

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 3/22/22**

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 3/22/22 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.**

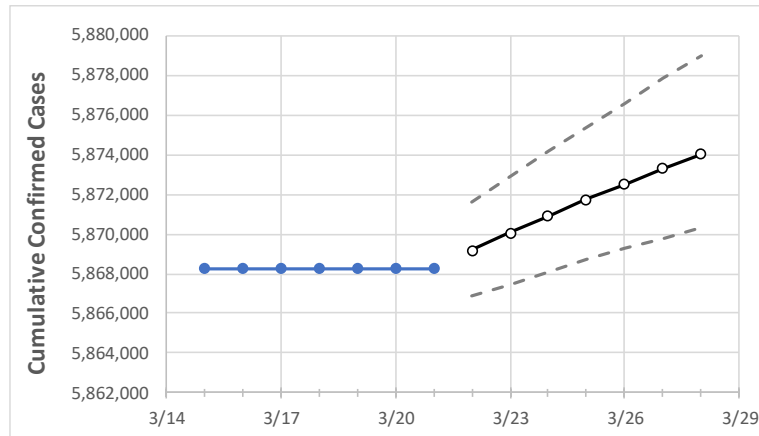
**IEM's Modeling Lead**

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:						
	3/18	3/19	3/20	3/21	3/22	3/23	3/24	3/25	3/26	3/27	3/28
Florida	5,868,263	5,868,263	5,868,263	5,868,263	5,869,172	5,870,060	5,870,895	5,871,731	5,872,528	5,873,296	5,874,014

*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:						
	3/18	3/19	3/20	3/21	3/22	3/23	3/24	3/25	3/26	3/27	3/28
Alachua	67,891	67,891	67,891	67,891	67,910	67,929	67,947	67,965	67,982	67,998	68,014
Broward	600,687	600,687	600,687	600,687	600,793	600,895	600,998	601,097	601,194	601,290	601,383
Charlotte	35,685	35,685	35,685	35,685	35,696	35,707	35,718	35,728	35,739	35,748	35,757
Collier	84,398	84,398	84,398	84,398	84,413	84,427	84,441	84,454	84,468	84,480	84,493
Duval	253,158	253,158	253,158	253,158	253,196	253,232	253,267	253,301	253,336	253,367	253,398
Hillsborough	373,808	373,808	373,808	373,808	373,875	373,941	374,004	374,066	374,127	374,185	374,243
Lake	84,857	84,857	84,857	84,857	84,869	84,880	84,891	84,901	84,911	84,920	84,929
Lee	190,203	190,203	190,203	190,203	190,233	190,262	190,290	190,317	190,342	190,368	190,392
Manatee	95,708	95,708	95,708	95,708	95,724	95,739	95,754	95,768	95,781	95,795	95,808
Miami-Dade	1,180,488	1,180,488	1,180,488	1,180,488	1,180,637	1,180,782	1,180,923	1,181,055	1,181,186	1,181,315	1,181,436
Okaloosa	51,420	51,420	51,420	51,420	51,424	51,427	51,430	51,433	51,436	51,439	51,442
Orange	375,946	375,946	375,946	375,946	376,026	376,103	376,176	376,248	376,318	376,387	376,452
Osceola	113,572	113,572	113,572	113,572	113,596	113,620	113,642	113,664	113,686	113,707	113,727
Palm Beach	366,844	366,844	366,844	366,844	366,915	366,985	367,053	367,119	367,183	367,246	367,307
Pasco	121,823	121,823	121,823	121,823	121,848	121,871	121,894	121,917	121,938	121,959	121,980
Pinellas	209,713	209,713	209,713	209,713	209,842	209,973	210,106	210,239	210,374	210,509	210,645
Polk	199,580	199,580	199,580	199,580	199,599	199,616	199,634	199,650	199,665	199,681	199,695
Sarasota	90,474	90,474	90,474	90,474	90,495	90,516	90,536	90,555	90,574	90,592	90,609
Seminole	103,176	103,176	103,176	103,176	103,190	103,204	103,217	103,230	103,242	103,254	103,266
St. Johns	62,586	62,586	62,586	62,586	62,587	62,589	62,590	62,591	62,592	62,594	62,595
Sumter	21,661	21,661	21,661	21,661	21,669	21,676	21,684	21,691	21,698	21,704	21,711
Volusia	116,764	116,764	116,764	116,764	116,778	116,792	116,805	116,818	116,830	116,842	116,853

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:											
	3/18	3/19	3/20	3/21	3/23				3/25				3/27			
Alachua	67,891	67,891	67,891	67,891	67,929	(13,586)	[3,261]	{1,630}	67,965	(13,593)	[3,262]	{1,631}	67,998	(13,600)	[3,264]	{1,632}
Broward	600,687	600,687	600,687	600,687	600,895	(120,179)	[28,843]	{14,421}	601,097	(120,219)	[28,853]	{14,426}	601,290	(120,258)	[28,862]	{14,431}
Charlotte	35,685	35,685	35,685	35,685	35,707	(7,141)	[1,714]	{857}	35,728	(7,146)	[1,715]	{857}	35,748	(7,150)	[1,716]	{858}
Collier	84,398	84,398	84,398	84,398	84,427	(16,885)	[4,052]	{2,026}	84,454	(16,891)	[4,054]	{2,027}	84,480	(16,896)	[4,055]	{2,028}
Duval	253,158	253,158	253,158	253,158	253,232	(50,646)	[12,155]	{6,078}	253,301	(50,660)	[12,158]	{6,079}	253,367	(50,673)	[12,162]	{6,081}
Hillsborough	373,808	373,808	373,808	373,808	373,941	(74,788)	[17,949]	{8,975}	374,066	(74,813)	[17,955]	{8,978}	374,185	(74,837)	[17,961]	{8,980}
Lake	84,857	84,857	84,857	84,857	84,880	(16,976)	[4,074]	{2,037}	84,901	(16,980)	[4,075]	{2,038}	84,920	(16,984)	[4,076]	{2,038}
Lee	190,203	190,203	190,203	190,203	190,262	(38,052)	[9,133]	{4,566}	190,317	(38,063)	[9,135]	{4,568}	190,368	(38,074)	[9,138]	{4,569}
Manatee	95,708	95,708	95,708	95,708	95,739	(19,148)	[4,595]	{2,298}	95,768	(19,154)	[4,597]	{2,298}	95,795	(19,159)	[4,598]	{2,299}
Miami-Dade	1,180,488	1,180,488	1,180,488	1,180,488	1,180,782	(236,156)	[56,678]	{28,339}	1,181,055	(236,211)	[56,691]	{28,345}	1,181,315	(236,263)	[56,703]	{28,352}
Okaloosa	51,420	51,420	51,420	51,420	51,427	(10,285)	[2,468]	{1,234}	51,433	(10,287)	[2,469]	{1,234}	51,439	(10,288)	[2,469]	{1,235}
Orange	375,946	375,946	375,946	375,946	376,103	(75,221)	[18,053]	{9,026}	376,248	(75,250)	[18,060]	{9,030}	376,387	(75,277)	[18,067]	{9,033}
Osceola	113,572	113,572	113,572	113,572	113,620	(22,724)	[5,454]	{2,727}	113,664	(22,733)	[5,456]	{2,728}	113,707	(22,741)	[5,458]	{2,729}
Palm Beach	366,844	366,844	366,844	366,844	366,985	(73,397)	[17,615]	{8,808}	367,119	(73,424)	[17,622]	{8,811}	367,246	(73,449)	[17,628]	{8,814}
Pasco	121,823	121,823	121,823	121,823	121,871	(24,374)	[5,850]	{2,925}	121,917	(24,383)	[5,852]	{2,926}	121,959	(24,392)	[5,854]	{2,927}
Pinellas	209,713	209,713	209,713	209,713	209,973	(41,995)	[10,079]	{5,039}	210,239	(42,048)	[10,091]	{5,046}	210,509	(42,102)	[10,104]	{5,052}
Polk	199,580	199,580	199,580	199,580	199,616	(39,923)	[9,582]	{4,791}	199,650	(39,930)	[9,583]	{4,792}	199,681	(39,936)	[9,585]	{4,792}
Sarasota	90,474	90,474	90,474	90,474	90,516	(18,103)	[4,345]	{2,172}	90,555	(18,111)	[4,347]	{2,173}	90,592	(18,118)	[4,348]	{2,174}
Seminole	103,176	103,176	103,176	103,176	103,204	(20,641)	[4,954]	{2,477}	103,230	(20,646)	[4,955]	{2,478}	103,254	(20,651)	[4,956]	{2,478}
St. Johns	62,586	62,586	62,586	62,586	62,589	(12,518)	[3,004]	{1,502}	62,591	(12,518)	[3,004]	{1,502}	62,594	(12,519)	[3,004]	{1,502}
Sumter	21,661	21,661	21,661	21,661	21,676	(4,335)	[1,040]	{520}	21,691	(4,338)	[1,041]	{521}	21,704	(4,341)	[1,042]	{521}
Volusia	116,764	116,764	116,764	116,764	116,792	(23,358)	[5,606]	{2,803}	116,818	(23,364)	[5,607]	{2,804}	116,842	(23,368)	[5,608]	{2,804}

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.