,931	38,007	38,081	38,154	38,229	38,299	38,372
Calcasieu Parish	32,888	32,917	33,073	33,142	33,219	33,294	33,366	33,440	33,510	33,582	33,655
East Baton Rouge Parish	61,776	61,874	61,994	62,057	62,139	62,231	62,315	62,396	62,480	62,566	62,632
Jefferson Parish	67,774	67,871	67,956	68,040	68,109	68,185	68,254	68,326	68,397	68,468	68,534
Lafayette Parish	37,391	37,440	37,522	37,566	37,639	37,704	37,773	37,836	37,905	37,970	38,033
Lafourche Parish	17,299	17,313	17,343	17,408	17,442	17,478	17,510	17,540	17,573	17,609	17,638
Orleans Parish	45,294	45,386	45,456	45,530	45,599	45,664	45,730	45,797	45,863	45,930	45,996
Ouachita Parish	29,598	29,668	29,774	29,845	29,932	30,018	30,100	30,182	30,271	30,353	30,425
Rapides Parish	20,391	20,420	20,497	20,552	20,597	20,641	20,684	20,726	20,767	20,808	20,848
St. Bernard Parish	6,679	6,683	6,690	6,704	6,712	6,721	6,729	6,737	6,745	6,753	6,761
St. Charles Parish	8,640	8,647	8,651	8,665	8,675	8,684	8,694	8,703	8,712	8,721	8,730
St. James Parish	3,348	3,353	3,366	3,369	3,375	3,382	3,387	3,393	3,399	3,405	3,410
St. John the Baptist Parish	6,127	6,138	6,145	6,155	6,163	6,171	6,178	6,185	6,193	6,201	6,207
St. Tammany Parish	41,946	42,019	42,162	42,244	42,319	42,393	42,462	42,537	42,606	42,677	42,748

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:		
	9/20	9/21	9/22	9/23	9/25	9/27	9/29
Ascension Parish	21,124	21,150	21,190	21,212	21,273 (4,255) [1,021] {511}	21,330 (4,266) [1,024] {512}	21,386 (4,277) [1,027] {513}
Bossier Parish	20,710	20,759	20,803	20,865	20,956 (4,191) [1,006] {503}	21,042 (4,208) [1,010] {505}	21,128 (4,226) [1,014] {507}
Caddo Parish	37,585	37,668	37,757	37,854	38,007 (7,601) [1,824] {912}	38,154 (7,631) [1,831] {916}	38,299 (7,660) [1,838] {919}
Calcasieu Parish	32,888	32,917	33,073	33,142	33,294 (6,659) [1,598] {799}	33,440 (6,688) [1,605] {803}	33,582 (6,716) [1,612] {806}
East Baton Rouge Parish	61,776	61,874	61,994	62,057	62,231 (12,446) [2,987] {1,494}	62,396 (12,479) [2,995] {1,497}	62,566 (12,513) [3,003] {1,502}
Jefferson Parish	67,774	67,871	67,956	68,040	68,185 (13,637) [3,273] {1,636}	68,326 (13,665) [3,280] {1,640}	68,468 (13,694) [3,286] {1,643}
Lafayette Parish	37,391	37,440	37,522	37,566	37,704 (7,541) [1,810] {905}	37,836 (7,567) [1,816] {908}	37,970 (7,594) [1,823] {911}
Lafourche Parish	17,299	17,313	17,343	17,408	17,478 (3,496) [839] {419}	17,540 (3,508) [842] {421}	17,609 (3,522) [845] {423}
Orleans Parish	45,294	45,386	45,456	45,530	45,664 (9,133) [2,192] {1,096}	45,797 (9,159) [2,198] {1,099}	45,930 (9,186) [2,205] {1,102}
Ouachita Parish	29,598	29,668	29,774	29,845	30,018 (6,004) [1,441] {720}	30,182 (6,036) [1,449] {724}	30,353 (6,071) [1,457] {728}
Rapides Parish	20,391	20,420	20,497	20,552	20,641 (4,128) [991] {495}	20,726 (4,145) [995] {497}	20,808 (4,162) [999] {499}
St. Bernard Parish	6,679	6,683	6,690	6,704	6,721 (1,344) [323] {161}	6,737 (1,347) [323] {162}	6,753 (1,351) [324] {162}
St. Charles Parish	8,640	8,647	8,651	8,665	8,684 (1,737) [417] {208}	8,703 (1,741) [418] {209}	8,721 (1,744) [419] {209}
St. James Parish	3,348	3,353	3,366	3,369	3,382 (676) [162] {81}	3,393 (679) [163] {81}	3,405 (681) [163] {82}
St. John the Baptist Parish	6,127	6,138	6,145	6,155	6,171 (1,234) [296] {148}	6,185 (1,237) [297] {148}	6,201 (1,240) [298] {149}
St. Tammany Parish	41,946	42,019	42,162	42,244	42,393 (8,479) [2,035] {1,017}	42,537 (8,507) [2,042] {1,021}	42,677 (8,535) [2,049] {1,024}

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.