

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 10/15/20**

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 10/15/20 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.**

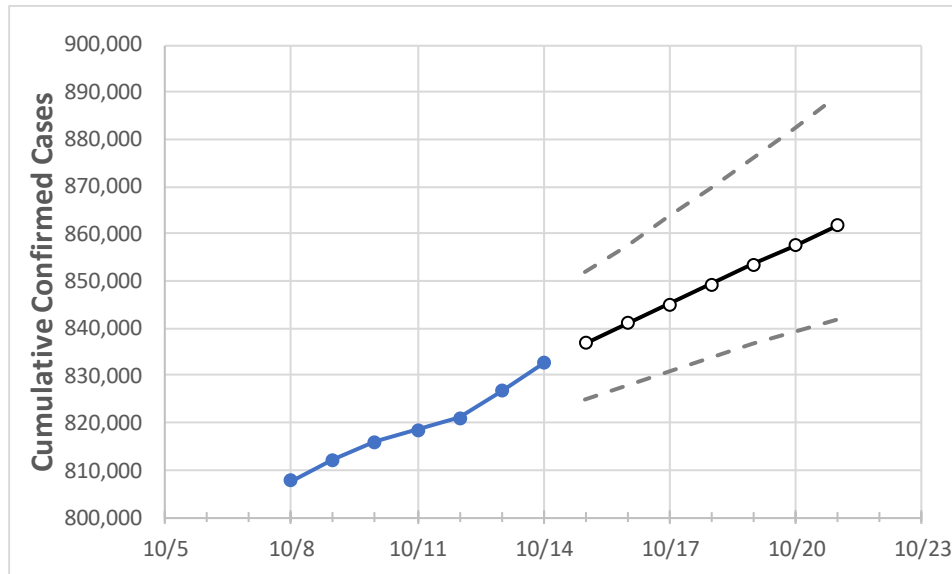
**IEM's Modeling Lead**

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:						
	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21
Texas	818,426	821,110	826,816	832,736	836,854	840,982	845,121	849,270	853,429	857,599	861,780

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:						
	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20	10/21
Bexar	59,684	59,730	59,902	60,034	60,139	60,241	60,339	60,436	60,529	60,619	60,707
Brazoria	11,762	11,791	11,960	11,847	11,867	11,887	11,906	11,924	11,942	11,960	11,977
Brazos	6,994	7,016	7,054	7,081	7,115	7,149	7,182	7,215	7,247	7,280	7,312
Collin	16,208	16,282	16,384	16,488	16,578	16,668	16,760	16,852	16,945	17,038	17,133
Dallas	86,229	86,329	86,775	87,835	88,086	88,336	88,584	88,831	89,076	89,319	89,561
Denton	12,912	12,960	13,047	13,192	13,255	13,318	13,382	13,446	13,510	13,575	13,641
El Paso	28,499	28,942	29,384	29,887	30,437	31,018	31,632	32,281	32,967	33,691	34,457
Ellis	4,584	4,595	4,605	4,638	4,644	4,649	4,655	4,660	4,666	4,671	4,676
Fort Bend	16,896	16,912	16,966	17,019	17,044	17,070	17,095	17,120	17,144	17,169	17,193
Galveston	11,930	11,942	11,954	11,979	11,997	12,016	12,034	12,052	12,070	12,088	12,106
Harris	151,161	151,463	151,880	152,623	153,060	153,488	153,905	154,313	154,712	155,101	155,481
Hidalgo	33,447	33,495	33,614	33,788	33,889	33,990	34,090	34,190	34,290	34,390	34,489
Johnson	3,290	3,303	3,316	3,337	3,347	3,357	3,367	3,376	3,386	3,394	3,403
Lubbock	13,756	14,006	14,165	14,377	14,579	14,787	15,000	15,219	15,444	15,675	15,913
McLennan	8,934	8,963	9,029	9,125	9,189	9,254	9,319	9,386	9,453	9,521	9,590
Montgomery	12,281	12,365	12,496	12,591	12,709	12,832	12,960	13,093	13,231	13,374	13,523
Tarrant	55,364	55,682	56,159	56,783	57,268	57,762	58,266	58,780	59,304	59,838	60,383
Travis	30,265	30,398	30,500	30,601	30,676	30,751	30,827	30,903	30,980	31,056	31,133
Williamson	8,974	9,003	9,043	9,074	9,100	9,127	9,153	9,181	9,208	9,235	9,263

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:											
	10/11	10/12	10/13	10/14	10/16				10/18				10/20			
Bexar	59,684	59,730	59,902	60,034	60,241	(12,048)	[2,892]	{1,446}	60,436	(12,087)	[2,901]	{1,450}	60,619	(12,124)	[2,910]	{1,455}
Brazoria	11,762	11,791	11,960	11,847	11,887	(2,377)	[571]	{285}	11,924	(2,385)	[572]	{286}	11,960	(2,392)	[574]	{287}
Brazos	6,994	7,016	7,054	7,081	7,149	(1,430)	[343]	{172}	7,215	(1,443)	[346]	{173}	7,280	(1,456)	[349]	{175}
Collin	16,208	16,282	16,384	16,488	16,668	(3,334)	[800]	{400}	16,852	(3,370)	[809]	{404}	17,038	(3,408)	[818]	{409}
Dallas	86,229	86,329	86,775	87,835	88,336	(17,667)	[4,240]	{2,120}	88,831	(17,766)	[4,264]	{2,132}	89,319	(17,864)	[4,287]	{2,144}
Denton	12,912	12,960	13,047	13,192	13,318	(2,664)	[639]	{320}	13,446	(2,689)	[645]	{323}	13,575	(2,715)	[652]	{326}
El Paso	28,499	28,942	29,384	29,887	31,018	(6,204)	[1,489]	{744}	32,281	(6,456)	[1,550]	{775}	33,691	(6,738)	[1,617]	{809}
Ellis	4,584	4,595	4,605	4,638	4,649	(930)	[223]	{112}	4,660	(932)	[224]	{112}	4,671	(934)	[224]	{112}
Fort Bend	16,896	16,912	16,966	17,019	17,070	(3,414)	[819]	{410}	17,120	(3,424)	[822]	{411}	17,169	(3,434)	[824]	{412}
Galveston	11,930	11,942	11,954	11,979	12,016	(2,403)	[577]	{288}	12,052	(2,410)	[579]	{289}	12,088	(2,418)	[580]	{290}
Harris	151,161	151,463	151,880	152,623	153,488	(30,698)	[7,367]	{3,684}	154,313	(30,863)	[7,407]	{3,704}	155,101	(31,020)	[7,445]	{3,722}
Hidalgo	33,447	33,495	33,614	33,788	33,990	(6,798)	[1,632]	{816}	34,190	(6,838)	[1,641]	{821}	34,390	(6,878)	[1,651]	{825}
Johnson	3,290	3,303	3,316	3,337	3,357	(671)	[161]	{81}	3,376	(675)	[162]	{81}	3,394	(679)	[163]	{81}
Lubbock	13,756	14,006	14,165	14,377	14,787	(2,957)	[710]	{355}	15,219	(3,044)	[731]	{365}	15,675	(3,135)	[752]	{376}
McLennan	8,934	8,963	9,029	9,125	9,254	(1,851)	[444]	{222}	9,386	(1,877)	[451]	{225}	9,521	(1,904)	[457]	{229}
Montgomery	12,281	12,365	12,496	12,591	12,832	(2,566)	[616]	{308}	13,093	(2,619)	[628]	{314}	13,374	(2,675)	[642]	{321}
Tarrant	55,364	55,682	56,159	56,783	57,762	(11,552)	[2,773]	{1,386}	58,780	(11,756)	[2,821]	{1,411}	59,838	(11,968)	[2,872]	{1,436}
Travis	30,265	30,398	30,500	30,601	30,751	(6,150)	[1,476]	{738}	30,903	(6,181)	[1,483]	{742}	31,056	(6,211)	[1,491]	{745}
Williamson	8,974	9,003	9,043	9,074	9,127	(1,825)	[438]	{219}	9,181	(1,836)	[441]	{220}	9,235	(1,847)	[443]	{222}

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.