

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 11/3/20**

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 10%, and are often within 5%, of actual confirmed cases.

The projections shown in this document are based on data pulled in as of 11/3/20 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.**

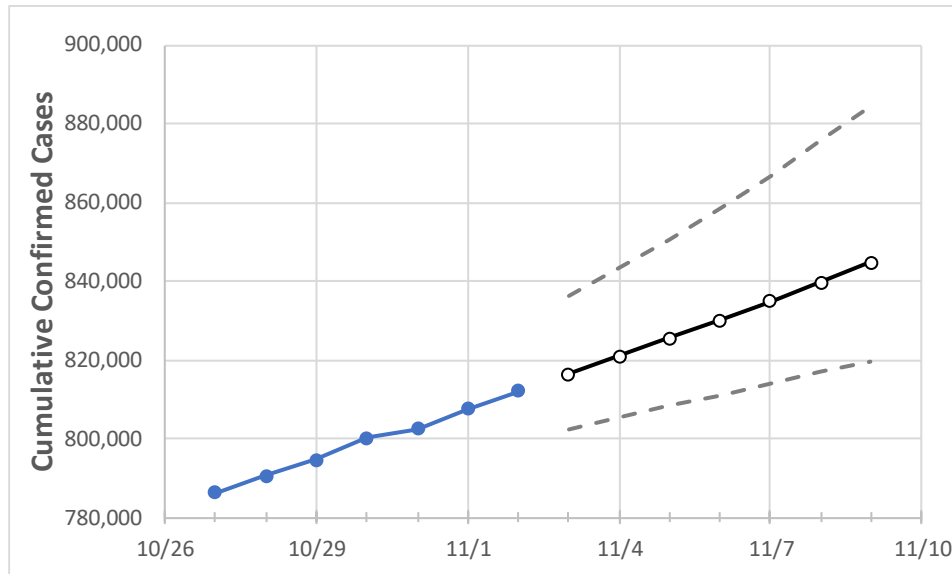
**IEM's Modeling Lead**

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:						
	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9
Florida	800,216	802,547	807,412	812,063	816,410	820,861	825,419	830,085	834,864	839,757	844,768

*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:						
	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9
Alachua	10,533	10,582	10,706	10,760	10,849	10,940	11,032	11,126	11,222	11,319	11,417
Broward	86,091	86,235	86,961	87,456	88,001	88,571	89,167	89,790	90,441	91,122	91,833
Charlotte	3,689	3,715	3,741	3,773	3,809	3,847	3,886	3,928	3,971	4,017	4,064
Collier	14,542	14,587	14,664	14,742	14,831	14,924	15,019	15,117	15,219	15,324	15,432
Duval	35,171	35,256	35,429	35,806	35,993	36,184	36,379	36,578	36,781	36,988	37,199
Hillsborough	48,148	48,287	48,669	48,925	49,167	49,413	49,663	49,918	50,176	50,439	50,707
Lake	8,662	8,680	8,729	8,785	8,827	8,869	8,913	8,956	9,000	9,045	9,090
Lee	23,517	23,589	23,685	23,834	23,983	24,135	24,291	24,452	24,617	24,786	24,960
Manatee	13,403	13,463	13,550	13,699	13,794	13,892	13,994	14,100	14,209	14,323	14,441
Miami-Dade	185,552	185,891	186,809	187,757	188,446	189,152	189,875	190,617	191,376	192,155	192,952
Okaloosa	6,473	6,499	6,545	6,590	6,645	6,701	6,757	6,814	6,872	6,931	6,991
Orange	46,424	46,434	46,725	46,986	47,168	47,350	47,532	47,714	47,895	48,076	48,257
Osceola	14,252	14,287	14,380	14,474	14,549	14,625	14,702	14,782	14,862	14,945	15,029
Palm Beach	52,184	52,447	52,779	53,151	53,536	53,943	54,373	54,826	55,305	55,811	56,344
Pasco	10,923	10,972	11,063	11,147	11,217	11,288	11,362	11,437	11,514	11,593	11,675
Pinellas	25,921	25,986	26,214	26,339	26,499	26,662	26,827	26,996	27,168	27,343	27,521
Polk	23,088	23,164	23,306	23,405	23,513	23,623	23,733	23,844	23,956	24,069	24,182
Sarasota	9,706	9,745	9,811	9,966	10,033	10,102	10,172	10,243	10,316	10,391	10,467
Seminole	10,357	10,411	10,470	10,512	10,570	10,630	10,691	10,754	10,819	10,886	10,954
St. Johns	6,564	6,599	6,639	6,720	6,778	6,837	6,898	6,961	7,025	7,092	7,160
Sumter	2,928	2,945	2,960	2,967	2,979	2,990	3,001	3,013	3,024	3,035	3,046
Volusia	12,876	12,927	13,008	13,089	13,175	13,262	13,352	13,443	13,536	13,631	13,728

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:											
	10/30	10/31	11/1	11/2	11/4			11/6			11/8					
Alachua	10,533	10,582	10,706	10,760	10,940	(2,188)	{525}	{263}	11,126	(2,225)	{534}	{267}	11,319	(2,264)	{543}	{272}
Broward	86,091	86,235	86,961	87,456	88,571	(17,714)	{4,251}	{2,126}	89,790	(17,958)	{4,310}	{2,155}	91,122	(18,224)	{4,374}	{2,187}
Charlotte	3,689	3,715	3,741	3,773	3,847	(769)	{185}	{92}	3,928	(786)	{189}	{94}	4,017	(803)	{193}	{96}
Collier	14,542	14,587	14,664	14,742	14,924	(2,985)	{716}	{358}	15,117	(3,023)	{726}	{363}	15,324	(3,065)	{736}	{368}
Duval	35,171	35,256	35,429	35,806	36,184	(7,237)	{1,737}	{868}	36,578	(7,316)	{1,756}	{878}	36,988	(7,398)	{1,775}	{888}
Hillsborough	48,148	48,287	48,669	48,925	49,413	(9,883)	{2,372}	{1,186}	49,918	(9,984)	{2,396}	{1,198}	50,439	(10,088)	{2,421}	{1,211}
Lake	8,662	8,680	8,729	8,785	8,869	(1,774)	{426}	{213}	8,956	(1,791)	{430}	{215}	9,045	(1,809)	{434}	{217}
Lee	23,517	23,589	23,685	23,834	24,135	(4,827)	{1,158}	{579}	24,452	(4,890)	{1,174}	{587}	24,786	(4,957)	{1,190}	{595}
Manatee	13,403	13,463	13,550	13,699	13,892	(2,778)	{667}	{333}	14,100	(2,820)	{677}	{338}	14,323	(2,865)	{688}	{344}
Miami-Dade	185,552	185,891	186,809	187,757	189,152	(37,830)	{9,079}	{4,540}	190,617	(38,123)	{9,150}	{4,575}	192,155	(38,431)	{9,223}	{4,612}
Okaloosa	6,473	6,499	6,545	6,590	6,701	(1,340)	{322}	{161}	6,814	(1,363)	{327}	{164}	6,931	(1,386)	{333}	{166}
Orange	46,424	46,434	46,725	46,986	47,350	(9,470)	{2,273}	{1,136}	47,714	(9,543)	{2,290}	{1,145}	48,076	(9,615)	{2,308}	{1,154}
Osceola	14,252	14,287	14,380	14,474	14,625	(2,925)	{702}	{351}	14,782	(2,956)	{710}	{355}	14,945	(2,989)	{717}	{359}
Palm Beach	52,184	52,447	52,779	53,151	53,943	(10,789)	{2,589}	{1,295}	54,826	(10,965)	{2,632}	{1,316}	55,811	(11,162)	{2,679}	{1,339}
Pasco	10,923	10,972	11,063	11,147	11,288	(2,258)	{542}	{271}	11,437	(2,287)	{549}	{274}	11,593	(2,319)	{556}	{278}
Pinellas	25,921	25,986	26,214	26,339	26,662	(5,332)	{1,280}	{640}	26,996	(5,399)	{1,296}	{648}	27,343	(5,469)	{1,312}	{656}
Polk	23,088	23,164	23,306	23,405	23,623	(4,725)	{1,134}	{567}	23,844	(4,769)	{1,145}	{572}	24,069	(4,814)	{1,155}	{578}
Sarasota	9,706	9,745	9,811	9,966	10,102	(2,020)	{485}	{242}	10,243	(2,049)	{492}	{246}	10,391	(2,078)	{499}	{249}
Seminole	10,357	10,411	10,470	10,512	10,630	(2,126)	{510}	{255}	10,754	(2,151)	{516}	{258}	10,886	(2,177)	{523}	{261}
St. Johns	6,564	6,599	6,639	6,720	6,837	(1,367)	{328}	{164}	6,961	(1,392)	{334}	{167}	7,092	(1,418)	{340}	{170}
Sumter	2,928	2,945	2,960	2,967	2,990	(598)	{144}	{72}	3,013	(603)	{145}	{72}	3,035	(607)	{146}	{73}
Volusia	12,876	12,927	13,008	13,089	13,262	(2,652)	{637}	{318}	13,443	(2,689)	{645}	{323}	13,631	(2,726)	{654}	{327}

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.