

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 2/18/21**

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 2/18/21 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.**

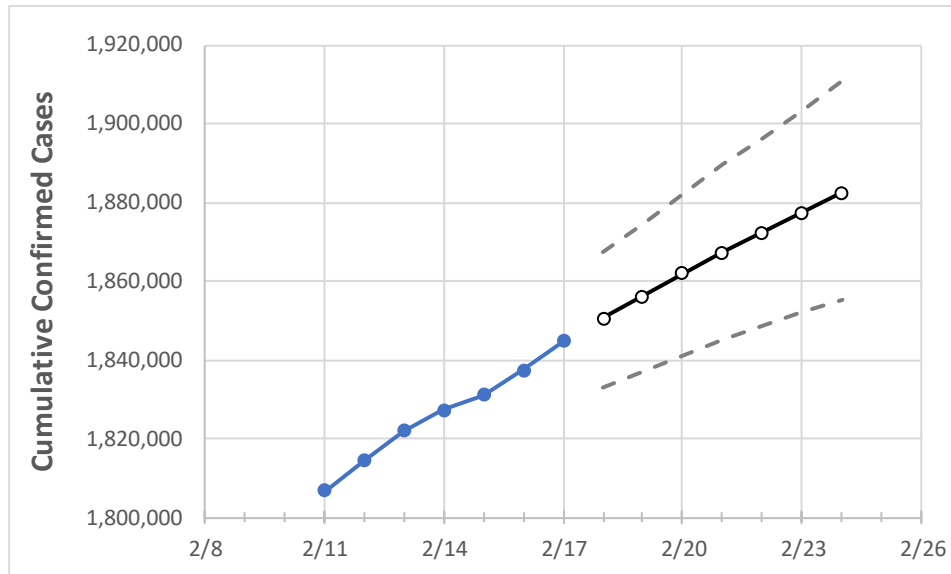
**IEM's Modeling Lead**

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.

## Florida State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22	2/23	2/24
Florida	1,827,373	1,830,988	1,837,285	1,844,627	1,850,496	1,856,213	1,861,899	1,867,295	1,872,434	1,877,495	1,882,561

*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:						
	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22	2/23	2/24
Alachua	21,791	21,830	21,887	21,960	22,005	22,047	22,088	22,125	22,160	22,194	22,226
Broward	184,773	185,310	186,063	186,831	187,567	188,289	189,004	189,686	190,353	191,000	191,657
Charlotte	10,280	10,322	10,346	10,393	10,429	10,465	10,501	10,535	10,570	10,604	10,638
Collier	29,136	29,195	29,250	29,347	29,415	29,482	29,548	29,611	29,673	29,734	29,793
Duval	86,163	86,283	86,562	86,872	87,104	87,337	87,564	87,784	87,999	88,204	88,410
Hillsborough	106,420	106,661	106,996	107,513	107,865	108,204	108,547	108,870	109,199	109,524	109,836
Lake	23,442	23,498	23,587	23,655	23,733	23,809	23,881	23,948	24,011	24,077	24,140
Lee	55,513	55,652	55,830	56,006	56,159	56,306	56,450	56,590	56,725	56,858	56,986
Manatee	30,333	30,384	30,557	30,737	30,852	30,968	31,083	31,198	31,309	31,419	31,534
Miami-Dade	393,971	394,492	395,828	397,226	398,434	399,623	400,802	401,970	403,117	404,195	405,262
Okaloosa	17,927	17,983	18,024	18,063	18,108	18,152	18,193	18,234	18,272	18,309	18,342
Orange	109,453	109,650	110,124	110,518	110,860	111,198	111,525	111,845	112,152	112,446	112,745
Osceola	35,394	35,429	35,576	35,689	35,780	35,873	35,961	36,043	36,121	36,202	36,277
Palm Beach	114,467	114,800	115,145	115,794	116,239	116,684	117,114	117,534	117,953	118,356	118,742
Pasco	31,631	31,744	31,872	32,036	32,157	32,277	32,395	32,512	32,629	32,741	32,853
Pinellas	63,171	63,326	63,568	63,871	64,070	64,269	64,465	64,649	64,831	65,015	65,188
Polk	54,435	54,573	54,829	55,058	55,287	55,509	55,729	55,941	56,149	56,350	56,554
Sarasota	25,982	26,011	26,071	26,193	26,253	26,312	26,369	26,427	26,477	26,528	26,576
Seminole	25,821	25,879	26,025	26,142	26,250	26,356	26,462	26,566	26,669	26,769	26,870
St. Johns	19,532	19,568	19,610	19,660	19,708	19,752	19,795	19,836	19,874	19,913	19,949
Sumter	7,597	7,608	7,634	7,668	7,690	7,711	7,732	7,751	7,770	7,787	7,804
Volusia	33,264	33,308	33,092	33,295	33,425	33,549	33,676	33,797	33,919	34,038	34,157

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:											
	2/14	2/15	2/16	2/17	2/19				2/21				2/23			
Alachua	21,791	21,830	21,887	21,960	22,047	(4,409)	[1,058]	{529}	22,125	(4,425)	[1,062]	{531}	22,194	(4,439)	[1,065]	{533}
Broward	184,773	185,310	186,063	186,831	188,289	(37,658)	[9,038]	{4,519}	189,686	(37,937)	[9,105]	{4,552}	191,000	(38,200)	[9,168]	{4,584}
Charlotte	10,280	10,322	10,346	10,393	10,465	(2,093)	[502]	{251}	10,535	(2,107)	[506]	{253}	10,604	(2,121)	[509]	{254}
Collier	29,136	29,195	29,250	29,347	29,482	(5,896)	[1,415]	{708}	29,611	(5,922)	[1,421]	{711}	29,734	(5,947)	[1,427]	{714}
Duval	86,163	86,283	86,562	86,872	87,337	(17,467)	[4,192]	{2,096}	87,784	(17,557)	[4,214]	{2,107}	88,204	(17,641)	[4,234]	{2,117}
Hillsborough	106,420	106,661	106,996	107,513	108,204	(21,641)	[5,194]	{2,597}	108,870	(21,774)	[5,226]	{2,613}	109,524	(21,905)	[5,257]	{2,629}
Lake	23,442	23,498	23,587	23,655	23,809	(4,762)	[1,143]	{571}	23,948	(4,790)	[1,149]	{575}	24,077	(4,815)	[1,156]	{578}
Lee	55,513	55,652	55,830	56,006	56,306	(11,261)	[2,703]	{1,351}	56,590	(11,318)	[2,716]	{1,358}	56,858	(11,372)	[2,729]	{1,365}
Manatee	30,333	30,384	30,557	30,737	30,968	(6,194)	[1,486]	{743}	31,198	(6,240)	[1,498]	{749}	31,419	(6,284)	[1,508]	{754}
Miami-Dade	393,971	394,492	395,828	397,226	399,623	(79,925)	[19,182]	{9,591}	401,970	(80,394)	[19,295]	{9,647}	404,195	(80,839)	[19,401]	{9,701}
Okaloosa	17,927	17,983	18,024	18,063	18,152	(3,630)	[871]	{436}	18,234	(3,647)	[875]	{438}	18,309	(3,662)	[879]	{439}
Orange	109,453	109,650	110,124	110,518	111,198	(22,240)	[5,337]	{2,669}	111,845	(22,369)	[5,369]	{2,684}	112,446	(22,489)	[5,397]	{2,699}
Osceola	35,394	35,429	35,576	35,689	35,873	(7,175)	[1,722]	{861}	36,043	(7,209)	[1,730]	{865}	36,202	(7,240)	[1,738]	{869}
Palm Beach	114,467	114,800	115,145	115,794	116,684	(23,337)	[5,601]	{2,800}	117,534	(23,507)	[5,642]	{2,821}	118,356	(23,671)	[5,681]	{2,841}
Pasco	31,631	31,744	31,872	32,036	32,277	(6,455)	[1,549]	{775}	32,512	(6,502)	[1,561]	{780}	32,741	(6,548)	[1,572]	{786}
Pinellas	63,171	63,326	63,568	63,871	64,269	(12,854)	[3,085]	{1,542}	64,649	(12,930)	[3,103]	{1,552}	65,015	(13,003)	[3,121]	{1,560}
Polk	54,435	54,573	54,829	55,058	55,509	(11,102)	[2,664]	{1,332}	55,941	(11,188)	[2,685]	{1,343}	56,350	(11,270)	[2,705]	{1,352}
Sarasota	25,982	26,011	26,071	26,193	26,312	(5,262)	[1,263]	{631}	26,427	(5,285)	[1,268]	{634}	26,528	(5,306)	[1,273]	{637}
Seminole	25,821	25,879	26,025	26,142	26,356	(5,271)	[1,265]	{633}	26,566	(5,313)	[1,275]	{638}	26,769	(5,354)	[1,285]	{642}
St. Johns	19,532	19,568	19,610	19,660	19,752	(3,950)	[948]	{474}	19,836	(3,967)	[952]	{476}	19,913	(3,983)	[956]	{478}
Sumter	7,597	7,608	7,634	7,668	7,711	(1,542)	[370]	{185}	7,751	(1,550)	[372]	{186}	7,787	(1,557)	[374]	{187}
Volusia	33,264	33,308	33,092	33,295	33,549	(6,710)	[1,610]	{805}	33,797	(6,759)	[1,622]	{811}	34,038	(6,808)	[1,634]	{817}

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.