

**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.**

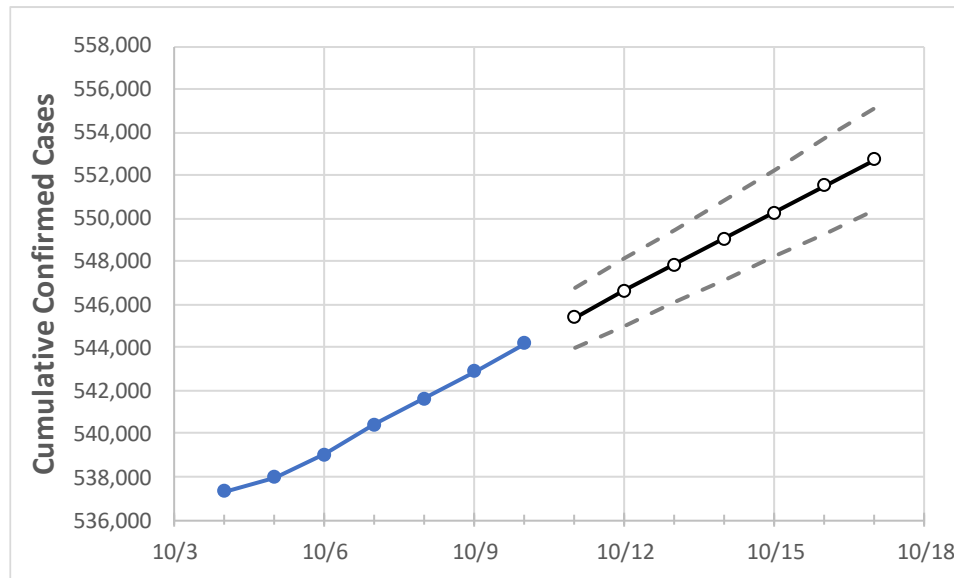
**IEM's Modeling Lead**

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.

## Maryland 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
Maryland	540,451	541,627	542,886	544,219	545,424	546,649	547,873	549,060	550,282	551,518	552,735

*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:						
	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17
Anne Arundel	51,229	51,343	51,458	51,549	51,656	51,762	51,869	51,978	52,084	52,196	52,304
Baltimore City	59,866	60,000	60,063	60,184	60,309	60,431	60,551	60,677	60,804	60,931	61,057
Baltimore County	74,504	74,627	74,809	74,923	75,059	75,199	75,334	75,476	75,614	75,755	75,898
Charles	14,007	14,037	14,085	14,099	14,131	14,163	14,195	14,227	14,259	14,291	14,322
Frederick	23,410	23,462	23,512	23,546	23,594	23,643	23,689	23,738	23,786	23,835	23,883
Harford	19,704	19,764	19,832	19,890	19,946	20,005	20,063	20,123	20,184	20,245	20,307
Howard	22,151	22,173	22,199	22,234	22,272	22,307	22,344	22,379	22,417	22,453	22,489
Montgomery	80,692	80,807	80,918	81,005	81,112	81,218	81,324	81,428	81,535	81,641	81,746
Prince George's	97,622	97,743	98,072	98,159	98,292	98,424	98,558	98,686	98,821	98,958	99,086

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:											
	10/7	10/8	10/9	10/10	10/12				10/14				10/16			
Anne Arundel	51,229	51,343	51,458	51,549	51,762	(10,352)	[2,485]	{1,242}	51,978	(10,396)	[2,495]	{1,247}	52,196	(10,439)	[2,505]	{1,253}
Baltimore City	59,866	60,000	60,063	60,184	60,431	(12,086)	[2,901]	{1,450}	60,677	(12,135)	[2,913]	{1,456}	60,931	(12,186)	[2,925]	{1,462}
Baltimore County	74,504	74,627	74,809	74,923	75,199	(15,040)	[3,610]	{1,805}	75,476	(15,095)	[3,623]	{1,811}	75,755	(15,151)	[3,636]	{1,818}
Charles	14,007	14,037	14,085	14,099	14,163	(2,833)	[680]	{340}	14,227	(2,845)	[683]	{341}	14,291	(2,858)	[686]	{343}
Frederick	23,410	23,462	23,512	23,546	23,643	(4,729)	[1,135]	{567}	23,738	(4,748)	[1,139]	{570}	23,835	(4,767)	[1,144]	{572}
Harford	19,704	19,764	19,832	19,890	20,005	(4,001)	[960]	{480}	20,123	(4,025)	[966]	{483}	20,245	(4,049)	[972]	{486}
Howard	22,151	22,173	22,199	22,234	22,307	(4,461)	[1,071]	{535}	22,379	(4,476)	[1,074]	{537}	22,453	(4,491)	[1,078]	{539}
Montgomery	80,692	80,807	80,918	81,005	81,218	(16,244)	[3,898]	{1,949}	81,428	(16,286)	[3,909]	{1,954}	81,641	(16,328)	[3,919]	{1,959}
Prince George's	97,622	97,743	98,072	98,159	98,424	(19,685)	[4,724]	{2,362}	98,686	(19,737)	[4,737]	{2,368}	98,958	(19,792)	[4,750]	{2,375}

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.