

**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.**

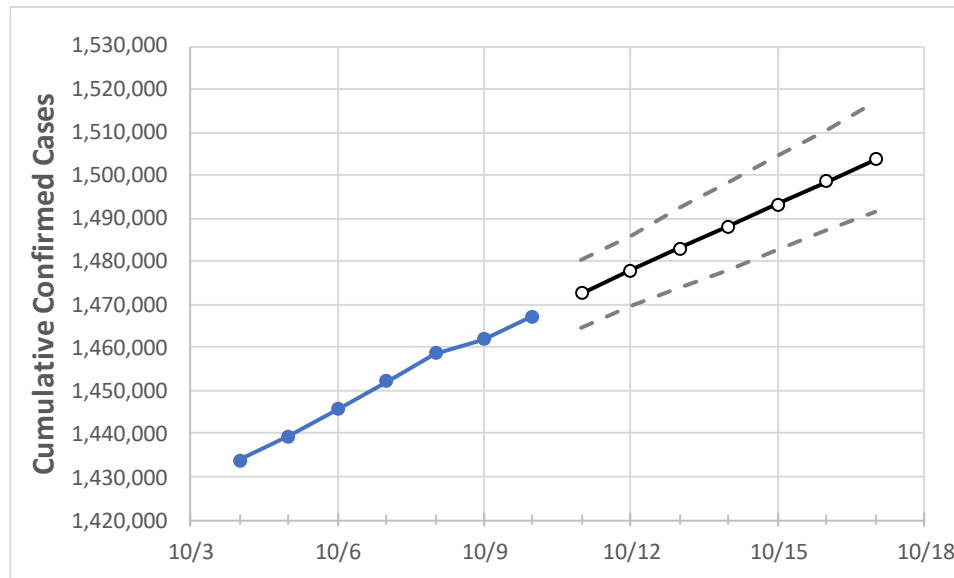
**IEM's Modeling Lead**

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.

## Ohio 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	
Ohio	1,452,096	1,458,747	1,461,932	1,467,331	1,472,658	1,477,881	1,483,071	1,488,272	1,493,367	1,498,593	1,503,621	

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.

## Ohio 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	
Athens	7,466	7,485	7,505	7,531	7,558	7,584	7,609	7,635	7,661	7,686	7,712	
Cuyahoga	140,741	141,227	141,484	142,029	142,444	142,869	143,291	143,710	144,131	144,558	144,978	
Franklin	159,040	159,683	159,913	160,316	160,727	161,133	161,541	161,940	162,340	162,748	163,137	
Hamilton	102,238	102,541	102,702	102,982	103,248	103,515	103,770	104,032	104,289	104,546	104,794	
Lake	25,776	25,876	25,941	26,029	26,118	26,208	26,300	26,392	26,485	26,579	26,672	
Lorain	33,833	34,018	34,093	34,252	34,397	34,544	34,691	34,836	34,983	35,126	35,275	
Lucas	53,746	54,051	54,199	54,427	54,623	54,808	55,004	55,198	55,392	55,585	55,774	
Mahoning	29,061	29,247	29,316	29,465	29,605	29,745	29,885	30,026	30,164	30,307	30,451	
Medina	21,079	21,160	21,194	21,258	21,332	21,405	21,478	21,550	21,621	21,695	21,763	
Miami	14,816	14,893	14,923	14,995	15,058	15,125	15,187	15,252	15,314	15,380	15,444	
Summit	59,139	59,401	59,515	59,760	59,964	60,172	60,375	60,585	60,789	61,001	61,212	

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.

### Ohio 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			
Athens	7,466	7,485	7,505	7,531	7,584	(1,517)	[364]	{182}	7,635	(1,527)	[366]	{183}	7,686	(1,537)	[369]	{184}
Cuyahoga	140,741	141,227	141,484	142,029	142,869	(28,574)	[6,858]	{3,429}	143,710	(28,742)	[6,898]	{3,449}	144,558	(28,912)	[6,939]	{3,469}
Franklin	159,040	159,683	159,913	160,316	161,133	(32,227)	[7,734]	{3,867}	161,940	(32,388)	[7,773]	{3,887}	162,748	(32,550)	[7,812]	{3,906}
Hamilton	102,238	102,541	102,702	102,982	103,515	(20,703)	[4,969]	{2,484}	104,032	(20,806)	[4,994]	{2,497}	104,546	(20,909)	[5,018]	{2,509}
Lake	25,776	25,876	25,941	26,029	26,208	(5,242)	[1,258]	{629}	26,392	(5,278)	[1,267]	{633}	26,579	(5,316)	[1,276]	{638}
Lorain	33,833	34,018	34,093	34,252	34,544	(6,909)	[1,658]	{829}	34,836	(6,967)	[1,672]	{836}	35,126	(7,025)	[1,686]	{843}
Lucas	53,746	54,051	54,199	54,427	54,808	(10,962)	[2,631]	{1,315}	55,198	(11,040)	[2,650]	{1,325}	55,585	(11,117)	[2,668]	{1,334}
Mahoning	29,061	29,247	29,316	29,465	29,745	(5,949)	[1,428]	{714}	30,026	(6,005)	[1,441]	{721}	30,307	(6,061)	[1,455]	{727}
Medina	21,079	21,160	21,194	21,258	21,405	(4,281)	[1,027]	{514}	21,550	(4,310)	[1,034]	{517}	21,695	(4,339)	[1,041]	{521}
Miami	14,816	14,893	14,923	14,995	15,125	(3,025)	[726]	{363}	15,252	(3,050)	[732]	{366}	15,380	(3,076)	[738]	{369}
Summit	59,139	59,401	59,515	59,760	60,172	(12,034)	[2,888]	{1,444}	60,585	(12,117)	[2,908]	{1,454}	61,001	(12,200)	[2,928]	{1,464}

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.