

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 10/13/21**

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 10/13/21 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.**

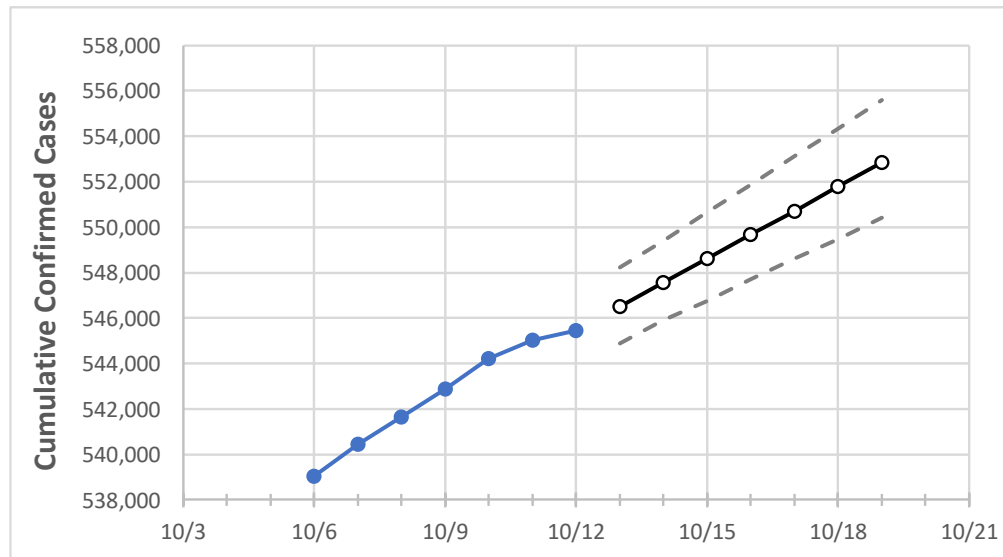
**IEM's Modeling Lead**

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:						
	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19
Maryland	542,886	544,219	545,028	545,439	546,508	547,578	548,627	549,686	550,707	551,798	552,855

*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:						
	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19
Anne Arundel	51,458	51,549	51,608	51,634	51,731	51,827	51,920	52,012	52,108	52,200	52,293
Baltimore City	60,063	60,184	60,287	60,340	60,455	60,568	60,682	60,797	60,914	61,029	61,144
Baltimore County	74,809	74,923	75,013	75,049	75,175	75,301	75,425	75,550	75,677	75,803	75,926
Charles	14,085	14,099	14,110	14,138	14,167	14,197	14,224	14,253	14,282	14,311	14,338
Frederick	23,512	23,546	23,557	23,601	23,645	23,688	23,729	23,773	23,816	23,860	23,901
Harford	19,832	19,890	19,938	19,967	20,019	20,074	20,127	20,180	20,235	20,290	20,345
Howard	22,199	22,234	22,249	22,260	22,291	22,323	22,355	22,386	22,418	22,448	22,479
Montgomery	80,918	81,005	81,028	81,142	81,240	81,337	81,435	81,530	81,625	81,724	81,822
Prince George's	98,072	98,159	98,237	98,360	98,487	98,615	98,741	98,864	98,990	99,115	99,233

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:											
	10/9	10/10	10/11	10/12	10/14				10/16				10/18			
Anne Arundel	51,458	51,549	51,608	51,634	51,827	(10,365)	[2,488]	{1,244}	52,012	(10,402)	[2,497]	{1,248}	52,200	(10,440)	[2,506]	{1,253}
Baltimore City	60,063	60,184	60,287	60,340	60,568	(12,114)	[2,907]	{1,454}	60,797	(12,159)	[2,918]	{1,459}	61,029	(12,206)	[2,929]	{1,465}
Baltimore County	74,809	74,923	75,013	75,049	75,301	(15,060)	[3,614]	{1,807}	75,550	(15,110)	[3,626]	{1,813}	75,803	(15,161)	[3,639]	{1,819}
Charles	14,085	14,099	14,110	14,138	14,197	(2,839)	[681]	{341}	14,253	(2,851)	[684]	{342}	14,311	(2,862)	[687]	{343}
Frederick	23,512	23,546	23,557	23,601	23,688	(4,738)	[1,137]	{569}	23,773	(4,755)	[1,141]	{571}	23,860	(4,772)	[1,145]	{573}
Harford	19,832	19,890	19,938	19,967	20,074	(4,015)	[964]	{482}	20,180	(4,036)	[969]	{484}	20,290	(4,058)	[974]	{487}
Howard	22,199	22,234	22,249	22,260	22,323	(4,465)	[1,071]	{536}	22,386	(4,477)	[1,075]	{537}	22,448	(4,490)	[1,078]	{539}
Montgomery	80,918	81,005	81,028	81,142	81,337	(16,267)	[3,904]	{1,952}	81,530	(16,306)	[3,913]	{1,957}	81,724	(16,345)	[3,923]	{1,961}
Prince George's	98,072	98,159	98,237	98,360	98,615	(19,723)	[4,733]	{2,367}	98,864	(19,773)	[4,745]	{2,373}	99,115	(19,823)	[4,758]	{2,379}

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.