

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 10/20/21**

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 10/20/21 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.**

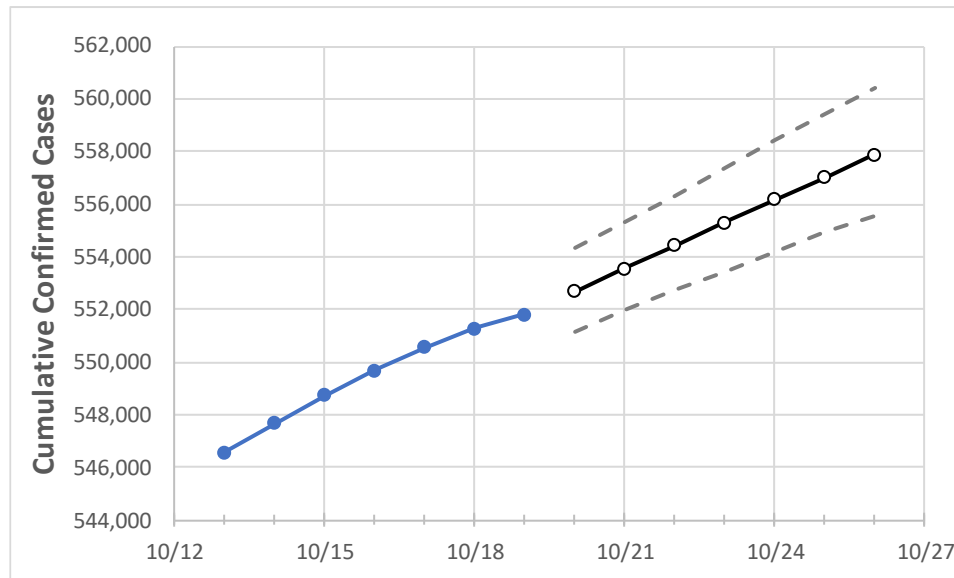
**IEM's Modeling Lead**

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.

## Maryland State Projections



	Actual Confirmed Cases On:						Projected Cases For:					
	10/16	10/17	10/18	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26	
Maryland	549,679	550,550	551,264	551,807	552,702	553,566	554,437	555,302	556,179	557,031	557,872	

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.

## Maryland Counties

	Actual Confirmed Cases On:					Projected Cases For:						
	10/16	10/17	10/18	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26	
Anne Arundel	52,028	52,107	52,143	52,207	52,287	52,365	52,440	52,515	52,593	52,669	52,742	
Baltimore City	60,710	60,812	60,923	60,903	61,000	61,095	61,185	61,279	61,370	61,463	61,555	
Baltimore County	75,550	75,644	75,718	75,812	75,920	76,021	76,123	76,227	76,326	76,428	76,531	
Charles	14,244	14,273	14,287	14,308	14,330	14,353	14,375	14,396	14,418	14,438	14,459	
Frederick	23,779	23,807	23,852	23,886	23,926	23,965	24,006	24,043	24,083	24,124	24,162	
Harford	20,178	20,222	20,280	20,328	20,383	20,437	20,492	20,548	20,601	20,657	20,712	
Howard	22,380	22,401	22,420	22,437	22,462	22,486	22,508	22,532	22,554	22,578	22,599	
Montgomery	81,487	81,557	81,618	81,691	81,769	81,848	81,925	82,004	82,077	82,158	82,230	
Prince George's	98,784	98,855	98,912	98,991	99,097	99,194	99,299	99,398	99,500	99,603	99,705	

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.

### Maryland Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	10/16	10/17	10/18	10/19	10/21				10/23				10/25			
Anne Arundel	52,028	52,107	52,143	52,207	52,365	(10,473)	[2,514]	{1,257}	52,515	(10,503)	[2,521]	{1,260}	52,669	(10,534)	[2,528]	{1,264}
Baltimore City	60,710	60,812	60,923	60,903	61,095	(12,219)	[2,933]	{1,466}	61,279	(12,256)	[2,941]	{1,471}	61,463	(12,293)	[2,950]	{1,475}
Baltimore County	75,550	75,644	75,718	75,812	76,021	(15,204)	[3,649]	{1,825}	76,227	(15,245)	[3,659]	{1,829}	76,428	(15,286)	[3,669]	{1,834}
Charles	14,244	14,273	14,287	14,308	14,353	(2,871)	[689]	{344}	14,396	(2,879)	[691]	{346}	14,438	(2,888)	[693]	{347}
Frederick	23,779	23,807	23,852	23,886	23,965	(4,793)	[1,150]	{575}	24,043	(4,809)	[1,154]	{577}	24,124	(4,825)	[1,158]	{579}
Harford	20,178	20,222	20,280	20,328	20,437	(4,087)	[981]	{490}	20,548	(4,110)	[986]	{493}	20,657	(4,131)	[992]	{496}
Howard	22,380	22,401	22,420	22,437	22,486	(4,497)	[1,079]	{540}	22,532	(4,506)	[1,082]	{541}	22,578	(4,516)	[1,084]	{542}
Montgomery	81,487	81,557	81,618	81,691	81,848	(16,370)	[3,929]	{1,964}	82,004	(16,401)	[3,936]	{1,968}	82,158	(16,432)	[3,944]	{1,972}
Prince George's	98,784	98,855	98,912	98,991	99,194	(19,839)	[4,761]	{2,381}	99,398	(19,880)	[4,771]	{2,386}	99,603	(19,921)	[4,781]	{2,390}

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.