IEM's AI Modeling: Short-term COVID-19 Projections
Date: 8/13/21

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 <u>not</u> 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 8/13/21 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
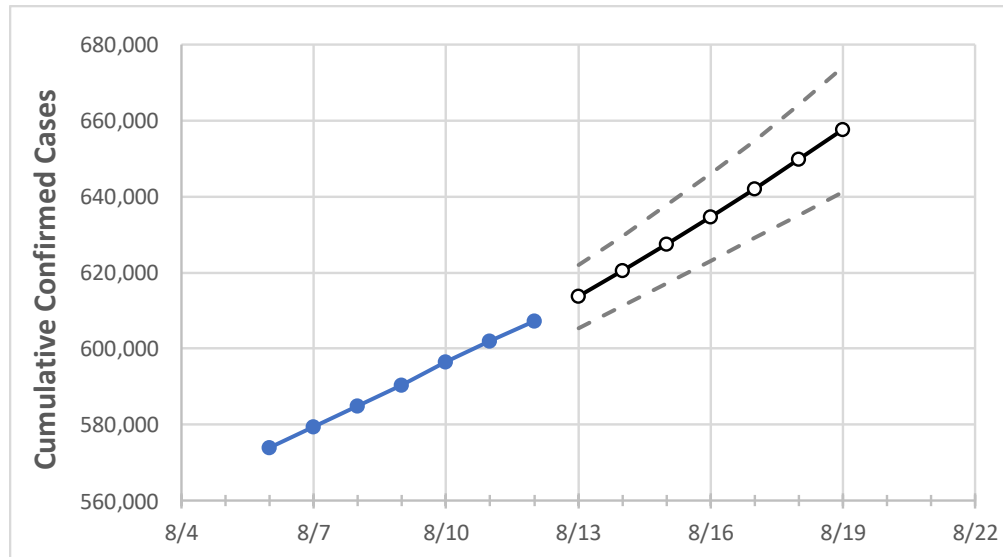
	Actual Confirmed Cases On:				Projected Cases For:						
	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17	8/18	8/19
Louisiana	590,446	596,534	601,941	607,228	613,704	620,476	627,423	634,591	642,061	649,796	657,628

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:						
	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17	8/18	8/19
Ascension Parish	17,263	17,443	17,585	17,745	17,951	18,160	18,375	18,593	18,824	19,055	19,300
Bossier Parish	16,558	16,737	16,870	17,053	17,214	17,386	17,569	17,761	17,967	18,180	18,409
Caddo Parish	31,138	31,410	31,709	31,970	32,270	32,583	32,914	33,257	33,617	33,997	34,394
Calcasieu Parish	26,427	26,647	26,830	26,953	27,175	27,408	27,653	27,908	28,177	28,459	28,757
East Baton Rouge Parish	51,423	51,738	52,100	52,402	52,866	53,329	53,820	54,316	54,817	55,334	55,859
Jefferson Parish	57,721	58,156	58,690	59,130	59,689	60,260	60,845	61,437	62,039	62,657	63,283
Lafayette Parish	30,424	30,924	31,183	31,430	31,824	32,231	32,653	33,095	33,558	34,038	34,548
Lafourche Parish	13,914	14,065	14,258	14,467	14,698	14,938	15,187	15,444	15,714	15,995	16,288
Orleans Parish	38,451	38,758	39,060	39,400	39,770	40,141	40,516	40,894	41,276	41,667	42,055
Ouachita Parish	22,807	23,111	23,339	23,548	23,836	24,137	24,459	24,796	25,147	25,518	25,906
Rapides Parish	15,420	15,632	15,792	15,898	16,085	16,285	16,499	16,724	16,955	17,203	17,461
St. Bernard Parish	5,312	5,360	5,430	5,473	5,536	5,603	5,669	5,738	5,807	5,879	5,951
St. Charles Parish	7,318	7,362	7,423	7,532	7,624	7,719	7,819	7,921	8,025	8,134	8,248
St. James Parish	2,604	2,638	2,661	2,699	2,735	2,772	2,811	2,851	2,893	2,939	2,985
St. John the Baptist Parish	4,981	5,039	5,076	5,126	5,179	5,232	5,287	5,342	5,397	5,452	5,510
St. Tammany Parish	34,087	34,414	34,740	35,120	35,525	35,940	36,372	36,816	37,269	37,739	38,223

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:		
	8/9	8/10	8/11	8/12	8/14	8/16	8/18
Ascension Parish	17,263	17,443	17,585	17,745	18,160 (3,632) [872] {436}	18,593 (3,719) [892] {446}	19,055 (3,811) [915] {457}
Bossier Parish	16,558	16,737	16,870	17,053	17,386 (3,477) [835] {417}	17,761 (3,552) [853] {426}	18,180 (3,636) [873] {436}
Caddo Parish	31,138	31,410	31,709	31,970	32,583 (6,517) [1,564] {782}	33,257 (6,651) [1,596] {798}	33,997 (6,799) [1,632] {816}
Calcasieu Parish	26,427	26,647	26,830	26,953	27,408 (5,482) [1,316] {658}	27,908 (5,582) [1,340] {670}	28,459 (5,692) [1,366] {683}
East Baton Rouge Parish	51,423	51,738	52,100	52,402	53,329 (10,666) [2,560] {1,280}	54,316 (10,863) [2,607] {1,304}	55,334 (11,067) [2,656] {1,328}
Jefferson Parish	57,721	58,156	58,690	59,130	60,260 (12,052) [2,892] {1,446}	61,437 (12,287) [2,949] {1,474}	62,657 (12,531) [3,008] {1,504}
Lafayette Parish	30,424	30,924	31,183	31,430	32,231 (6,446) [1,547] {774}	33,095 (6,619) [1,589] {794}	34,038 (6,808) [1,634] {817}
Lafourche Parish	13,914	14,065	14,258	14,467	14,938 (2,988) [717] {359}	15,444 (3,089) [741] {371}	15,995 (3,199) [768] {384}
Orleans Parish	38,451	38,758	39,060	39,400	40,141 (8,028) [1,927] {963}	40,894 (8,179) [1,963] {981}	41,667 (8,333) [2,000] {1,000}
Ouachita Parish	22,807	23,111	23,339	23,548	24,137 (4,827) [1,159] {579}	24,796 (4,959) [1,190] {595}	25,518 (5,104) [1,225] {612}
Rapides Parish	15,420	15,632	15,792	15,898	16,285 (3,257) [782] {391}	16,724 (3,345) [803] {401}	17,203 (3,441) [826] {413}
St. Bernard Parish	5,312	5,360	5,430	5,473	5,603 (1,121) [269] {134}	5,738 (1,148) [275] {138}	5,879 (1,176) [282] {141}
St. Charles Parish	7,318	7,362	7,423	7,532	7,719 (1,544) [371] {185}	7,921 (1,584) [380] {190}	8,134 (1,627) [390] {195}
St. James Parish	2,604	2,638	2,661	2,699	2,772 (554) [133] {67}	2,851 (570) [137] {68}	2,939 (588) [141] {71}
St. John the Baptist Parish	4,981	5,039	5,076	5,126	5,232 (1,046) [251] {126}	5,342 (1,068) [256] {128}	5,452 (1,090) [262] {131}
St. Tammany Parish	34,087	34,414	34,740	35,120	35,940 (7,188) [1,725] {863}	36,816 (7,363) [1,767] {884}	37,739 (7,548) [1,811] {906}

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.