

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 9/10/20**

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 20%, and are often within 10%, of actual confirmed cases.

The projections shown in this document are based on data pulled in as of 9/10/20 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.**

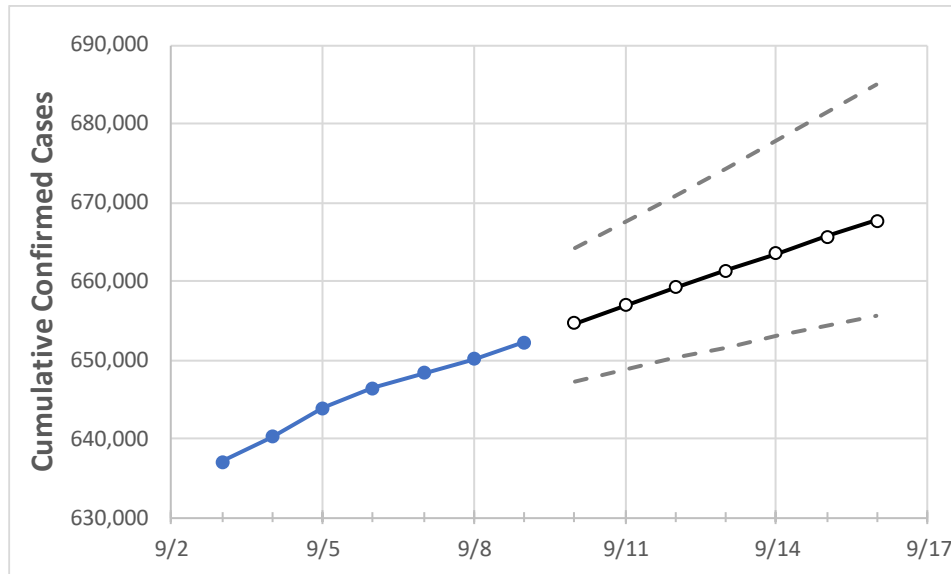
**IEM's Modeling Lead**

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.

## Florida State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15	9/16
Florida	646,431	648,269	650,092	652,259	654,625	656,934	659,187	661,387	663,534	665,629	667,674

*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 20%, and are often within 10%, of actual confirmed cases.*

## Florida Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15	9/16
Alachua	5,582	5,633	5,722	5,812	5,864	5,917	5,971	6,027	6,084	6,143	6,203
Broward	73,293	73,426	73,556	73,696	73,838	73,974	74,102	74,224	74,340	74,450	74,555
Charlotte	2,793	2,811	2,822	2,821	2,836	2,851	2,865	2,880	2,894	2,908	2,922
Collier	11,994	12,024	12,049	12,071	12,096	12,120	12,144	12,166	12,188	12,209	12,230
Duval	27,635	27,734	27,802	27,886	28,001	28,115	28,227	28,340	28,451	28,561	28,671
Hillsborough	38,426	38,545	38,652	38,790	38,937	39,082	39,223	39,363	39,499	39,633	39,764
Lake	6,787	6,824	6,841	6,871	6,903	6,934	6,965	6,994	7,023	7,051	7,078
Lee	19,134	19,176	19,210	19,241	19,280	19,317	19,352	19,385	19,417	19,447	19,476
Manatee	10,656	10,673	10,699	10,729	10,750	10,770	10,790	10,809	10,827	10,844	10,861
Miami-Dade	161,363	161,637	162,026	162,433	162,756	163,062	163,352	163,626	163,886	164,131	164,364
Okaloosa	4,382	4,410	4,428	4,461	4,490	4,519	4,548	4,578	4,607	4,636	4,666
Orange	37,074	37,152	37,247	37,366	37,473	37,575	37,675	37,770	37,862	37,951	38,036
Osceola	11,517	11,542	11,560	11,594	11,627	11,660	11,690	11,720	11,749	11,776	11,803
Palm Beach	43,067	43,187	43,309	43,422	43,526	43,625	43,721	43,814	43,903	43,989	44,072
Pasco	8,316	8,338	8,357	8,381	8,405	8,429	8,452	8,474	8,495	8,515	8,535
Pinellas	20,425	20,474	20,526	20,588	20,651	20,714	20,776	20,838	20,899	20,959	21,019
Polk	17,799	17,863	17,932	18,025	18,130	18,234	18,338	18,441	18,544	18,647	18,750
Sarasota	7,410	7,434	7,457	7,486	7,513	7,541	7,568	7,595	7,621	7,648	7,674
Seminole	8,361	8,382	8,412	8,437	8,467	8,497	8,526	8,555	8,583	8,610	8,637
St. Johns	4,634	4,675	4,699	4,729	4,772	4,818	4,864	4,913	4,963	5,016	5,070
Sumter	2,042	2,048	2,049	2,060	2,070	2,081	2,091	2,100	2,110	2,119	2,128
Volusia	9,772	9,816	9,862	9,878	9,920	9,961	10,001	10,040	10,079	10,117	10,154

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.

### Florida Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	9/6	9/7	9/8	9/9	9/11				9/13				9/15			
Alachua	5,582	5,633	5,722	5,812	5,917	(1,183)	[284]	{142}	6,027	(1,205)	[289]	{145}	6,143	(1,229)	[295]	{147}
Broward	73,293	73,426	73,556	73,696	73,974	(14,795)	[3,551]	{1,775}	74,224	(14,845)	[3,563]	{1,781}	74,450	(14,890)	[3,574]	{1,787}
Charlotte	2,793	2,811	2,822	2,821	2,851	(570)	[137]	{68}	2,880	(576)	[138]	{69}	2,908	(582)	[140]	{70}
Collier	11,994	12,024	12,049	12,071	12,120	(2,424)	[582]	{291}	12,166	(2,433)	[584]	{292}	12,209	(2,442)	[586]	{293}
Duval	27,635	27,734	27,802	27,886	28,115	(5,623)	[1,349]	{675}	28,340	(5,668)	[1,360]	{680}	28,561	(5,712)	[1,371]	{685}
Hillsborough	38,426	38,545	38,652	38,790	39,082	(7,816)	[1,876]	{938}	39,363	(7,873)	[1,889]	{945}	39,633	(7,927)	[1,902]	{951}
Lake	6,787	6,824	6,841	6,871	6,934	(1,387)	[333]	{166}	6,994	(1,399)	[336]	{168}	7,051	(1,410)	[338]	{169}
Lee	19,134	19,176	19,210	19,241	19,317	(3,863)	[927]	{464}	19,385	(3,877)	[930]	{465}	19,447	(3,889)	[933]	{467}
Manatee	10,656	10,673	10,699	10,729	10,770	(2,154)	[517]	{258}	10,809	(2,162)	[519]	{259}	10,844	(2,169)	[521]	{260}
Miami-Dade	161,363	161,637	162,026	162,433	163,062	(32,612)	[7,827]	{3,913}	163,626	(32,725)	[7,854]	{3,927}	164,131	(32,826)	[7,878]	{3,939}
Okaloosa	4,382	4,410	4,428	4,461	4,519	(904)	[217]	{108}	4,578	(916)	[220]	{110}	4,636	(927)	[223]	{111}
Orange	37,074	37,152	37,247	37,366	37,575	(7,515)	[1,804]	{902}	37,770	(7,554)	[1,813]	{906}	37,951	(7,590)	[1,822]	{911}
Osceola	11,517	11,542	11,560	11,594	11,660	(2,332)	[560]	{280}	11,720	(2,344)	[563]	{281}	11,776	(2,355)	[565]	{283}
Palm Beach	43,067	43,187	43,309	43,422	43,625	(8,725)	[2,094]	{1,047}	43,814	(8,763)	[2,103]	{1,052}	43,989	(8,798)	[2,111]	{1,056}
Pasco	8,316	8,338	8,357	8,381	8,429	(1,686)	[405]	{202}	8,474	(1,695)	[407]	{203}	8,515	(1,703)	[409]	{204}
Pinellas	20,425	20,474	20,526	20,588	20,714	(4,143)	[994]	{497}	20,838	(4,168)	[1,000]	{500}	20,959	(4,192)	[1,006]	{503}
Polk	17,799	17,863	17,932	18,025	18,234	(3,647)	[875]	{438}	18,441	(3,688)	[885]	{443}	18,647	(3,729)	[895]	{448}
Sarasota	7,410	7,434	7,457	7,486	7,541	(1,508)	[362]	{181}	7,595	(1,519)	[365]	{182}	7,648	(1,530)	[367]	{184}
Seminole	8,361	8,382	8,412	8,437	8,497	(1,699)	[408]	{204}	8,555	(1,711)	[411]	{205}	8,610	(1,722)	[413]	{207}
St. Johns	4,634	4,675	4,699	4,729	4,818	(964)	[231]	{116}	4,913	(983)	[236]	{118}	5,016	(1,003)	[241]	{120}
Sumter	2,042	2,048	2,049	2,060	2,081	(416)	[100]	{50}	2,100	(420)	[101]	{50}	2,119	(424)	[102]	{51}
Volusia	9,772	9,816	9,862	9,878	9,961	(1,992)	[478]	{239}	10,040	(2,008)	[482]	{241}	10,117	(2,023)	[486]	{243}

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.