

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 12/1/21**

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 12/1/21 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.**

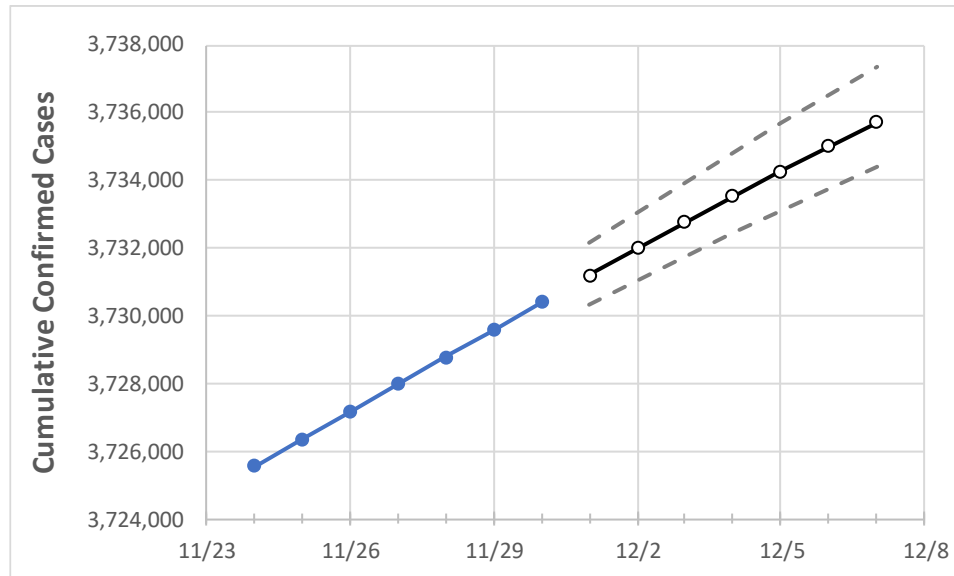
**IEM's Modeling Lead**

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:						
	11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7
Florida	3,727,970	3,728,778	3,729,587	3,730,395	3,731,209	3,732,002	3,732,777	3,733,519	3,734,269	3,735,022	3,735,729

*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:						
	11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7
Alachua	40,348	40,359	40,371	40,383	40,394	40,405	40,415	40,426	40,436	40,446	40,455
Broward	363,296	363,367	363,439	363,511	363,587	363,656	363,726	363,795	363,861	363,928	363,993
Charlotte	23,753	23,761	23,768	23,775	23,783	23,791	23,799	23,806	23,814	23,821	23,829
Collier	58,769	58,786	58,802	58,819	58,835	58,851	58,867	58,883	58,898	58,914	58,929
Duval	167,080	167,103	167,125	167,148	167,170	167,192	167,212	167,233	167,253	167,273	167,293
Hillsborough	246,228	246,296	246,365	246,433	246,518	246,602	246,684	246,763	246,840	246,921	246,998
Lake	55,853	55,868	55,882	55,896	55,913	55,929	55,945	55,961	55,976	55,992	56,006
Lee	128,431	128,455	128,478	128,502	128,523	128,544	128,564	128,583	128,603	128,621	128,639
Manatee	66,296	66,309	66,323	66,337	66,350	66,364	66,376	66,389	66,401	66,414	66,426
Miami-Dade	685,679	685,828	685,976	686,124	686,270	686,409	686,548	686,680	686,811	686,943	687,067
Okaloosa	34,991	34,996	35,002	35,007	35,012	35,017	35,021	35,026	35,030	35,034	35,038
Orange	232,363	232,412	232,462	232,511	232,561	232,611	232,660	232,710	232,759	232,808	232,856
Osceola	73,320	73,341	73,363	73,384	73,407	73,430	73,452	73,474	73,495	73,516	73,537
Palm Beach	230,177	230,228	230,278	230,329	230,383	230,436	230,489	230,539	230,588	230,638	230,687
Pasco	80,255	80,271	80,287	80,303	80,320	80,336	80,352	80,368	80,384	80,400	80,414
Pinellas	137,652	137,682	137,712	137,742	137,771	137,799	137,828	137,855	137,882	137,909	137,935
Polk	130,238	130,266	130,294	130,322	130,351	130,379	130,406	130,434	130,461	130,487	130,511
Sarasota	57,479	57,499	57,519	57,539	57,559	57,579	57,598	57,618	57,637	57,657	57,677
Seminole	63,367	63,390	63,412	63,435	63,459	63,483	63,506	63,528	63,550	63,573	63,594
St. Johns	41,529	41,542	41,556	41,569	41,583	41,596	41,609	41,623	41,636	41,649	41,661
Sumter	14,855	14,861	14,866	14,871	14,876	14,881	14,885	14,890	14,894	14,899	14,903
Volusia	77,770	77,794	77,819	77,844	77,870	77,895	77,920	77,944	77,968	77,992	78,015

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:											
	11/27	11/28	11/29	11/30	12/2				12/4				12/6			
Alachua	40,348	40,359	40,371	40,383	40,405	(8,081)	[1,939]	{970}	40,426	(8,085)	[1,940]	{970}	40,446	(8,089)	[1,941]	{971}
Broward	363,296	363,367	363,439	363,511	363,656	(72,731)	[17,456]	{8,728}	363,795	(72,759)	[17,462]	{8,731}	363,928	(72,786)	[17,469]	{8,734}
Charlotte	23,753	23,761	23,768	23,775	23,791	(4,758)	[1,142]	{571}	23,806	(4,761)	[1,143]	{571}	23,821	(4,764)	[1,143]	{572}
Collier	58,769	58,786	58,802	58,819	58,851	(11,770)	[2,825]	{1,412}	58,883	(11,777)	[2,826]	{1,413}	58,914	(11,783)	[2,828]	{1,414}
Duval	167,080	167,103	167,125	167,148	167,192	(33,438)	[8,025]	{4,013}	167,233	(33,447)	[8,027]	{4,014}	167,273	(33,455)	[8,029]	{4,015}
Hillsborough	246,228	246,296	246,365	246,433	246,602	(49,320)	[11,837]	{5,918}	246,763	(49,353)	[11,845]	{5,922}	246,921	(49,384)	[11,852]	{5,926}
Lake	55,853	55,868	55,882	55,896	55,929	(11,186)	[2,685]	{1,342}	55,961	(11,192)	[2,686]	{1,343}	55,992	(11,198)	[2,688]	{1,344}
Lee	128,431	128,455	128,478	128,502	128,544	(25,709)	[6,170]	{3,085}	128,583	(25,717)	[6,172]	{3,086}	128,621	(25,724)	[6,174]	{3,087}
Manatee	66,296	66,309	66,323	66,337	66,364	(13,273)	[3,185]	{1,593}	66,389	(13,278)	[3,187]	{1,593}	66,414	(13,283)	[3,188]	{1,594}
Miami-Dade	685,679	685,828	685,976	686,124	686,409	(137,282)	[32,948]	{16,474}	686,680	(137,336)	[32,961]	{16,480}	686,943	(137,389)	[32,973]	{16,487}
Okaloosa	34,991	34,996	35,002	35,007	35,017	(7,003)	[1,681]	{840}	35,026	(7,005)	[1,681]	{841}	35,034	(7,007)	[1,682]	{841}
Orange	232,363	232,412	232,462	232,511	232,611	(46,522)	[11,165]	{5,583}	232,710	(46,542)	[11,170]	{5,585}	232,808	(46,562)	[11,175]	{5,587}
Osceola	73,320	73,341	73,363	73,384	73,430	(14,686)	[3,525]	{1,762}	73,474	(14,695)	[3,527]	{1,763}	73,516	(14,703)	[3,529]	{1,764}
Palm Beach	230,177	230,228	230,278	230,329	230,436	(46,087)	[11,061]	{5,530}	230,539	(46,108)	[11,066]	{5,533}	230,638	(46,128)	[11,071]	{5,535}
Pasco	80,255	80,271	80,287	80,303	80,336	(16,067)	[3,856]	{1,928}	80,368	(16,074)	[3,858]	{1,929}	80,400	(16,080)	[3,859]	{1,930}
Pinellas	137,652	137,682	137,712	137,742	137,799	(27,560)	[6,614]	{3,307}	137,855	(27,571)	[6,617]	{3,309}	137,909	(27,582)	[6,620]	{3,310}
Polk	130,238	130,266	130,294	130,322	130,379	(26,076)	[6,258]	{3,129}	130,434	(26,087)	[6,261]	{3,130}	130,487	(26,097)	[6,263]	{3,132}
Sarasota	57,479	57,499	57,519	57,539	57,579	(11,516)	[2,764]	{1,382}	57,618	(11,524)	[2,766]	{1,383}	57,657	(11,531)	[2,768]	{1,384}
Seminole	63,367	63,390	63,412	63,435	63,483	(12,697)	[3,047]	{1,524}	63,528	(12,706)	[3,049]	{1,525}	63,573	(12,715)	[3,051]	{1,526}
St. Johns	41,529	41,542	41,556	41,569	41,596	(8,319)	[1,997]	{998}	41,623	(8,325)	[1,998]	{999}	41,649	(8,330)	[1,999]	{1,000}
Sumter	14,855	14,861	14,866	14,871	14,881	(2,976)	[714]	{357}	14,890	(2,978)	[715]	{357}	14,899	(2,980)	[715]	{358}
Volusia	77,770	77,794	77,819	77,844	77,895	(15,579)	[3,739]	{1,869}	77,944	(15,589)	[3,741]	{1,871}	77,992	(15,598)	[3,744]	{1,872}

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.