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

Date: 6/14/21

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 6/14/21 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.

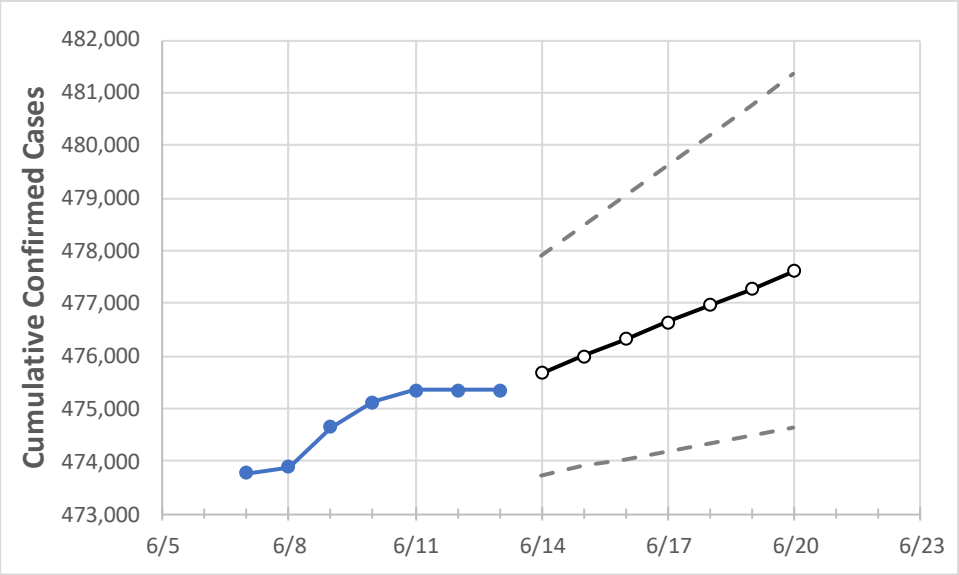
IEM's Modeling Lead

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:						
	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20
Louisiana	475,126	475,354	475,354	475,354	475,668	475,991	476,318	476,630	476,953	477,275	477,600

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:						
	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20
Ascension Parish	12,707	12,712	12,712	12,712	12,722	12,731	12,741	12,750	12,760	12,769	12,777
Bossier Parish	14,292	14,301	14,301	14,301	14,310	14,318	14,327	14,334	14,342	14,350	14,358
Caddo Parish	26,919	26,944	26,944	26,944	26,972	27,000	27,029	27,058	27,089	27,119	27,150
Calcasieu Parish	22,956	22,956	22,956	22,956	22,972	22,989	23,007	23,024	23,042	23,059	23,078
East Baton Rouge Parish	40,575	40,591	40,591	40,591	40,625	40,658	40,692	40,726	40,761	40,797	40,832
Jefferson Parish	47,149	47,175	47,175	47,175	47,211	47,247	47,284	47,322	47,361	47,400	47,440
Lafayette Parish	24,254	24,265	24,265	24,265	24,293	24,322	24,353	24,384	24,416	24,448	24,482
Lafourche Parish	9,928	9,936	9,936	9,936	9,946	9,957	9,968	9,979	9,990	10,001	10,012
Orleans Parish	30,827	30,830	30,830	30,830	30,846	30,863	30,879	30,894	30,910	30,926	30,941
Ouachita Parish	18,873	18,875	18,875	18,875	18,883	18,890	18,898	18,906	18,914	18,922	18,930
Rapides Parish	12,599	12,603	12,603	12,603	12,609	12,616	12,621	12,627	12,633	12,639	12,644
St. Bernard Parish	4,105	4,106	4,106	4,106	4,110	4,114	4,118	4,123	4,128	4,132	4,138
St. Charles Parish	5,571	5,576	5,576	5,576	5,581	5,585	5,590	5,595	5,600	5,604	5,609
St. James Parish	2,014	2,016	2,016	2,016	2,018	2,020	2,022	2,024	2,026	2,028	2,030
St. John the Baptist Parish	3,820	3,821	3,821	3,821	3,825	3,828	3,832	3,835	3,839	3,843	3,847
St. Tammany Parish	26,131	26,143	26,143	26,143	26,161	26,179	26,197	26,216	26,235	26,255	26,276

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:		
	6/10	6/11	6/12	6/13	6/15	6/17	6/19
Ascension Parish	12,707	12,712	12,712	12,712	12,731 (2,546) [611] {306}	12,750 (2,550) [612] {306}	12,769 (2,554) [613] {306}
Bossier Parish	14,292	14,301	14,301	14,301	14,318 (2,864) [687] {344}	14,334 (2,867) [688] {344}	14,350 (2,870) [689] {344}
Caddo Parish	26,919	26,944	26,944	26,944	27,000 (5,400) [1,296] {648}	27,058 (5,412) [1,299] {649}	27,119 (5,424) [1,302] {651}
Calcasieu Parish	22,956	22,956	22,956	22,956	22,989 (4,598) [1,103] {552}	23,024 (4,605) [1,105] {553}	23,059 (4,612) [1,107] {553}
East Baton Rouge Parish	40,575	40,591	40,591	40,591	40,658 (8,132) [1,952] {976}	40,726 (8,145) [1,955] {977}	40,797 (8,159) [1,958] {979}
Jefferson Parish	47,149	47,175	47,175	47,175	47,247 (9,449) [2,268] {1,134}	47,322 (9,464) [2,271] {1,136}	47,400 (9,480) [2,275] {1,138}
Lafayette Parish	24,254	24,265	24,265	24,265	24,322 (4,864) [1,167] {584}	24,384 (4,877) [1,170] {585}	24,448 (4,890) [1,174] {587}
Lafourche Parish	9,928	9,936	9,936	9,936	9,957 (1,991) [478] {239}	9,979 (1,996) [479] {239}	10,001 (2,000) [480] {240}
Orleans Parish	30,827	30,830	30,830	30,830	30,863 (6,173) [1,481] {741}	30,894 (6,179) [1,483] {741}	30,926 (6,185) [1,484] {742}
Ouachita Parish	18,873	18,875	18,875	18,875	18,890 (3,778) [907] {453}	18,906 (3,781) [907] {454}	18,922 (3,784) [908] {454}
Rapides Parish	12,599	12,603	12,603	12,603	12,616 (2,523) [606] {303}	12,627 (2,525) [606] {303}	12,639 (2,528) [607] {303}
St. Bernard Parish	4,105	4,106	4,106	4,106	4,114 (823) [197] {99}	4,123 (825) [198] {99}	4,132 (826) [198] {99}
St. Charles Parish	5,571	5,576	5,576	5,576	5,585 (1,117) [268] {134}	5,595 (1,119) [269] {134}	5,604 (1,121) [269] {135}
St. James Parish	2,014	2,016	2,016	2,016	2,020 (404) [97] {48}	2,024 (405) [97] {49}	2,028 (406) [97] {49}
St. John the Baptist Parish	3,820	3,821	3,821	3,821	3,828 (766) [184] {92}	3,835 (767) [184] {92}	3,843 (769) [184] {92}
St. Tammany Parish	26,131	26,143	26,143	26,143	26,179 (5,236) [1,257] {628}	26,216 (5,243) [1,258] {629}	26,255 (5,251) [1,260] {630}

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.