

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 10/4/21**

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 10/4/21 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.**

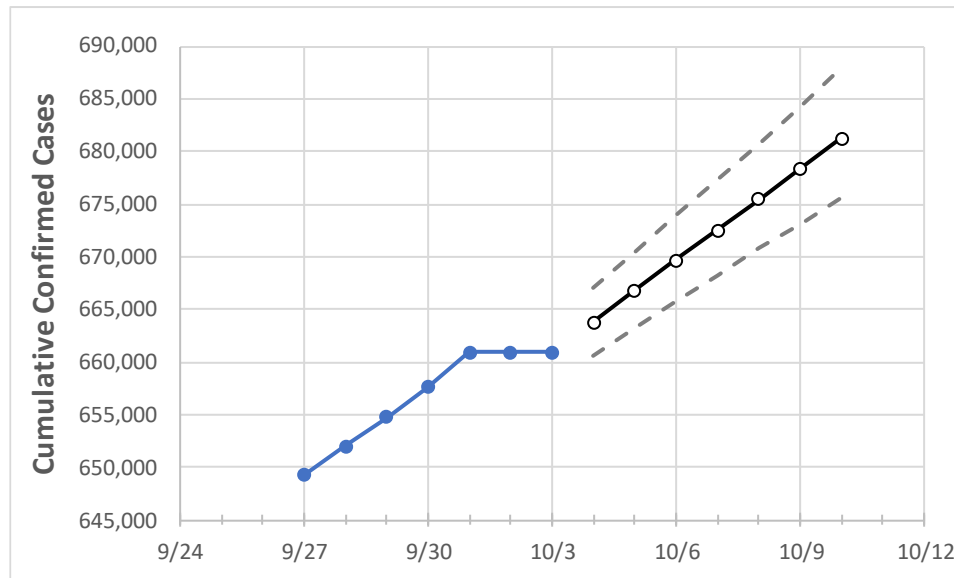
**IEM's Modeling Lead**

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.

## Washington State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	9/30	10/1	10/2	10/3	10/4	10/5	10/6	10/7	10/8	10/9	10/10
Washington	657,626	660,910	660,910	660,910	663,811	666,804	669,640	672,539	675,428	678,365	681,268

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.

## Washington Counties

	Actual Confirmed Cases On:				Projected Cases For:							
	9/30	10/1	10/2	10/3	10/4	10/5	10/6	10/7	10/8	10/9	10/10	
Benton	29,192	29,328	29,328	29,328	29,455	29,580	29,700	29,820	29,946	30,065	30,186	
Clark	37,484	37,651	37,651	37,651	37,821	37,990	38,158	38,331	38,503	38,678	38,850	
Grant	14,365	14,458	14,458	14,458	14,532	14,606	14,679	14,754	14,829	14,903	14,976	
Island	3,446	3,476	3,476	3,476	3,508	3,539	3,572	3,606	3,639	3,674	3,709	
King	151,467	152,022	152,022	152,022	152,499	152,977	153,447	153,930	154,374	154,861	155,322	
Kitsap	14,998	15,105	15,105	15,105	15,199	15,291	15,385	15,474	15,567	15,658	15,753	
Pierce	83,560	83,884	83,884	83,884	84,260	84,641	85,016	85,392	85,765	86,148	86,523	
Skagit	9,497	9,579	9,579	9,579	9,646	9,713	9,779	9,849	9,918	9,986	10,058	
Snohomish	59,052	59,338	59,338	59,338	59,597	59,862	60,118	60,381	60,644	60,909	61,175	
Spokane	65,555	65,838	65,838	65,838	66,110	66,381	66,653	66,925	67,187	67,463	67,729	
Thurston	18,121	18,221	18,221	18,221	18,337	18,453	18,568	18,687	18,804	18,925	19,046	
Whatcom	14,606	14,682	14,682	14,682	14,748	14,816	14,883	14,950	15,019	15,086	15,152	
Yakima	40,605	40,863	40,863	40,863	41,004	41,143	41,284	41,423	41,559	41,704	41,839	

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.

### Washington Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	9/30	10/1	10/2	10/3	10/5				10/7				10/9			
Benton	29,192	29,328	29,328	29,328	29,580	(5,916)	[1,420]	{710}	29,820	(5,964)	[1,431]	{716}	30,065	(6,013)	[1,443]	{722}
Clark	37,484	37,651	37,651	37,651	37,990	(7,598)	[1,824]	{912}	38,331	(7,666)	[1,840]	{920}	38,678	(7,736)	[1,857]	{928}
Grant	14,365	14,458	14,458	14,458	14,606	(2,921)	[701]	{351}	14,754	(2,951)	[708]	{354}	14,903	(2,981)	[715]	{358}
Island	3,446	3,476	3,476	3,476	3,539	(708)	[170]	{85}	3,606	(721)	[173]	{87}	3,674	(735)	[176]	{88}
King	151,467	152,022	152,022	152,022	152,977	(30,595)	[7,343]	{3,671}	153,930	(30,786)	[7,389]	{3,694}	154,861	(30,972)	[7,433]	{3,717}
Kitsap	14,998	15,105	15,105	15,105	15,291	(3,058)	[734]	{367}	15,474	(3,095)	[743]	{371}	15,658	(3,132)	[752]	{376}
Pierce	83,560	83,884	83,884	83,884	84,641	(16,928)	[4,063]	{2,031}	85,392	(17,078)	[4,099]	{2,049}	86,148	(17,230)	[4,135]	{2,068}
Skagit	9,497	9,579	9,579	9,579	9,713	(1,943)	[466]	{233}	9,849	(1,970)	[473]	{236}	9,986	(1,997)	[479]	{240}
Snohomish	59,052	59,338	59,338	59,338	59,862	(11,972)	[2,873]	{1,437}	60,381	(12,076)	[2,898]	{1,449}	60,909	(12,182)	[2,924]	{1,462}
Spokane	65,555	65,838	65,838	65,838	66,381	(13,276)	[3,186]	{1,593}	66,925	(13,385)	[3,212]	{1,606}	67,463	(13,493)	[3,238]	{1,619}
Thurston	18,121	18,221	18,221	18,221	18,453	(3,691)	[886]	{443}	18,687	(3,737)	[897]	{448}	18,925	(3,785)	[908]	{454}
Whatcom	14,606	14,682	14,682	14,682	14,816	(2,963)	[711]	{356}	14,950	(2,990)	[718]	{359}	15,086	(3,017)	[724]	{362}
Yakima	40,605	40,863	40,863	40,863	41,143	(8,229)	[1,975]	{987}	41,423	(8,285)	[1,988]	{994}	41,704	(8,341)	[2,002]	{1,001}

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.