

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 10/11/21**

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 10/11/21 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.**

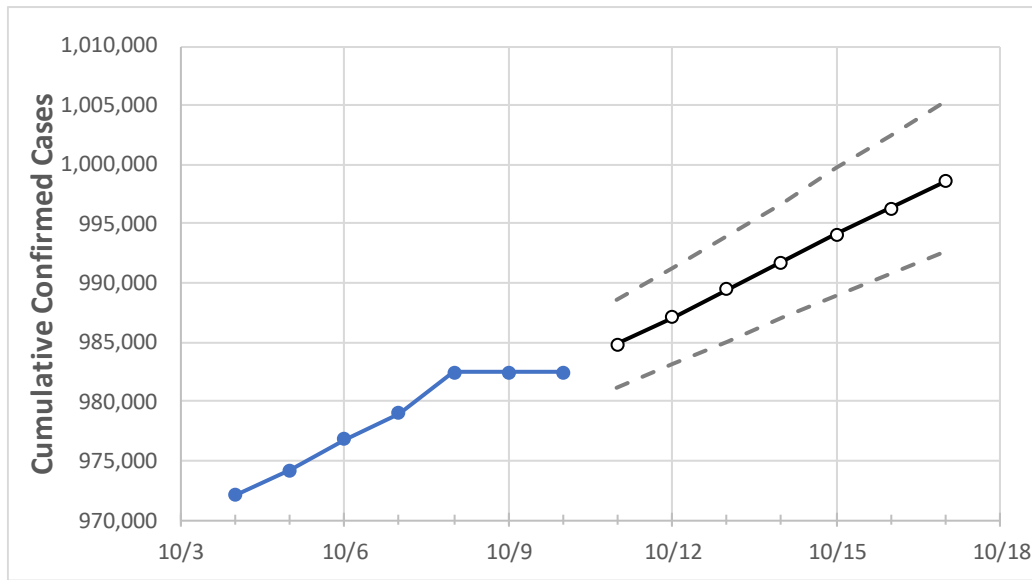
**IEM's Modeling Lead**

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.

## Indiana State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17
Indiana	979,000	982,444	982,444	982,444	984,831	987,119	989,444	991,760	994,080	996,340	998,550

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.

## Indiana Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17
Decatur	4,043	4,046	4,046	4,046	4,057	4,067	4,078	4,088	4,099	4,109	4,119
Hamilton	45,278	45,412	45,412	45,412	45,498	45,586	45,669	45,753	45,840	45,923	46,004
Hendricks	23,235	23,318	23,318	23,318	23,381	23,445	23,507	23,570	23,634	23,695	23,756
Johnson	24,445	24,530	24,530	24,530	24,585	24,639	24,692	24,744	24,797	24,852	24,904
Lake	65,015	65,145	65,145	65,145	65,254	65,360	65,466	65,573	65,679	65,786	65,890
Madison	18,140	18,206	18,206	18,206	18,252	18,299	18,344	18,391	18,437	18,483	18,526
Marion	132,602	132,897	132,897	132,897	133,126	133,352	133,570	133,787	133,994	134,211	134,413
St. Joseph	43,252	43,434	43,434	43,434	43,525	43,620	43,714	43,806	43,900	43,996	44,096

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.

### Indiana Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	10/7	10/8	10/9	10/10	10/12				10/14				10/16			
Decatur	4,043	4,046	4,046	4,046	4,067	(813)	[195]	{98}	4,088	(818)	[196]	{98}	4,109	(822)	[197]	{99}
Hamilton	45,278	45,412	45,412	45,412	45,586	(9,117)	[2,188]	{1,094}	45,753	(9,151)	[2,196]	{1,098}	45,923	(9,185)	[2,204]	{1,102}
Hendricks	23,235	23,318	23,318	23,318	23,445	(4,689)	[1,125]	{563}	23,570	(4,714)	[1,131]	{566}	23,695	(4,739)	[1,137]	{569}
Johnson	24,445	24,530	24,530	24,530	24,639	(4,928)	[1,183]	{591}	24,744	(4,949)	[1,188]	{594}	24,852	(4,970)	[1,193]	{596}
Lake	65,015	65,145	65,145	65,145	65,360	(13,072)	[3,137]	{1,569}	65,573	(13,115)	[3,148]	{1,574}	65,786	(13,157)	[3,158]	{1,579}
Madison	18,140	18,206	18,206	18,206	18,299	(3,660)	[878]	{439}	18,391	(3,678)	[883]	{441}	18,483	(3,697)	[887]	{444}
Marion	132,602	132,897	132,897	132,897	133,352	(26,670)	[6,401]	{3,200}	133,787	(26,757)	[6,422]	{3,211}	134,211	(26,842)	[6,442]	{3,221}
St. Joseph	43,252	43,434	43,434	43,434	43,620	(8,724)	[2,094]	{1,047}	43,806	(8,761)	[2,103]	{1,051}	43,996	(8,799)	[2,112]	{1,056}

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.