

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 8/25/21**

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 8/25/21 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.**

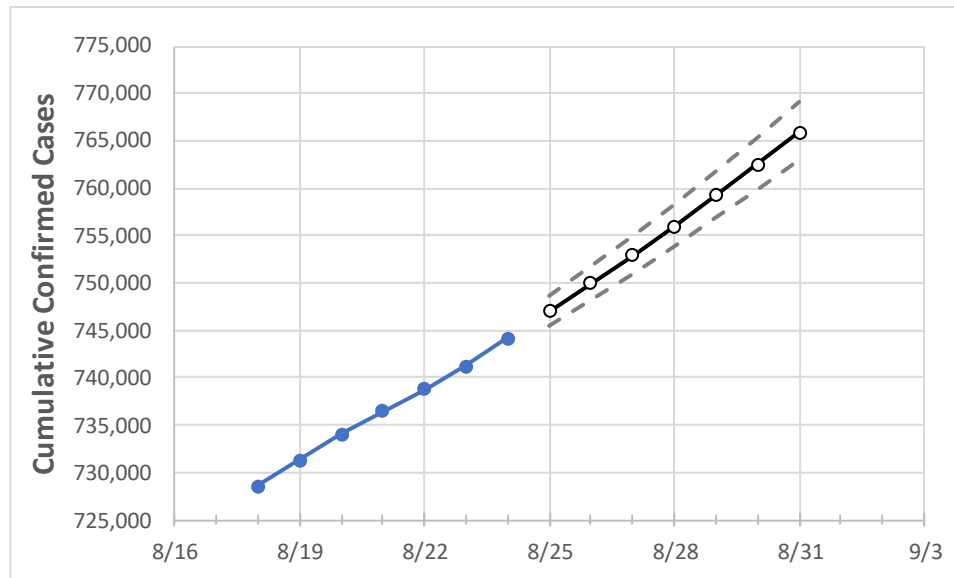
**IEM's Modeling Lead**

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.

## Virginia State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31
Virginia	736,439	738,800	741,160	744,187	747,030	749,940	752,939	756,033	759,199	762,476	765,851

Note: The Commonwealth'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.

## Virginia Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31
Alexandria City	12,599	12,620	12,654	12,684	12,712	12,741	12,769	12,799	12,830	12,861	12,893
Arlington	16,297	16,327	16,362	16,415	16,454	16,494	16,534	16,575	16,617	16,659	16,702
Fairfax	82,449	82,600	82,757	83,011	83,208	83,407	83,610	83,820	84,040	84,258	84,487
Henrico	28,250	28,361	28,473	28,592	28,713	28,835	28,963	29,094	29,229	29,367	29,510
James City	5,250	5,274	5,299	5,323	5,358	5,392	5,429	5,467	5,506	5,547	5,590
Loudoun	29,770	29,833	29,902	29,995	30,065	30,138	30,210	30,287	30,364	30,444	30,526
Prince William	53,910	53,983	54,113	54,283	54,401	54,524	54,647	54,773	54,903	55,041	55,176
Virginia Beach City	40,371	40,538	40,706	40,981	41,210	41,442	41,685	41,931	42,192	42,454	42,732

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.

### Virginia Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	8/21	8/22	8/23	8/24	8/26				8/28				8/30			
Alexandria City	12,599	12,620	12,654	12,684	12,741	(2,548)	[612]	{306}	12,799	(2,560)	[614]	{307}	12,861	(2,572)	[617]	{309}
Arlington	16,297	16,327	16,362	16,415	16,494	(3,299)	[792]	{396}	16,575	(3,315)	[796]	{398}	16,659	(3,332)	[800]	{400}
Fairfax	82,449	82,600	82,757	83,011	83,407	(16,681)	[4,004]	{2,002}	83,820	(16,764)	[4,023]	{2,012}	84,258	(16,852)	[4,044]	{2,022}
Henrico	28,250	28,361	28,473	28,592	28,835	(5,767)	[1,384]	{692}	29,094	(5,819)	[1,397]	{698}	29,367	(5,873)	[1,410]	{705}
James City	5,250	5,274	5,299	5,323	5,392	(1,078)	[259]	{129}	5,467	(1,093)	[262]	{131}	5,547	(1,109)	[266]	{133}
Loudoun	29,770	29,833	29,902	29,995	30,138	(6,028)	[1,447]	{723}	30,287	(6,057)	[1,454]	{727}	30,444	(6,089)	[1,461]	{731}
Prince William	53,910	53,983	54,113	54,283	54,524	(10,905)	[2,617]	{1,309}	54,773	(10,955)	[2,629]	{1,315}	55,041	(11,008)	[2,642]	{1,321}
Virginia Beach City	40,371	40,538	40,706	40,981	41,442	(8,288)	[1,989]	{995}	41,931	(8,386)	[2,013]	{1,006}	42,454	(8,491)	[2,038]	{1,019}

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.