

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 6/30/21**

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 6/30/21 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.**

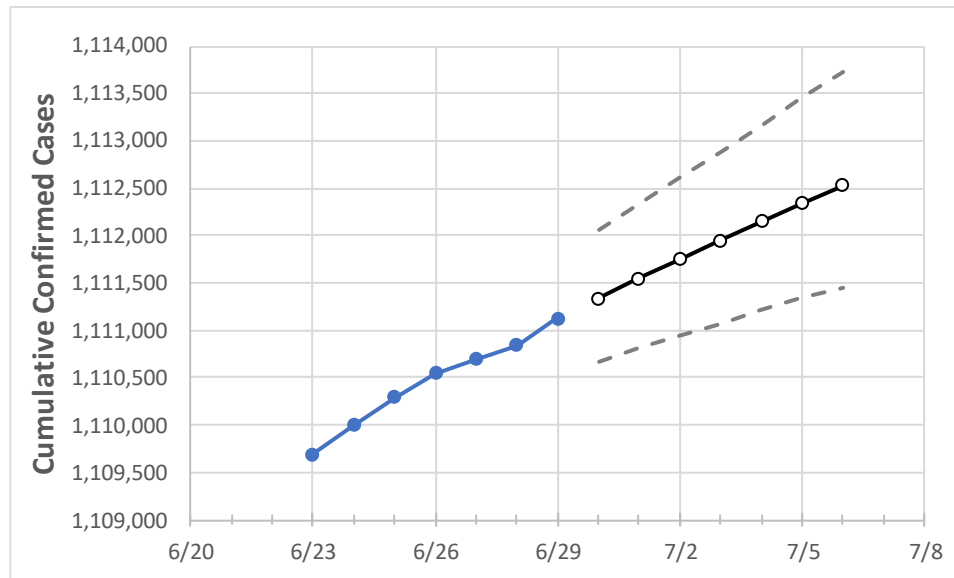
**IEM's Modeling Lead**

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:						
	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6
Ohio	1,110,546	1,110,700	1,110,847	1,111,124	1,111,339	1,111,553	1,111,751	1,111,949	1,112,148	1,112,338	1,112,526

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:						
	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6
Athens	5,247	5,249	5,250	5,250	5,251	5,252	5,254	5,255	5,256	5,257	5,259
Cuyahoga	115,969	115,990	116,000	116,041	116,061	116,080	116,098	116,117	116,134	116,151	116,167
Franklin	129,060	129,083	129,120	129,164	129,203	129,241	129,278	129,316	129,355	129,392	129,428
Hamilton	81,477	81,484	81,490	81,511	81,520	81,528	81,536	81,544	81,552	81,559	81,566
Lake	21,232	21,237	21,238	21,240	21,245	21,249	21,253	21,257	21,261	21,265	21,270
Lorain	25,705	25,707	25,713	25,717	25,721	25,724	25,728	25,731	25,735	25,738	25,741
Lucas	43,414	43,415	43,422	43,437	43,443	43,448	43,454	43,459	43,464	43,469	43,474
Mahoning	22,406	22,409	22,410	22,414	22,418	22,421	22,424	22,427	22,430	22,433	22,436
Medina	15,628	15,631	15,632	15,637	15,639	15,641	15,643	15,644	15,646	15,648	15,649
Miami	10,864	10,867	10,868	10,870	10,872	10,874	10,875	10,877	10,879	10,880	10,882
Summit	48,487	48,491	48,497	48,503	48,510	48,517	48,523	48,529	48,535	48,541	48,546

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:											
	6/26	6/27	6/28	6/29	7/1				7/3				7/5			
Athens	5,247	5,249	5,250	5,250	5,252	(1,050)	[252]	{126}	5,255	(1,051)	[252]	{126}	5,257	(1,051)	[252]	{126}
Cuyahoga	115,969	115,990	116,000	116,041	116,080	(23,216)	[5,572]	{2,786}	116,117	(23,223)	[5,574]	{2,787}	116,151	(23,230)	[5,575]	{2,788}
Franklin	129,060	129,083	129,120	129,164	129,241	(25,848)	[6,204]	{3,102}	129,316	(25,863)	[6,207]	{3,104}	129,392	(25,878)	[6,211]	{3,105}
Hamilton	81,477	81,484	81,490	81,511	81,528	(16,306)	[3,913]	{1,957}	81,544	(16,309)	[3,914]	{1,957}	81,559	(16,312)	[3,915]	{1,957}
Lake	21,232	21,237	21,238	21,240	21,249	(4,250)	[1,020]	{510}	21,257	(4,251)	[1,020]	{510}	21,265	(4,253)	[1,021]	{510}
Lorain	25,705	25,707	25,713	25,717	25,724	(5,145)	[1,235]	{617}	25,731	(5,146)	[1,235]	{618}	25,738	(5,148)	[1,235]	{618}
Lucas	43,414	43,415	43,422	43,437	43,448	(8,690)	[2,086]	{1,043}	43,459	(8,692)	[2,086]	{1,043}	43,469	(8,694)	[2,087]	{1,043}
Mahoning	22,406	22,409	22,410	22,414	22,421	(4,484)	[1,076]	{538}	22,427	(4,485)	[1,077]	{538}	22,433	(4,487)	[1,077]	{538}
Medina	15,628	15,631	15,632	15,637	15,641	(3,128)	[751]	{375}	15,644	(3,129)	[751]	{375}	15,648	(3,130)	[751]	{376}
Miami	10,864	10,867	10,868	10,870	10,874	(2,175)	[522]	{261}	10,877	(2,175)	[522]	{261}	10,880	(2,176)	[522]	{261}
Summit	48,487	48,491	48,497	48,503	48,517	(9,703)	[2,329]	{1,164}	48,529	(9,706)	[2,329]	{1,165}	48,541	(9,708)	[2,330]	{1,165}

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.