

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 10/7/20**

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 10/7/20 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.**

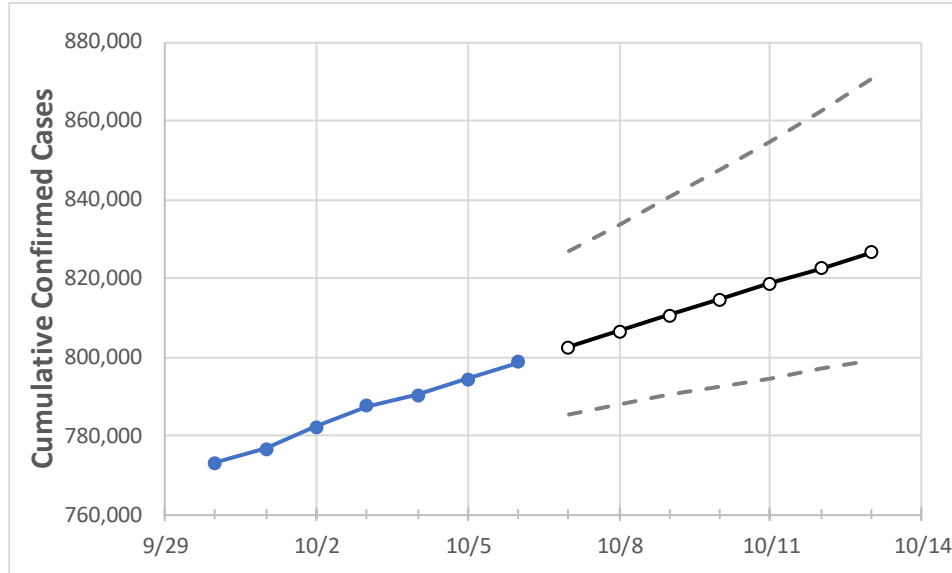
**IEM's Modeling Lead**

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.

## Texas State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	10/3	10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13
Texas	787,425	790,194	794,319	798,569	802,537	806,519	810,512	814,519	818,538	822,571	826,615

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.

## Texas Counties

	Actual Confirmed Cases On:					Projected Cases For:						
	10/3	10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13	
Bexar	58,184	58,678	58,746	58,746	58,878	59,010	59,143	59,277	59,411	59,545	59,680	
Brazoria	11,539	11,575	11,589	11,603	11,625	11,646	11,666	11,685	11,703	11,720	11,736	
Brazos	6,622	6,659	6,686	6,725	6,760	6,794	6,828	6,862	6,895	6,928	6,960	
Collin	15,548	15,568	15,610	15,736	15,826	15,916	16,008	16,100	16,194	16,288	16,384	
Dallas	82,918	83,178	84,245	84,491	84,846	85,204	85,564	85,927	86,292	86,660	87,030	
Denton	12,425	12,467	12,508	12,567	12,619	12,670	12,720	12,770	12,820	12,868	12,917	
El Paso	25,206	25,569	25,793	26,030	26,336	26,656	26,990	27,339	27,703	28,083	28,481	
Ellis	4,482	4,483	4,483	4,484	4,489	4,493	4,497	4,501	4,505	4,508	4,512	
Fort Bend	16,603	16,612	16,620	16,642	16,669	16,696	16,722	16,747	16,771	16,795	16,818	
Galveston	11,757	11,788	11,798	11,807	11,825	11,843	11,861	11,878	11,896	11,913	11,930	
Harris	147,298	147,808	148,235	148,769	149,375	149,981	150,585	151,187	151,788	152,386	152,983	
Hidalgo	32,481	32,555	32,630	32,813	32,903	32,992	33,080	33,167	33,253	33,338	33,422	
Johnson	3,169	3,178	3,187	3,196	3,213	3,229	3,246	3,262	3,278	3,294	3,310	
Lubbock	12,398	12,580	12,640	12,766	12,918	13,072	13,229	13,388	13,549	13,713	13,879	
McLennan	8,334	8,385	8,411	8,583	8,643	8,704	8,765	8,828	8,891	8,954	9,019	
Montgomery	11,353	11,398	11,444	11,682	11,736	11,791	11,846	11,901	11,956	12,012	12,067	
Tarrant	51,499	52,100	52,366	52,720	53,106	53,495	53,886	54,281	54,680	55,081	55,485	
Travis	29,750	29,799	29,857	29,952	30,029	30,105	30,181	30,256	30,331	30,406	30,480	
Williamson	8,738	8,770	8,802	8,861	8,888	8,915	8,942	8,970	8,998	9,026	9,055	

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.

### Texas Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	10/3	10/4	10/5	10/6	10/8				10/10				10/12			
Bexar	58,184	58,678	58,746	58,746	59,010	(11,802)	[2,832]	{1,416}	59,277	(11,855)	[2,845]	{1,423}	59,545	(11,909)	[2,858]	{1,429}
Brazoria	11,539	11,575	11,589	11,603	11,646	(2,329)	[559]	{280}	11,685	(2,337)	[561]	{280}	11,720	(2,344)	[563]	{281}
Brazos	6,622	6,659	6,686	6,725	6,794	(1,359)	[326]	{163}	6,862	(1,372)	[329]	{165}	6,928	(1,386)	[333]	{166}
Collin	15,548	15,568	15,610	15,736	15,916	(3,183)	[764]	{382}	16,100	(3,220)	[773]	{386}	16,288	(3,258)	[782]	{391}
Dallas	82,918	83,178	84,245	84,491	85,204	(17,041)	[4,090]	{2,045}	85,927	(17,185)	[4,124]	{2,062}	86,660	(17,332)	[4,160]	{2,080}
Denton	12,425	12,467	12,508	12,567	12,670	(2,534)	[608]	{304}	12,770	(2,554)	[613]	{306}	12,868	(2,574)	[618]	{309}
El Paso	25,206	25,569	25,793	26,030	26,656	(5,331)	[1,279]	{640}	27,339	(5,468)	[1,312]	{656}	28,083	(5,617)	[1,348]	{674}
Ellis	4,482	4,483	4,483	4,484	4,493	(899)	[216]	{108}	4,501	(900)	[216]	{108}	4,508	(902)	[216]	{108}
Fort Bend	16,603	16,612	16,620	16,642	16,696	(3,339)	[801]	{401}	16,747	(3,349)	[804]	{402}	16,795	(3,359)	[806]	{403}
Galveston	11,757	11,788	11,798	11,807	11,843	(2,369)	[568]	{284}	11,878	(2,376)	[570]	{285}	11,913	(2,383)	[572]	{286}
Harris	147,298	147,808	148,235	148,769	149,981	(29,996)	[7,199]	{3,600}	151,187	(30,237)	[7,257]	{3,628}	152,386	(30,477)	[7,315]	{3,657}
Hidalgo	32,481	32,555	32,630	32,813	32,992	(6,598)	[1,584]	{792}	33,167	(6,633)	[1,592]	{796}	33,338	(6,668)	[1,600]	{800}
Johnson	3,169	3,178	3,187	3,196	3,229	(646)	[155]	{78}	3,262	(652)	[157]	{78}	3,294	(659)	[158]	{79}
Lubbock	12,398	12,580	12,640	12,766	13,072	(2,614)	[627]	{314}	13,388	(2,678)	[643]	{321}	13,713	(2,743)	[658]	{329}
McLennan	8,334	8,385	8,411	8,583	8,704	(1,741)	[418]	{209}	8,828	(1,766)	[424]	{212}	8,954	(1,791)	[430]	{215}
Montgomery	11,353	11,398	11,444	11,682	11,791	(2,358)	[566]	{283}	11,901	(2,380)	[571]	{286}	12,012	(2,402)	[577]	{288}
Tarrant	51,499	52,100	52,366	52,720	53,495	(10,699)	[2,568]	{1,284}	54,281	(10,856)	[2,606]	{1,303}	55,081	(11,016)	[2,644]	{1,322}
Travis	29,750	29,799	29,857	29,952	30,105	(6,021)	[1,445]	{723}	30,256	(6,051)	[1,452]	{726}	30,406	(6,081)	[1,459]	{730}
Williamson	8,738	8,770	8,802	8,861	8,915	(1,783)	[428]	{214}	8,970	(1,794)	[431]	{215}	9,026	(1,805)	[433]	{217}

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.