

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 12/10/20**

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

The projections shown in this document are based on data pulled in as of 12/10/20 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.**

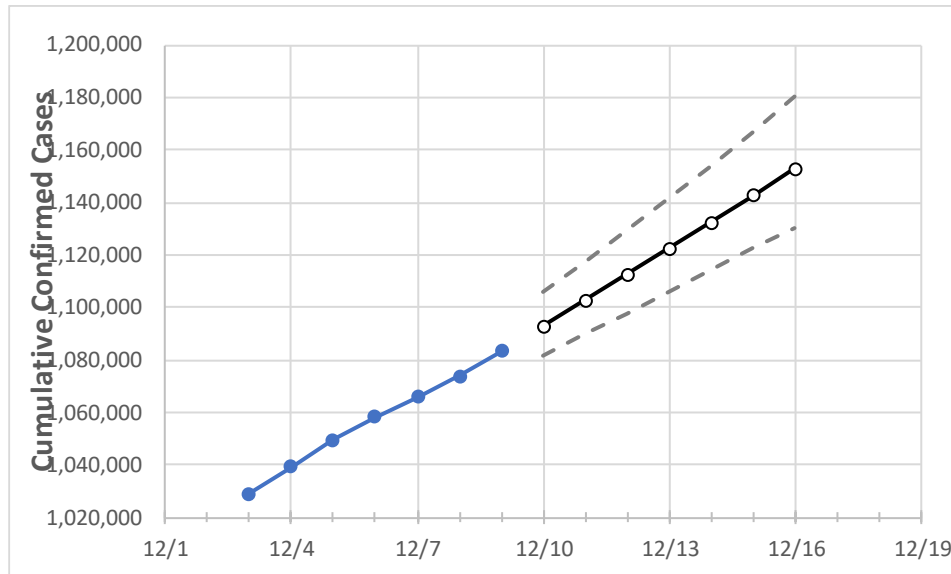
**IEM's Modeling Lead**

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:							
	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14	12/15	12/16	
Florida	1,058,074	1,065,785	1,073,770	1,083,362	1,092,899	1,102,566	1,112,364	1,122,296	1,132,362	1,142,565	1,152,906	

*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:						
	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14	12/15	12/16
Alachua	13,382	13,479	13,567	13,649	13,733	13,819	13,906	13,995	14,085	14,176	14,269
Broward	113,634	114,426	115,414	116,428	117,489	118,570	119,671	120,792	121,935	123,098	124,283
Charlotte	5,527	5,593	5,652	5,746	5,822	5,899	5,979	6,060	6,144	6,230	6,318
Collier	18,926	19,026	19,133	19,351	19,510	19,673	19,840	20,011	20,186	20,365	20,549
Duval	47,036	47,418	47,818	48,250	48,737	49,230	49,729	50,235	50,747	51,266	51,790
Hillsborough	61,276	61,599	62,149	62,439	62,894	63,355	63,823	64,298	64,780	65,269	65,765
Lake	11,183	11,301	11,524	11,638	11,754	11,874	11,999	12,127	12,260	12,398	12,540
Lee	32,209	32,476	32,790	33,132	33,476	33,827	34,183	34,546	34,916	35,292	35,675
Manatee	17,713	17,800	18,008	18,182	18,331	18,481	18,634	18,788	18,945	19,103	19,263
Miami-Dade	243,050	245,064	246,915	249,043	251,295	253,575	255,884	258,221	260,588	262,983	265,408
Okaloosa	9,776	9,870	10,072	10,204	10,324	10,447	10,574	10,705	10,839	10,977	11,119
Orange	61,474	62,041	60,291	61,055	61,632	62,220	62,820	63,431	64,055	64,691	65,339
Osceola	19,625	19,809	20,277	20,545	20,790	21,043	21,304	21,573	21,851	22,138	22,434
Palm Beach	68,912	69,331	69,855	70,314	70,846	71,383	71,924	72,469	73,019	73,574	74,133
Pasco	16,153	16,338	16,543	16,716	16,927	17,143	17,364	17,589	17,818	18,053	18,293
Pinellas	34,899	35,202	35,505	35,883	36,193	36,508	36,827	37,152	37,481	37,815	38,154
Polk	29,135	29,362	29,734	29,938	30,224	30,522	30,831	31,153	31,487	31,834	32,195
Sarasota	14,753	14,862	15,024	15,168	15,316	15,464	15,612	15,759	15,906	16,052	16,198
Seminole	13,642	13,770	14,456	14,603	14,769	14,941	15,119	15,305	15,497	15,697	15,905
St. Johns	9,542	9,620	9,722	9,852	9,971	10,093	10,216	10,341	10,468	10,598	10,729
Sumter	3,716	3,745	3,802	3,844	3,890	3,938	3,990	4,044	4,101	4,161	4,225
Volusia	17,388	17,498	17,720	17,875	18,024	18,173	18,324	18,475	18,626	18,779	18,932

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:											
	12/6	12/7	12/8	12/9	12/11				12/13				12/15			
Alachua	13,382	13,479	13,567	13,649	13,819	(2,764)	[663]	{332}	13,995	(2,799)	[672]	{336}	14,176	(2,835)	[680]	{340}
Broward	113,634	114,426	115,414	116,428	118,570	(23,714)	[5,691]	{2,846}	120,792	(24,158)	[5,798]	{2,899}	123,098	(24,620)	[5,909]	{2,954}
Charlotte	5,527	5,593	5,652	5,746	5,899	(1,180)	[283]	{142}	6,060	(1,212)	[291]	{145}	6,230	(1,246)	[299]	{150}
Collier	18,926	19,026	19,133	19,351	19,673	(3,935)	[944]	{472}	20,011	(4,002)	[961]	{480}	20,365	(4,073)	[978]	{489}
Duval	47,036	47,418	47,818	48,250	49,230	(9,846)	[2,363]	{1,182}	50,235	(10,047)	[2,411]	{1,206}	51,266	(10,253)	[2,461]	{1,230}
Hillsborough	61,276	61,599	62,149	62,439	63,355	(12,671)	[3,041]	{1,521}	64,298	(12,860)	[3,086]	{1,543}	65,269	(13,054)	[3,133]	{1,566}
Lake	11,183	11,301	11,524	11,638	11,874	(2,375)	[570]	{285}	12,127	(2,425)	[582]	{291}	12,398	(2,480)	[595]	{298}
Lee	32,209	32,476	32,790	33,132	33,827	(6,765)	[1,624]	{812}	34,546	(6,909)	[1,658]	{829}	35,292	(7,058)	[1,694]	{847}
Manatee	17,713	17,800	18,008	18,182	18,481	(3,696)	[887]	{444}	18,788	(3,758)	[902]	{451}	19,103	(3,821)	[917]	{458}
Miami-Dade	243,050	245,064	246,915	249,043	253,575	(50,715)	[12,172]	{6,086}	258,221	(51,644)	[12,395]	{6,197}	262,983	(52,597)	[12,623]	{6,312}
Okaloosa	9,776	9,870	10,072	10,204	10,447	(2,089)	[501]	{251}	10,705	(2,141)	[514]	{257}	10,977	(2,195)	[527]	{263}
Orange	61,474	62,041	60,291	61,055	62,220	(12,444)	[2,987]	{1,493}	63,431	(12,686)	[3,045]	{1,522}	64,691	(12,938)	[3,105]	{1,553}
Osceola	19,625	19,809	20,277	20,545	21,043	(4,209)	[1,010]	{505}	21,573	(4,315)	[1,036]	{518}	22,138	(4,428)	[1,063]	{531}
Palm Beach	68,912	69,331	69,855	70,314	71,383	(14,277)	[3,426]	{1,713}	72,469	(14,494)	[3,479]	{1,739}	73,574	(14,715)	[3,532]	{1,766}
Pasco	16,153	16,338	16,543	16,716	17,143	(3,429)	[823]	{411}	17,589	(3,518)	[844]	{422}	18,053	(3,611)	[867]	{433}
Pinellas	34,899	35,202	35,505	35,883	36,508	(7,302)	[1,752]	{876}	37,152	(7,430)	[1,783]	{892}	37,815	(7,563)	[1,815]	{908}
Polk	29,135	29,362	29,734	29,938	30,522	(6,104)	[1,465]	{733}	31,153	(6,231)	[1,495]	{748}	31,834	(6,367)	[1,528]	{764}
Sarasota	14,753	14,862	15,024	15,168	15,464	(3,093)	[742]	{371}	15,759	(3,152)	[756]	{378}	16,052	(3,210)	[771]	{385}
Seminole	13,642	13,770	14,456	14,603	14,941	(2,988)	[717]	{359}	15,305	(3,061)	[735]	{367}	15,697	(3,139)	[753]	{377}
St. Johns	9,542	9,620	9,722	9,852	10,093	(2,019)	[484]	{242}	10,341	(2,068)	[496]	{248}	10,598	(2,120)	[509]	{254}
Sumter	3,716	3,745	3,802	3,844	3,938	(788)	[189]	{95}	4,044	(809)	[194]	{97}	4,161	(832)	[200]	{100}
Volusia	17,388	17,498	17,720	17,875	18,173	(3,635)	[872]	{436}	18,475	(3,695)	[887]	{443}	18,779	(3,756)	[901]	{451}

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.