

## IEM's AI Modeling: Short-term COVID-19 Projections

Date: 6/14/21

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 6/14/21 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.**

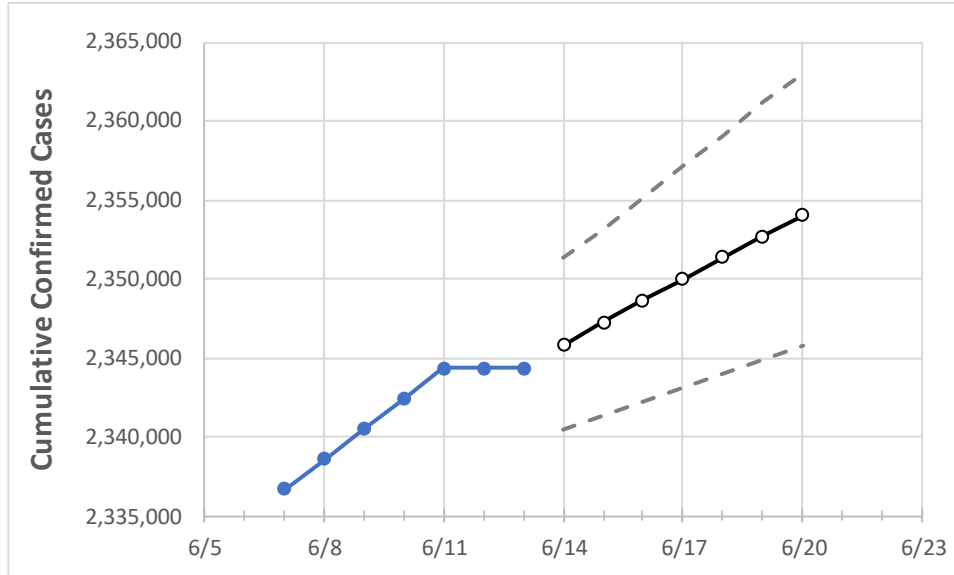
### IEM's Modeling Lead

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:							
	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	

Florida	2,342,412	2,344,321	2,344,321	2,344,321	2,345,798	2,347,249	2,348,641	2,349,999	2,351,350	2,352,694	2,354,024
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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:							
	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	
Alachua	25,597	25,609	25,609	25,609	25,618	25,627	25,636	25,645	25,653	25,661	25,669	
Broward	246,565	246,767	246,767	246,767	246,920	247,071	247,219	247,368	247,515	247,661	247,810	
Charlotte	13,511	13,522	13,522	13,522	13,531	13,540	13,548	13,556	13,565	13,572	13,580	
Collier	37,415	37,448	37,448	37,448	37,478	37,507	37,536	37,564	37,592	37,620	37,648	
Duval	101,712	101,826	101,826	101,826	101,925	102,027	102,130	102,234	102,339	102,443	102,548	
Hillsborough	144,640	144,772	144,772	144,772	144,897	145,020	145,143	145,261	145,376	145,490	145,604	
Lake	31,302	31,329	31,329	31,329	31,347	31,365	31,381	31,398	31,414	31,429	31,444	
Lee	74,192	74,254	74,254	74,254	74,297	74,338	74,376	74,415	74,452	74,488	74,524	
Manatee	40,147	40,173	40,173	40,173	40,194	40,215	40,235	40,255	40,274	40,293	40,312	
Miami-Dade	504,300	504,650	504,650	504,650	504,910	505,170	505,429	505,687	505,944	506,190	506,436	
Okaloosa	21,002	21,016	21,016	21,016	21,028	21,039	21,051	21,062	21,074	21,086	21,098	
Orange	144,106	144,256	144,256	144,256	144,371	144,483	144,592	144,704	144,815	144,928	145,032	
Osceola	46,673	46,733	46,733	46,733	46,781	46,831	46,882	46,933	46,983	47,035	47,084	
Palm Beach	149,529	149,633	149,633	149,633	149,719	149,804	149,889	149,970	150,053	150,134	150,220	
Pasco	43,218	43,264	43,264	43,264	43,298	43,332	43,366	43,398	43,431	43,464	43,496	
Pinellas	81,858	81,908	81,908	81,908	81,945	81,981	82,017	82,052	82,086	82,119	82,153	
Polk	71,649	71,703	71,703	71,703	71,748	71,791	71,833	71,876	71,916	71,957	71,995	
Sarasota	33,903	33,923	33,923	33,923	33,940	33,957	33,973	33,990	34,005	34,021	34,036	
Seminole	35,687	35,732	35,732	35,732	35,765	35,797	35,829	35,861	35,893	35,924	35,954	
St. Johns	23,429	23,447	23,447	23,447	23,460	23,473	23,485	23,497	23,509	23,521	23,533	
Sumter	9,539	9,545	9,545	9,545	9,549	9,552	9,555	9,558	9,562	9,565	9,568	
Volusia	45,228	45,269	45,269	45,269	45,301	45,332	45,362	45,391	45,419	45,447	45,476	

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:											
	6/10	6/11	6/12	6/13	6/15			6/17			6/19					
Alachua	25,597	25,609	25,609	25,609	25,627	(5,125)	[1,230]	{615}	25,645	(5,129)	[1,231]	{615}	25,661	(5,132)	[1,232]	{616}
Broward	246,565	246,767	246,767	246,767	247,071	(49,414)	[11,859]	{5,930}	247,368	(49,474)	[11,874]	{5,937}	247,661	(49,532)	[11,888]	{5,944}
Charlotte	13,511	13,522	13,522	13,522	13,540	(2,708)	[650]	{325}	13,556	(2,711)	[651]	{325}	13,572	(2,714)	[651]	{326}
Collier	37,415	37,448	37,448	37,448	37,507	(7,501)	[1,800]	{900}	37,564	(7,513)	[1,803]	{902}	37,620	(7,524)	[1,806]	{903}
Duval	101,712	101,826	101,826	101,826	102,027	(20,405)	[4,897]	{2,449}	102,234	(20,447)	[4,907]	{2,454}	102,443	(20,489)	[4,917]	{2,459}
Hillsborough	144,640	144,772	144,772	144,772	145,020	(29,004)	[6,961]	{3,480}	145,261	(29,052)	[6,973]	{3,486}	145,490	(29,098)	[6,984]	{3,492}
Lake	31,302	31,329	31,329	31,329	31,365	(6,273)	[1,506]	{753}	31,398	(6,280)	[1,507]	{754}	31,429	(6,286)	[1,509]	{754}
Lee	74,192	74,254	74,254	74,254	74,338	(14,868)	[3,568]	{1,784}	74,415	(14,883)	[3,572]	{1,786}	74,488	(14,898)	[3,575]	{1,788}
Manatee	40,147	40,173	40,173	40,173	40,215	(8,043)	[1,930]	{965}	40,255	(8,051)	[1,932]	{966}	40,293	(8,059)	[1,934]	{967}
Miami-Dade	504,300	504,650	504,650	504,650	505,170	(101,034)	[24,248]	{12,124}	505,687	(101,137)	[24,273]	{12,136}	506,190	(101,238)	[24,297]	{12,149}
Okaloosa	21,002	21,016	21,016	21,016	21,039	(4,208)	[1,010]	{505}	21,062	(4,212)	[1,011]	{505}	21,086	(4,217)	[1,012]	{506}
Orange	144,106	144,256	144,256	144,256	144,483	(28,897)	[6,935]	{3,468}	144,704	(28,941)	[6,946]	{3,473}	144,928	(28,986)	[6,957]	{3,478}
Osceola	46,673	46,733	46,733	46,733	46,831	(9,366)	[2,248]	{1,124}	46,933	(9,387)	[2,253]	{1,126}	47,035	(9,407)	[2,258]	{1,129}
Palm Beach	149,529	149,633	149,633	149,633	149,804	(29,961)	[7,191]	{3,595}	149,970	(29,994)	[7,199]	{3,599}	150,134	(30,027)	[7,206]	{3,603}
Pasco	43,218	43,264	43,264	43,264	43,332	(8,666)	[2,080]	{1,040}	43,398	(8,680)	[2,083]	{1,042}	43,464	(8,693)	[2,086]	{1,043}
Pinellas	81,858	81,908	81,908	81,908	81,981	(16,396)	[3,935]	{1,968}	82,052	(16,410)	[3,939]	{1,969}	82,119	(16,424)	[3,942]	{1,971}
Polk	71,649	71,703	71,703	71,703	71,791	(14,358)	[3,446]	{1,723}	71,876	(14,375)	[3,450]	{1,725}	71,957	(14,391)	[3,454]	{1,727}
Sarasota	33,903	33,923	33,923	33,923	33,957	(6,791)	[1,630]	{815}	33,990	(6,798)	[1,632]	{816}	34,021	(6,804)	[1,633]	{817}
Seminole	35,687	35,732	35,732	35,732	35,797	(7,159)	[1,718]	{859}	35,861	(7,172)	[1,721]	{861}	35,924	(7,185)	[1,724]	{862}
St. Johns	23,429	23,447	23,447	23,447	23,473	(4,695)	[1,127]	{563}	23,497	(4,699)	[1,128]	{564}	23,521	(4,704)	[1,129]	{565}
Sumter	9,539	9,545	9,545	9,545	9,552	(1,910)	[458]	{229}	9,558	(1,912)	[459]	{229}	9,565	(1,913)	[459]	{230}
Volusia	45,228	45,269	45,269	45,269	45,332	(9,066)	[2,176]	{1,088}	45,391	(9,078)	[2,179]	{1,089}	45,447	(9,089)	[2,181]	{1,091}

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.