

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 8/27/21**

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 8/27/21 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.

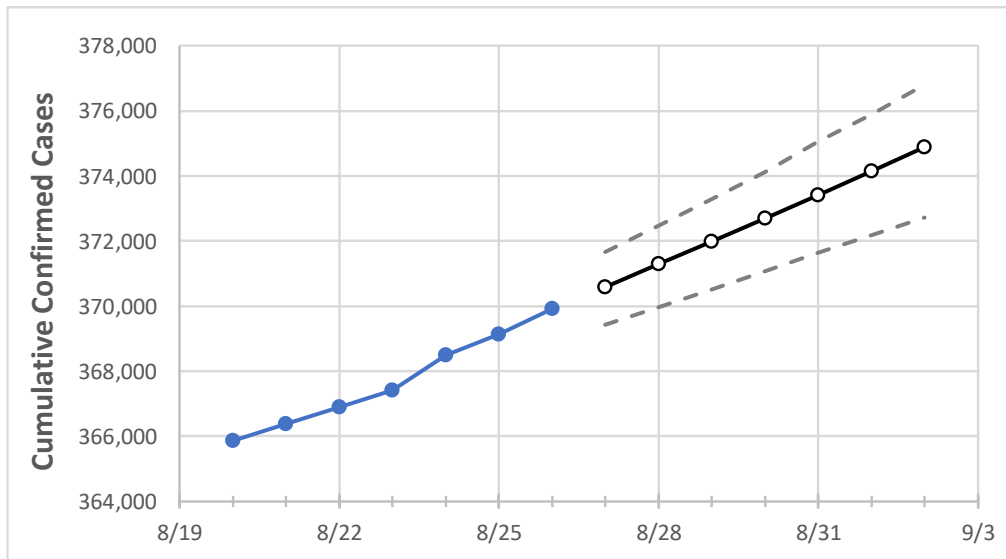
IEM's Modeling Lead

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.

Connecticut State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2
Connecticut	367,410	368,481	369,132	369,920	370,588	371,288	371,993	372,698	373,403	374,149	374,877

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.

Connecticut Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2
Fairfield	104,837	105,111	105,279	105,493	105,668	105,843	106,019	106,205	106,386	106,575	106,765
Hartford	89,540	89,728	89,852	90,054	90,215	90,372	90,539	90,699	90,860	91,027	91,189
Litchfield	15,404	15,434	15,463	15,496	15,528	15,561	15,595	15,629	15,664	15,701	15,737
Middlesex	13,627	13,658	13,686	13,714	13,741	13,768	13,796	13,824	13,851	13,880	13,909
New Haven	97,062	97,459	97,670	97,874	98,053	98,229	98,408	98,586	98,772	98,961	99,144
Tolland	10,187	10,222	10,234	10,259	10,280	10,301	10,323	10,346	10,369	10,393	10,417

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.

Connecticut Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	8/23	8/24	8/25	8/26	8/28				8/30				9/1			
Fairfield	104,837	105,111	105,279	105,493	105,843	(21,169)	[5,080]	{2,540}	106,205	(21,241)	[5,098]	{2,549}	106,575	(21,315)	[5,116]	{2,558}
Hartford	89,540	89,728	89,852	90,054	90,372	(18,074)	[4,338]	{2,169}	90,699	(18,140)	[4,354]	{2,177}	91,027	(18,205)	[4,369]	{2,185}
Litchfield	15,404	15,434	15,463	15,496	15,561	(3,112)	[747]	{373}	15,629	(3,126)	[750]	{375}	15,701	(3,140)	[754]	{377}
Middlesex	13,627	13,658	13,686	13,714	13,768	(2,754)	[661]	{330}	13,824	(2,765)	[664]	{332}	13,880	(2,776)	[666]	{333}
New Haven	97,062	97,459	97,670	97,874	98,229	(19,646)	[4,715]	{2,357}	98,586	(19,717)	[4,732]	{2,366}	98,961	(19,792)	[4,750]	{2,375}
Tolland	10,187	10,222	10,234	10,259	10,301	(2,060)	[494]	{247}	10,346	(2,069)	[497]	{248}	10,393	(2,079)	[499]	{249}

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.