

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

**Date: 3/2/22**

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 3/2/22 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.**

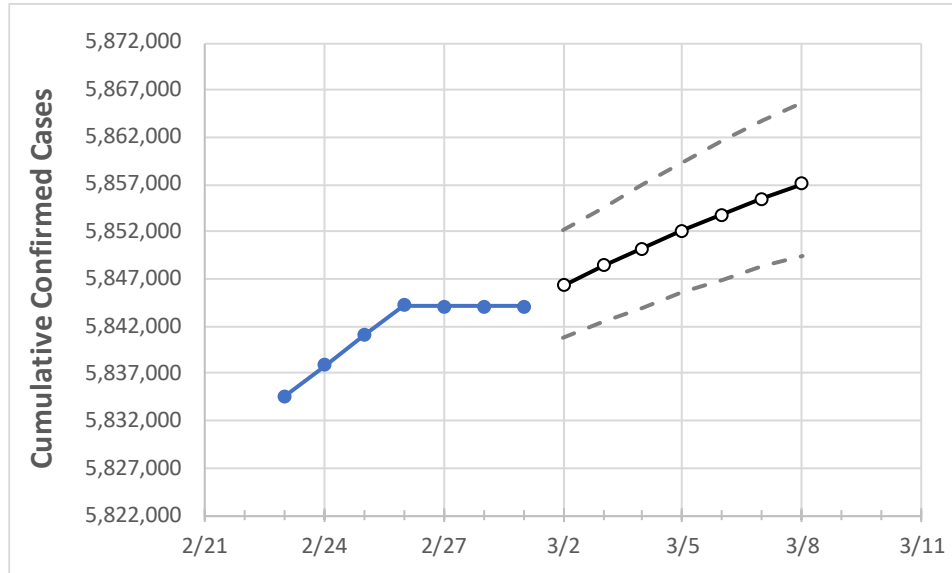
### **IEM's Modeling Lead**

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:							
	2/26	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	
Florida	5,844,229	5,844,163	5,844,096	5,844,096	5,846,287	5,848,396	5,850,204	5,852,120	5,853,843	5,855,520	5,857,064	

*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.*

## Florida Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	2/26	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8
Alachua	67,390	67,390	67,390	67,390	67,429	67,465	67,500	67,534	67,565	67,594	67,624
Broward	598,603	598,603	598,603	598,603	598,731	598,856	598,966	599,071	599,179	599,270	599,357
Charlotte	35,311	35,311	35,311	35,311	35,339	35,366	35,391	35,415	35,437	35,459	35,480
Collier	84,025	84,025	84,025	84,025	84,061	84,094	84,124	84,155	84,183	84,210	84,237
Duval	252,188	252,188	252,188	252,188	252,275	252,358	252,433	252,506	252,575	252,640	252,699
Hillsborough	372,296	372,296	372,296	372,296	372,569	372,840	373,096	373,344	373,576	373,806	374,019
Lake	84,442	84,442	84,442	84,442	84,493	84,541	84,585	84,628	84,670	84,709	84,747
Lee	189,298	189,298	189,298	189,298	189,393	189,488	189,572	189,659	189,734	189,811	189,880
Manatee	95,225	95,225	95,225	95,225	95,266	95,305	95,341	95,374	95,408	95,438	95,467
Miami-Dade	1,176,706	1,176,706	1,176,706	1,176,706	1,176,971	1,177,202	1,177,432	1,177,641	1,177,837	1,178,036	1,178,212
Okaloosa	51,273	51,273	51,273	51,273	51,291	51,310	51,326	51,341	51,357	51,371	51,383
Orange	373,962	373,962	373,962	373,962	374,139	374,302	374,462	374,607	374,752	374,887	375,012
Osceola	113,011	113,011	113,011	113,011	113,065	113,116	113,164	113,211	113,255	113,299	113,337
Palm Beach	365,203	365,203	365,203	365,203	365,312	365,416	365,514	365,610	365,696	365,780	365,860
Pasco	121,129	121,129	121,129	121,129	121,188	121,243	121,294	121,344	121,392	121,435	121,475
Pinellas	208,177	208,177	208,177	208,177	208,298	208,409	208,518	208,620	208,719	208,812	208,906
Polk	198,867	198,867	198,867	198,867	198,951	199,028	199,102	199,172	199,237	199,301	199,361
Sarasota	89,894	89,894	89,894	89,894	89,963	90,026	90,086	90,143	90,200	90,255	90,302
Seminole	102,807	102,807	102,807	102,807	102,849	102,888	102,924	102,960	102,994	103,026	103,056
St. Johns	62,619	62,619	62,619	62,619	62,638	62,655	62,671	62,688	62,702	62,716	62,729
Sumter	21,454	21,454	21,454	21,454	21,475	21,496	21,514	21,533	21,550	21,568	21,584
Volusia	116,204	116,204	116,204	116,204	116,255	116,306	116,353	116,397	116,441	116,482	116,519

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:											
	2/26	2/27	2/28	3/1	3/3			3/5			3/7					
Alachua	67,390	67,390	67,390	67,390	67,465	(13,493)	[3,238]	{1,619}	67,534	(13,507)	[3,242]	{1,621}	67,594	(13,519)	[3,245]	{1,622}
Broward	598,603	598,603	598,603	598,603	598,856	(119,771)	[28,745]	{14,373}	599,071	(119,814)	[28,755]	{14,378}	599,270	(119,854)	[28,765]	{14,382}
Charlotte	35,311	35,311	35,311	35,311	35,366	(7,073)	[1,698]	{849}	35,415	(7,083)	[1,700]	{850}	35,459	(7,092)	[1,702]	{851}
Collier	84,025	84,025	84,025	84,025	84,094	(16,819)	[4,037]	{2,018}	84,155	(16,831)	[4,039]	{2,020}	84,210	(16,842)	[4,042]	{2,021}
Duval	252,188	252,188	252,188	252,188	252,358	(50,472)	[12,113]	{6,057}	252,506	(50,501)	[12,120]	{6,060}	252,640	(50,528)	[12,127]	{6,063}
Hillsborough	372,296	372,296	372,296	372,296	372,840	(74,568)	[17,896]	{8,948}	373,344	(74,669)	[17,921]	{8,960}	373,806	(74,761)	[17,943]	{8,971}
Lake	84,442	84,442	84,442	84,442	84,541	(16,908)	[4,058]	{2,029}	84,628	(16,926)	[4,062]	{2,031}	84,709	(16,942)	[4,066]	{2,033}
Lee	189,298	189,298	189,298	189,298	189,488	(37,898)	[9,095]	{4,548}	189,659	(37,932)	[9,104]	{4,552}	189,811	(37,962)	[9,111]	{4,555}
Manatee	95,225	95,225	95,225	95,225	95,305	(19,061)	[4,575]	{2,287}	95,374	(19,075)	[4,578]	{2,289}	95,438	(19,088)	[4,581]	{2,291}
Miami-Dade	1,176,706	1,176,706	1,176,706	1,176,706	1,177,202	(235,440)	[56,506]	{28,253}	1,177,641	(235,528)	[56,527]	{28,263}	1,178,036	(235,607)	[56,546]	{28,273}
Okaloosa	51,273	51,273	51,273	51,273	51,310	(10,262)	[2,463]	{1,231}	51,341	(10,268)	[2,464]	{1,232}	51,371	(10,274)	[2,466]	{1,233}
Orange	373,962	373,962	373,962	373,962	374,302	(74,860)	[17,966]	{8,983}	374,607	(74,921)	[17,981]	{8,991}	374,887	(74,977)	[17,995]	{8,997}
Osceola	113,011	113,011	113,011	113,011	113,116	(22,623)	[5,430]	{2,715}	113,211	(22,642)	[5,434]	{2,717}	113,299	(22,660)	[5,438]	{2,719}
Palm Beach	365,203	365,203	365,203	365,203	365,416	(73,083)	[17,540]	{8,770}	365,610	(73,122)	[17,549]	{8,775}	365,780	(73,156)	[17,557]	{8,779}
Pasco	121,129	121,129	121,129	121,129	121,243	(24,249)	[5,820]	{2,910}	121,344	(24,269)	[5,825]	{2,912}	121,435	(24,287)	[5,829]	{2,914}
Pinellas	208,177	208,177	208,177	208,177	208,409	(41,682)	[10,004]	{5,002}	208,620	(41,724)	[10,014]	{5,007}	208,812	(41,762)	[10,023]	{5,011}
Polk	198,867	198,867	198,867	198,867	199,028	(39,806)	[9,553]	{4,777}	199,172	(39,834)	[9,560]	{4,780}	199,301	(39,860)	[9,566]	{4,783}
Sarasota	89,894	89,894	89,894	89,894	90,026	(18,005)	[4,321]	{2,161}	90,143	(18,029)	[4,327]	{2,163}	90,255	(18,051)	[4,332]	{2,166}
Seminole	102,807	102,807	102,807	102,807	102,888	(20,578)	[4,939]	{2,469}	102,960	(20,592)	[4,942]	{2,471}	103,026	(20,605)	[4,945]	{2,473}
St. Johns	62,619	62,619	62,619	62,619	62,655	(12,531)	[3,007]	{1,504}	62,688	(12,538)	[3,009]	{1,505}	62,716	(12,543)	[3,010]	{1,505}
Sumter	21,454	21,454	21,454	21,454	21,496	(4,299)	[1,032]	{516}	21,533	(4,307)	[1,034]	{517}	21,568	(4,314)	[1,035]	{518}
Volusia	116,204	116,204	116,204	116,204	116,306	(23,261)	[5,583]	{2,791}	116,397	(23,279)	[5,587]	{2,794}	116,482	(23,296)	[5,591]	{2,796}

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.