

## **IEM's AI Modeling: Short-term COVID-19 Projections**

**Date: 7/30/21**

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 7/30/21 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.**

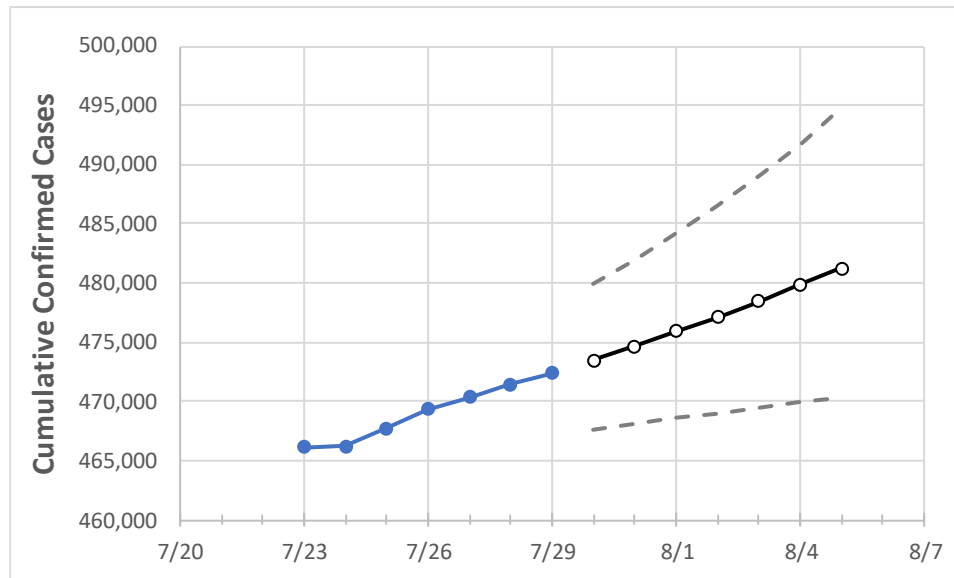
### **IEM's Modeling Lead**

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:						
	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5
Washington	469,308	470,333	471,489	472,362	473,510	474,663	475,902	477,118	478,475	479,850	481,279

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:						
	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5
Benton	19,161	19,266	19,417	19,483	19,618	19,766	19,925	20,093	20,269	20,453	20,653
Clark	26,814	26,890	26,932	26,992	27,059	27,131	27,207	27,288	27,372	27,464	27,561
Grant	10,033	10,041	10,051	10,059	10,068	10,078	10,088	10,098	10,108	10,119	10,131
Island	2,026	2,034	2,040	2,042	2,051	2,061	2,070	2,080	2,091	2,102	2,113
King	116,154	116,313	116,569	116,760	117,012	117,273	117,549	117,836	118,133	118,446	118,763
Kitsap	9,223	9,252	9,258	9,273	9,298	9,325	9,352	9,380	9,409	9,439	9,472
Pierce	59,066	59,183	59,329	59,443	59,598	59,762	59,927	60,102	60,286	60,482	60,680
Skagit	6,242	6,253	6,273	6,283	6,302	6,321	6,341	6,363	6,387	6,412	6,438
Snohomish	42,433	42,528	42,643	42,712	42,855	42,998	43,146	43,309	43,478	43,656	43,826
Spokane	48,363	48,463	48,553	48,612	48,705	48,801	48,900	48,999	49,103	49,217	49,334
Thurston	11,753	11,785	11,818	11,849	11,887	11,926	11,968	12,011	12,056	12,101	12,148
Whatcom	10,228	10,256	10,291	10,319	10,346	10,377	10,408	10,441	10,476	10,513	10,552
Yakima	31,515	31,546	31,582	31,609	31,652	31,697	31,742	31,788	31,836	31,884	31,933

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:											
	7/26	7/27	7/28	7/29	7/31				8/2				8/4			
Benton	19,161	19,266	19,417	19,483	19,766	(3,953)	[949]	{474}	20,093	(4,019)	[964]	{482}	20,453	(4,091)	[982]	{491}
Clark	26,814	26,890	26,932	26,992	27,131	(5,426)	[1,302]	{651}	27,288	(5,458)	[1,310]	{655}	27,464	(5,493)	[1,318]	{659}
Grant	10,033	10,041	10,051	10,059	10,078	(2,016)	[484]	{242}	10,098	(2,020)	[485]	{242}	10,119	(2,024)	[486]	{243}
Island	2,026	2,034	2,040	2,042	2,061	(412)	[99]	{49}	2,080	(416)	[100]	{50}	2,102	(420)	[101]	{50}
King	116,154	116,313	116,569	116,760	117,273	(23,455)	[5,629]	{2,815}	117,836	(23,567)	[5,656]	{2,828}	118,446	(23,689)	[5,685]	{2,843}
Kitsap	9,223	9,252	9,258	9,273	9,325	(1,865)	[448]	{224}	9,380	(1,876)	[450]	{225}	9,439	(1,888)	[453]	{227}
Pierce	59,066	59,183	59,329	59,443	59,762	(11,952)	[2,869]	{1,434}	60,102	(12,020)	[2,885]	{1,442}	60,482	(12,096)	[2,903]	{1,452}
Skagit	6,242	6,253	6,273	6,283	6,321	(1,264)	[303]	{152}	6,363	(1,273)	[305]	{153}	6,412	(1,282)	[308]	{154}
Snohomish	42,433	42,528	42,643	42,712	42,998	(8,600)	[2,064]	{1,032}	43,309	(8,662)	[2,079]	{1,039}	43,656	(8,731)	[2,095]	{1,048}
Spokane	48,363	48,463	48,553	48,612	48,801	(9,760)	[2,342]	{1,171}	48,999	(9,800)	[2,352]	{1,176}	49,217	(9,843)	[2,362]	{1,181}
Thurston	11,753	11,785	11,818	11,849	11,926	(2,385)	[572]	{286}	12,011	(2,402)	[577]	{288}	12,101	(2,420)	[581]	{290}
Whatcom	10,228	10,256	10,291	10,319	10,377	(2,075)	[498]	{249}	10,441	(2,088)	[501]	{251}	10,513	(2,103)	[505]	{252}
Yakima	31,515	31,546	31,582	31,609	31,697	(6,339)	[1,521]	{761}	31,788	(6,358)	[1,526]	{763}	31,884	(6,377)	[1,530]	{765}

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.