

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 7/23/21**

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 7/23/21 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.

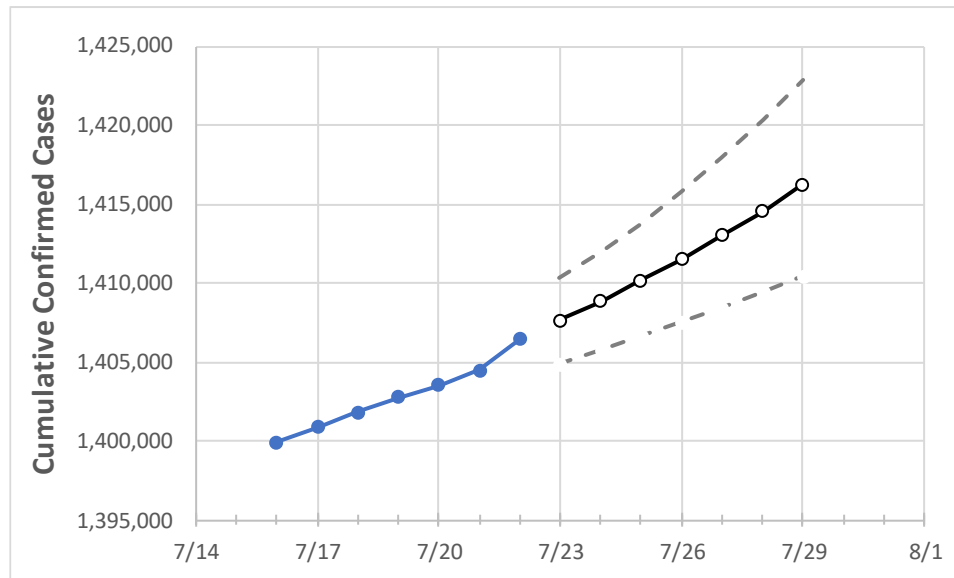
IEM's Modeling Lead

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.

Illinois State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29
Illinois	1,402,763	1,403,508	1,404,466	1,406,459	1,407,617	1,408,851	1,410,146	1,411,530	1,412,998	1,414,557	1,416,224

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.

Illinois Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29
Cook	559,767	559,884	560,155	560,675	561,017	561,378	561,772	562,194	562,638	563,115	563,635
DuPage	93,057	93,095	93,155	93,274	93,324	93,378	93,435	93,496	93,561	93,629	93,702
Kane	59,800	59,811	59,828	59,878	59,901	59,924	59,949	59,974	60,001	60,029	60,058
Lake	68,816	68,841	68,872	68,926	68,965	69,007	69,050	69,097	69,146	69,198	69,254
McHenry	29,377	29,384	29,394	29,423	29,439	29,457	29,475	29,495	29,515	29,537	29,559
Will	77,454	77,483	77,522	77,623	77,671	77,723	77,779	77,839	77,903	77,969	78,040

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.

Illinois Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	7/19	7/20	7/21	7/22	7/24				7/26				7/28			
Cook	559,767	559,884	560,155	560,675	561,378	(112,276)	[26,946]	{13,473}	562,194	(112,439)	[26,985]	{13,493}	563,115	(112,623)	[27,029]	{13,515}
DuPage	93,057	93,095	93,155	93,274	93,378	(18,676)	[4,482]	{2,241}	93,496	(18,699)	[4,488]	{2,244}	93,629	(18,726)	[4,494]	{2,247}
Kane	59,800	59,811	59,828	59,878	59,924	(11,985)	[2,876]	{1,438}	59,974	(11,995)	[2,879]	{1,439}	60,029	(12,006)	[2,881]	{1,441}
Lake	68,816	68,841	68,872	68,926	69,007	(13,801)	[3,312]	{1,656}	69,097	(13,819)	[3,317]	{1,658}	69,198	(13,840)	[3,322]	{1,661}
McHenry	29,377	29,384	29,394	29,423	29,457	(5,891)	[1,414]	{707}	29,495	(5,899)	[1,416]	{708}	29,537	(5,907)	[1,418]	{709}
Will	77,454	77,483	77,522	77,623	77,723	(15,545)	[3,731]	{1,865}	77,839	(15,568)	[3,736]	{1,868}	77,969	(15,594)	[3,743]	{1,871}

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.