

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 9/22/21**

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 9/22/21 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.**

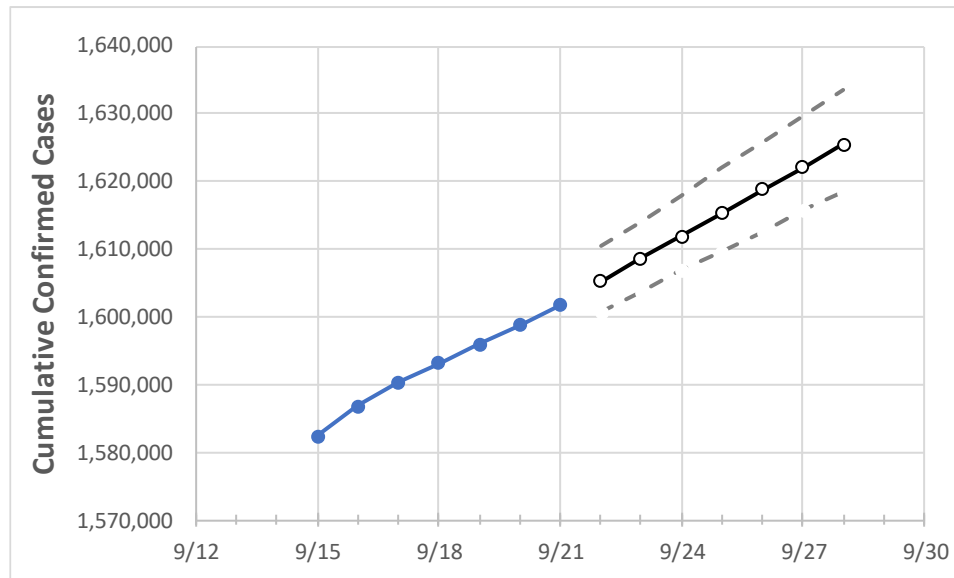
**IEM's Modeling Lead**

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:							
	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	
Illinois	1,593,147	1,595,952	1,598,757	1,601,759	1,605,177	1,608,580	1,611,902	1,615,326	1,618,767	1,622,067	1,625,441	

*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:							
	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	
Cook	610,201	611,027	611,852	612,610	613,533	614,460	615,346	616,229	617,152	618,048	618,939	
DuPage	103,295	103,437	103,580	103,738	103,915	104,090	104,267	104,444	104,616	104,795	104,967	
Kane	65,485	65,572	65,658	65,762	65,864	65,966	66,066	66,165	66,267	66,365	66,464	
Lake	76,605	76,737	76,868	76,969	77,108	77,248	77,383	77,520	77,656	77,794	77,924	
McHenry	32,822	32,872	32,921	32,968	33,034	33,100	33,169	33,231	33,301	33,366	33,432	
Will	86,714	86,847	86,981	87,115	87,275	87,435	87,594	87,757	87,914	88,074	88,235	

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:							
	9/18	9/19	9/20	9/21	9/23		9/25		9/27			
Cook	610,201	611,027	611,852	612,610	614,460	(122,892) [29,494] {14,747}	616,229	(123,246) [29,579] {14,789}	618,048	(123,610) [29,666] {14,833}		
DuPage	103,295	103,437	103,580	103,738	104,090	(20,818) [4,996] {2,498}	104,444	(20,889) [5,013] {2,507}	104,795	(20,959) [5,030] {2,515}		
Kane	65,485	65,572	65,658	65,762	65,966	(13,193) [3,166] {1,583}	66,165	(13,233) [3,176] {1,588}	66,365	(13,273) [3,186] {1,593}		
Lake	76,605	76,737	76,868	76,969	77,248	(15,450) [3,708] {1,854}	77,520	(15,504) [3,721] {1,860}	77,794	(15,559) [3,734] {1,867}		
McHenry	32,822	32,872	32,921	32,968	33,100	(6,620) [1,589] {794}	33,231	(6,646) [1,595] {798}	33,366	(6,673) [1,602] {801}		
Will	86,714	86,847	86,981	87,115	87,435	(17,487) [4,197] {2,098}	87,757	(17,551) [4,212] {2,106}	88,074	(17,615) [4,228] {2,114}		

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966 or Stephanie Tennyson at [stephanie.tennyson@iem.com](mailto:stephanie.tennyson@iem.com) or 202-309-4257.