HMA

HEALTH MANAGEMENT ASSOCIATES

System Capacity and Population Needs

Excerpt from
Tarrant County Long Range Planning Report

PREPARED FOR
TARRANT COUNTY

BY
HEALTH MANAGEMENT ASSOCIATES
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Research and Consulting in the Fields of Health and Human Services Policy, Health Economics and Finance, Program Evaluation, Data Analysis, and Health System Restructuring

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4. System Capacity and Population Needs

An important component of the marketplace assessment is to understand the current primary care, specialty care, and hospital bed needs of the target population(s) and the percentage of that need that is currently being fulfilled by JPS. This not only brings context to current strains in the JPS delivery system, but more importantly, by identifying both the current and projected future gaps, JPS can make more informed strategic decisions on the size and constitution of their professional staff, as well as their facilities, necessary to anticipate and meet future needs.

Methods used to calculate the need for primary care providers and community health centers, specialists and inpatient hospital beds are described in detail in the Appendix.

It is important to note that the tools used to develop estimates are intended to inform ongoing planning rather than to create a static output. Because current assumptions may change, these tools should be used to check assumptions and modify plans over time. **(Refer to Supplemental Spreadsheet: Population Estimates and Predicted Demand.)**

Population Growth

Population growth has enormous implications for public health, health care, and social service systems. Over the next twenty years, Tarrant County's population is expected to grow by 46%, from 2,020,278 in 2017 to 2,948,206 in 2037, with the JPS Connection-eligible population percent change expected to be approximately the same, growing from 425,701 in 2017 to 621,228 in 2037. The following sections detail the impact of population growth on primary care, specialty care, and acute psychiatric and medical hospital bed needs.

Primary Care

The table below depicts the need for primary care providers (PCPs) for the entire Tarrant County population over the next 20 years. Given the estimated total number of licensed primary care physicians, we estimate that approximately 75% of the total primary care need in the county is currently being met. In other words, Tarrant County as a whole has fewer physician FTEs than needed to meet demands. The gap is certainly met in part by non-physician PCPs, but these advanced practice nurses and physician assistants are not likely filling the entire 25% gap. The demand for those under the 250% of the Federal Poverty Level (FPL) is only a portion of the overall need.

Table 27: Primary Care Demand for all of Tarrant County, TX

Primary Care Demand for all of Tarrant County, TX					
	2017	2022	2027	2032	2037
Total Number of FTEs Needed in County	1,043	1,168	1,294	1,437	1,581
Number of Physician PCP FTEs in County[7,10]	778				
Percent of demand met	75%				

Table 28, below, provides estimates of the number of full-time equivalent (FTE) primary care providers (PCPs) required to meet the needs of Tarrant County residents that have an annual income below 250% of the Federal Poverty Level (FPL).

Table 28: Primary Care Demand for Population < 250% poverty - Tarrant County, TX

Primary Care Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Total Number of FTEs Needed in County	378	423	469	521	573
Age < 65	319	349	377	408	437
Age 65 and older	59	75	92	113	136

Note: Excludes undocumented.

At present, JPS could meet 26% of the target population's primary care needs through its existing medical homes. Much of the balance of that need (74%) is likely being met in low acuity Emergency Department (ED) visits, in other hospitals, and through charity care and private practices. The mismatch between the supply (some portion of the 26% plus the amount delivered by other systems) and the need will prevent JPS from achieving other goals laid out in this report. To achieve the reduction in the morbidity that now results in preventable emergency department visits and hospitalizations at JPS, JPS needs to place greater emphasis on ambulatory care services. Particularly given the limited options for primary care for the target population, JPS must consider strategies to meet or otherwise ensure that a significantly greater percentage of the primary care need for this population is met.

The table below provides a projection of the number of PCPs needed over the next 20 years for the target population if JPS were to continue to meet 26% percent of the primary care need versus incrementally increasing the percent need met to 50% over 20 years.

Table 29: Number of JPS PCPs Needed to Meet Current (26%) and an Enhanced Percent (50%) of Primary Care Demand for Population < 250% FPL - Tarrant County, TX

Primary Care Demand for Population < 250% FPL - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of JPS PCP FTEs Needed to Continue to meet current 26% of Demand through 2037	98 (current)	110	122	135	149
Percent of demand met by JPS	26.0%	26.0%	26.0%	26.0%	26.0%
Number of JPS PCP FTEs Needed to Meet 50% of demand by 2037	98 (current)	135	178	229	287
Percent of demand met	26.0%	32.0%	38.0%	44.0%	50.0%

Note: Excludes undocumented.

The increase in overall primary care need in Tarrant County over the next 20 years will negatively impact lower income populations disproportionately unless a sustained effort is made by JPS to increase the

percent of the target population need met from 26% to a much higher level. While we present two scenarios above, one in which the status quo is maintained, and one in which JPS meets a significantly higher percentage of primary care needs of the <250% FPL population, we created a tool that allows for changes in primary care coverage assumptions that auto-calculates the resulting primary care FTE requirements. (Refer to Supplemental Spreadsheet – Population Estimates and Predicted Demand.)

As depicted in Table 30 below, in order for JPS to increase their primary care capacity to meet 50% of need of the target population as modeled above, an additional 188 FTEs beyond attrition would be needed by 2037. While new health centers could be developed and/or existing health centers expanded, this increase in PCPs would require the equivalent of approximately 19 new health centers of a recommended size of 18 exam rooms by 2037.

Table 30: Incremental Primary Care FTEs and Health Center Needs with Assumptions to Meet 50% Need of Population <250% FPL, Tarrant County, TX

Incremental Primary Care FTEs and Health Center Needs for < 250%FPL – Tarrant County, TX					
	2022	2027	2032	2037	Total in 20 Years
Number of FTEs Needed to be Added by the Indicated Year	37	43	51	57	188
Number of Health Centers Needed to be Added by the Indicated Year	4	4	5	6	19

It is important to note that maintaining the current level of 26% of needs met for the population <250% FPL is projected to result in a *falling percentage of need met* for the JPS Connection-eligible population over time, as demonstrated in Table 31 below.

Table 31: Primary Care Demand for JPS Connection-eligible Population - Tarrant County, TX

Primary Care Demand for JPS Connection - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	263	301	340	386	433
Age < 65	204	226	248	273	297
Age 65 and older	59	75	92	113	136
Number of JPS PCP FTEs (extrapolated across years at same demand met)	98 (current)	110	122	136	149
Percent of demand met by JPS	37.4%	36.6%	35.9%	35.2%	34.4%

Assumptions:

- Generalist visits per 1,000 population[1]: 1,718
- Medicare primary care visits per 1,000 beneficiaries[2] 2,949
- Average primary care cost per beneficiary[3] $524
- Total revenues[4] $634,928.95
- Average compensation per primary care physician[5] $241,273
- Percent of revenues from physician costs[6] 38%
- Number of visits seen by average primary care physician[4] 3,574

- Percent of FTEs of primary care providers spent in primary care[7] 67%
- Number of primary care visits in US[1] 490,831,000
- Estimated number of primary care providers[8] 205,000
- FTEs per health center with 18 exams rooms, 36K visits[9] 10
- Percent of undocumented in Tarrant who are over age 65 2%
- Assumed Percentage of Primary Care Needs Met 26%
- Visits to primary care in JPS in FY2015 351,052
- Number of FTEs are estimated for primary care providers; this includes physicians, as well as advanced nurse practitioners and physician assistants expected to have a panel size close to the size of the physician panels.

[1] National Ambulatory Medical Care Survey
[2]Calculated estimate from other sources in this list
[3]2012 CommonWealth: Paying More for Primary Care: Can It Help Bend the Medicare Cost Curve
[4]Calculated estimate from other sources in this list
[5]http://blogs.aafp.org/fpm/gettingpaid/category/Physician+compensation
[6]MGMA Cost Survey: 2014 Report Based on 2013 Data
[7]Estimate to get visits close to separately identified of 3,600
[8]HRSA Health Workforce: Projecting the Supply and Demand for Primary Care Practitioners Through 2020
[9]Assumes 3,600 visits per year
[10]Dartmouth Atlas 2011 for Fort Worth Service Area, 57.5 primary care physicians per 100,000 population

Note: Methods used to calculate the need for primary care providers and community health centers are described in detail in the Appendix.

Specialty Care

Specialty care needs and workforce requirements also are expected to grow over the next two decades, and it is widely recognized that JPS is the main provider of specialty care for the < 250% FPL population. For the specialties covered (see Table 32 below), JPS currently has FTE capacity that would be expected to be able to serve on average 27% of specialty demand. This ranges from JPS meeting approximately 6% (dermatology) to 72% (infectious disease) of the estimated need of the population with incomes below 250% FPL. Two hospital-based specialties appear to have enough FTEs to serve more than the total population under 250% FPL. This could be for a number of reasons, including that a broader population is served, academic work is causing each FTE to be less than one FTE of clinical time, or other efficiency issues.

There is no correlation between wait times and the calculated percentage of need identified. For example, general surgery FTEs are only sufficient to serve 14% of the estimated need and yet have a much shorter wait time than gastroenterology, which is expected to meet nearly 50% of the estimated need. The reason for the lack of correlation may be that post-surgical visits are the largest feeder of clinic visits and there may not be adequate surgical capacity to create this flow. With gastroenterology, non-urgent new visits and procedures are fed in from primary care, the Emergency Department, and other systems of care. Differences in service efficiencies could also be present. In any case, it is clear that the FTEs are only sufficient for a fraction of most specialty needs and that population growth will result in the need for a great deal of additional specialty capacity. In addition to the overall estimated need, specific specialties were analyzed to determine the number of specialists needed if the current percentage of population need were to continue to be met. Current FTEs were estimated by visit data when FTE data were not available.

Table 32: Total Specialty FTEs needed for population <250% poverty

Total Specialty FTEs needed for population <250% poverty								
Specialties	JPS FTEs 2017	Estimated need Tarrant County 2017	Percent of need met by JPS FTEs	Wait times (months)	Estimated need Tarrant County			
					2022	2027	2032	2037
Allergy & Immunology	0	7.6	0%	no data	8.4	9.2	10.1	11.0
Cardiology	8	30.5	26%	no data	35.0	39.8	45.3	51.0
Cardiovascular Surgery	5	11.2	45%	1 to 2	12.9	14.6	16.7	18.8
Child Psychiatry	1	24.6	4%	no data	26.9	29.0	31.4	33.7
Dermatology	1	17.6	6%	12	19.8	22.0	24.4	26.9
Endocrinology	2.5	6.6	38%	4 to 10	7.4	8.2	9.1	10.0
Gastroenterology	7.8	16.7	47%	5 to 12	18.8	20.8	23.2	25.6
Hematology-Oncology	8.0	19.7	41%	no data	22.6	25.7	29.2	32.9
Infectious Diseases	4	5.5	72%	8	6.2	6.8	7.4	8.1
Neonatology	11.5	6.3	182%	no data	6.9	7.5	8.1	8.6
Nephrology	6	8.8	68%	4 to 12	10.1	11.5	13.1	14.7
Neurology	4.4	17.7	25%	4 to 12	20.3	23.1	26.3	29.6
Neurosurgery	2	9.4	21%	2	10.5	11.7	13.0	14.3
Ophthalmology	7	26.4	26%	12	29.7	32.9	36.7	40.4
Orthopedic Surgery	9.7	37.7	26%	2 to 9	42.3	47.0	52.3	57.7
Otolaryngology	2.2	20.3	11%	3 to 4	22.7	25.3	28.1	31.0
Physical Med & Rehab	5	10.5	47%	4	11.8	13.1	14.6	16.1
Plastic Surgery	1	10.5	10%	no data	11.6	12.7	14.0	15.2
Psychiatry	32	62.3	51%	no data	69.1	75.8	83.3	90.8
Pulmonary Diseases	2	10.2	20%	10	11.5	12.7	14.2	15.6
Rheumatology	2.4	9.6	25%	4	10.8	12.0	13.3	14.7
Surgery, General	9	63.3	14%	2 to 5	71.0	78.9	87.8	96.8

Thoracic Surgery	1	7.6	13%	no data	8.8	9.9	11.3	12.8
Urology	2.6	24.6	11%	6 to 9	28.3	32.1	36.5	41.1
Anesthesiology	77	52.2	147%	no data	58.6	65.1	72.5	79.9
Emergency Medicine	90	40.4	223%	n/a	45.4	50.4	56.1	61.9
Pathology	8.5	40.0	21%	n/a	44.9	49.9	55.5	61.2
Radiology	6.5	46.0	14%	n/a	51.6	57.3	63.8	70.4
TOTAL	317	644			724	805	897	991

For many specialties, the current percentage of need met is not adequate, as evidenced by both the analysis and the wait times. The specialty-specific projection tables below show the current "capacity-to-meet-need" being kept the same into the future. This projection tool can also be used to plan for a higher level of specialty support, which may be of strategic importance. Tables are prepared for cardiology, dermatology, endocrinology, gastroenterology, oncology, neurology, orthopedics, psychiatry, pulmonology, and urology, all at existing percent of demand met levels and all for physician FTEs. Advanced practice nurses (APNs) and physician assistants (PA) can and should be part of a plan to meet need, but this analysis is restricted to physician FTE estimations. Additionally, the estimates are based on a typical inpatient/outpatient mix and in services that are currently called upon to meet more inpatient need within Tarrant County, such as psychiatry, the analysis may show more need being met than actually is. The analysis would need to be adjusted in order to use for planning purposes in these cases.

To the extent that plans are made to continue to meet a relatively low percentage of need, such as in dermatology and urology, a variety of other strategies can be used to improve access, including partnering with other institutions (potentially rationalizing charity care to incorporate population strategies and innovations), strengthening referral rules to decrease inappropriate/low-need patients being placed in urgent/same day spots, deploying innovative access initiatives such as e-consults, and organizing space and staff to more specifically respond to the highest need/highest impact specialty services.

Table 33: Cardiology: Cardiology Demand for Population < 250% poverty* - Tarrant County, TX

Cardiology: Cardiology Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	30	35	40	45	51
Age < 65	21	22	24	26	28
Age 65 and older	10	12.6	15.5	19.0	23
Number of FTEs in JPS (extrapolated across years at same demand met)	8.0 (current)	9.2	10.5	11.9	13.4
Percent of demand met by JPS	26.3%	26.3%	26.3%	26.3%	26.3%
Incremental FTEs needed	n/a	1	1	2	1

Excludes undocumented
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 26.3%

Table 34: Dermatology: Dermatology Demand for Population < 250% poverty* - Tarrant County, TX

Dermatology: Dermatology Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	18	20	22	24	27
Age < 65	15	16	17	19	20
Age 65 and older	3	3.8	4.7	5.8	7
Number of FTEs in JPS (extrapolated across years at same demand met)	2.0 (current)	2.2	2.5	2.8	3.1
Percent of demand met by JPS	11.4%	11.4%	11.4%	11.4%	11.4%
Incremental FTEs needed	n/a	0	0	1	0

Excludes undocumented
2017 includes a planned increase of FTEs to 2, other tables show 1 FTE meeting 6% demand
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 11.4%

Table 35: Endocrinology: Endocrinology Demand for Population < 250% poverty* - Tarrant County, TX

Endocrinology: Endocrinology Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	7	7	8	9	10
Age < 65	5	6	6	7	7
Age 65 and older	1	1.4	1.8	2.2	3
Number of FTEs in JPS (extrapolated across years at same demand met)	2.5 (current)	2.8	3.1	3.5	3.8
Percent of demand met by JPS	38.1%	38.1%	38.1%	38.1%	38.1%
Incremental FTEs needed	n/a	0	1	0	0

Excludes undocumented
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 38.1%

Table 36: Gastroenterology: Gastroenterology Demand for Population < 250% poverty* - Tarrant County, TX

Gastroenterology: Gastroenterology Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	17	19	21	23	26
Age < 65	14	15	16	18	19
Age 65 and older	3	3.6	4.5	5.5	7
Number of FTEs in JPS (extrapolated across years at same demand met)	7.8 (current)	8.8	9.7	10.8	11.9
Percent of demand met by JPS	46.7%	46.7%	46.7%	46.7%	46.7%
Incremental FTEs needed	n/a	1	1	1	1

Excludes undocumented
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 46.7%

Table 37: Oncology: Oncology Demand for Population < 250% poverty* - Tarrant County, TX

Oncology: Oncology Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	20	23	26	29	33
Age < 65	13	15	16	17	18
Age 65 and older	6	8.1	10.0	12.3	15
Number of FTEs in JPS (extrapolated across years at same demand met)	8.0 (current)	9.2	10.4	11.9	13.4
Percent of demand met by JPS	40.7%	40.7%	40.7%	40.7%	40.7%
Incremental FTEs needed	n/a	1	1	2	1

Excludes undocumented
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 40.7%

Table 38: Neurology: Neurology Demand for Population < 250% poverty* - Tarrant County, TX

Neurology: Neurology Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	18	20	23	26	30
Age < 65	12	13	14	15	16
Age 65 and older	6	7.3	9.0	11.1	13
Number of FTEs in JPS (extrapolated across years at same demand met)	4.4 (current)	5.1	5.7	6.6	7.4
Percent of demand met by JPS	24.9%	24.9%	24.9%	24.9%	24.9%
Incremental FTEs needed	n/a	1	0	1	1

Excludes undocumented
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 24.9%

Table 39: Ortho: Orthopedic Surgeon Demand for Population < 250% poverty* - Tarrant County, TX

Ortho: Orthopedic Surgeon Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	38	42	47	52	58
Age < 65	31	34	37	40	43
Age 65 and older	6	8.1	10.0	12.3	15
Number of FTEs in JPS (extrapolated across years at same demand met)	9.7 (current)	10.9	12.1	13.5	14.8
Percent of demand met by JPS	25.8%	25.8%	25.8%	25.8%	25.8%
Incremental FTEs needed	n/a	1	1	2	1

Excludes undocumented
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 25.8%

Table 40: Psychiatry: Psychiatry Demand for Population < 250% poverty* - Tarrant County, TX

Psychiatry: Psychiatry Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	62	69	76	83	91
Age < 65	56	62	67	72	77
Age 65 and older	6	7.4	9.1	11.2	13
Number of FTEs in JPS (extrapolated across years at same demand met)	32.0 (current)	35.5	38.9	42.8	46.7
Percent of demand met by JPS	51.4%	51.4%	51.4%	51.4%	51.4%
Incremental FTEs needed	n/a	3	4	4	4

Excludes undocumented
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 51.4%

Table 41: Pulmonary: Pulmonary Demand for Population < 250% poverty - Tarrant County, TX*

Pulmonary: Pulmonary Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	10	11	13	14	16
Age < 65	8	9	10	11	12
Age 65 and older	2	2.2	2.7	3.4	4
Number of FTEs in JPS (extrapolated across years at same demand met)	2.0 (current)	2.2	2.5	2.8	3.1
Percent of demand met by JPS	19.6%	19.6%	19.6%	19.6%	19.6%
Incremental FTEs needed	n/a	0	0	1	0

Excludes undocumented
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 19.6%

Table 42: Urology: Urology Demand for Population < 250% poverty - Tarrant County, TX*

Urology: Urology Demand for Population < 250% poverty* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Number of FTEs Needed	25	28	32	37	41
Age < 65	17	18	20	21	23
Age 65 and older	8	10.1	12.5	15.4	18
Number of FTEs in JPS (extrapolated across years at same demand met)	2.6 (current)	3.4	3.9	4.5	5.0
Percent of demand met by JPS	12.2%	12.2%	12.2%	12.2%	12.2%
Incremental FTEs needed	n/a	1	0	1	0

Note: Excludes undocumented
Assumptions: Goal Percentage of Needs Met for Population <250% FPL: 12.2

Note: Methods used to calculate the need for specialties are described in detail in the Appendix.

Psychiatry Bed Needs

The number of psychiatric beds, unlike acute care medical beds for Tarrant County as a whole, are well below the current need level, and projected population growth will only increase the gap. Table 41 below bases public bed need on total population, with 70 beds per 100,000 patients. (See Delivery System chapter and Table 51 for more detail). Although the total number of public psychiatric beds needed by 2037 will be 2,064, as outlined in JPS Delivery System, a robust system of community behavioral health services could result in reducing this need to 1,032. If JPS plans to meet about one-half of this need, 516 beds will be needed, compared to the 132 current beds.

Table 43: Psychiatric Bed Needs* - Tarrant County, TX

Psychiatric Bed Needs* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Total public beds needed at literature-supported level	1,414	1,568	1,722	1,893	2,064
Total public beds needed with investments in new programing	707	784	861	947	1,032
JPS beds required to meet target of 50% of need	354	392	431	473	516
JPS actual (current) beds	132	132	132	132	132
Proportion of target contribution met	37%	34%	31%	28%	26%

Excludes undocumented
Assumptions:

- *Current literature-supported need for public beds per 100,000: 70*
- *Percentage decrease from literature-supported level possible with enriched services: 50%*
- *Target percentage need met by JPS: 50%*

Note: Methods used to calculate the need for psychiatric beds are described in detail in the Appendix.

Acute Medical Hospital Bed Needs

Population growth and an aging population will increase the need for acute medical hospital beds. The table below projects the beds per thousand available *if no further capacity was built in Tarrant County*. Total beds for Tarrant County were calculated by subtracting the rate if no capacity was built from the target rate of beds per thousand and multiplying this by the total population. The number of beds for the population under 250% FPL was calculated differently by using only the incremental population and applying the final target bed rate. Therefore, the estimation methodology assumes that the additional under 250% FPL population (the growth) will all be well managed.

Given these assumptions, 770 beds will be needed in the next 20 years in Tarrant County. The number of beds needed for the population growth in the <250% FPL segment is 648. Decreasing bed rates in the current <250% FPL population (due to better management) will likely offset the need for a portion of the 648 beds. The extent of this offset is dependent on the relative reduction in bed use in this population versus others.

Table 44: Acute Medical Hospital Bed Needs* - Tarrant County, TX

Acute Medical Hospital Bed Needs* - Tarrant County, TX					
	2017	2022	2027	2032	2037
Beds per thousand for Tarrant County predicted population if no further capacity built	2.0	1.8	1.7	1.5	1.4
Target beds per thousand for Tarrant County population	n/a	1.92	1.82	1.73	1.65
Number of new beds needed for Tarrant County population	n/a	219	404	603	770
Number of new beds needed just for growth of population < 250% FPL at final target rate	n/a	154	307	478	648

**Bed needs in this table are for Tarrant County as a whole.*
Assumptions:

- *Current Total Tarrant County Acute Care Beds: 4,084*
- *Bed Rate Decline Maximum per 5 Year Period: 5%*

Table 45 analyzes bed need for a particular target population currently served by JPS: adults eligible for JPS Connection and Medicare beneficiaries below 250% FPL. Similar to primary care and specialty care analyses, the percentage of need being met is estimated now and in the future, with some of the need being met by other Tarrant County hospitals. The table demonstrates that if the current number of beds were to be maintained, the percent of bed need met by JPS for the target population would decrease from 34% to 23% between now and 2037.

JPS currently has 406 medical beds and would require an additional 100 beds in 2037 if they were just to continue to meet demand for 34% of this population; however, the significant queues for admission at the JPS emergency room certainly indicate that a larger percentage of the need should be met at JPS. In any particular day, it is not unusual to have 40 people waiting for a medical bed at JPS.

Table 45: Acute Medical Hospital Bed Needs for JPS Connection-eligible Population and Medicare <250% FPL- Tarrant County, TX

Acute Medical Hospital Bed Needs for JPS Connection-eligible plus Medicare < 250% FPL Population - Tarrant County, TX					
	2017	2022	2027	2032	2037
Beds needed per thousand adjusted for payer mix and bed need reductions in Table 44, and changing demographics	1.547	1.560	1.563	1.563	1.553
Number of beds needed for target population (JPS Connection-eligible and Medicare <250% FPL)	659	737	810	890	964
Total JPS acute care hospital beds	406	406	406	406	406
Number of beds available for target population+	224	224	224	224	224
Percent of bed need met by JPS for target population	34%	30%	28%	25%	23%

+Estimated percentage of JPS beds used by JPS Connection, Medicare and Self-Pay (based on 2016 charges) is 55.1%.

Note: Methods used to calculate the need for acute care hospital beds are described in detail in the Appendix.

Appendix: Methodology for PCP, Health Center, Specialists and Inpatient Bed Needs

Projections for primary care providers and health centers

Estimates of primary care needs of the population were calculated using two methods.

1. Population age under 65: Primary care visits per person were used from the National Ambulatory Medical Care Survey. These visits per person were multiplied by the population, resulting in total visits. The total visits were divided by the number of expected visits per primary care FTE. Expected visits for each primary care FTE were calculated based on the number of primary care visits in the U.S., the number of primary care providers in the U.S., and an estimate of the average time spent in clinical work. This calculation resulted in 3,574 expected visits per primary care provider. Visits per FTE is institution-dependent but 3,600 is not an unreasonable average number to project in the safety net with some FTEs representing new hires and some FTEs having other non-clinical responsibilities. The result is a number of expected FTEs for the population under age 65 and under 250% poverty which is 343 in 2017.

2. Populated age 65 and older: A similar process was used for age over 65 population, with the exception of the number of primary care visits which were calculated based on Medicare data rather than the National Ambulatory Care Survey. The Medicare visits per beneficiary are based on the average revenue per primary care practice divided by the Medicare per beneficiary payments for primary care. This gives the number of Medicare beneficiaries an FTE could see. Taking the number of visits seen by a primary care provider and dividing this by the number of Medicare beneficiaries for an FTE gives the number of visits on average for each beneficiary (2.949). Multiplying by 1,000 gives the rate of visits per 1,000 beneficiaries.

Projections for specialists

In order to estimate the specialty needs for the defined populations, one methodology was used for the non-Medicare population and these results were adjusted to reflect the needs of the Medicare population. The specialty need population assumptions were derived from multiple sources including the Graduate Medical Education National Advisory Council, the American Medical Association, Mulhausen Staff Model HMO, and various other public and non-public sources. The populations served in the source materials were heterogeneous, as were the models of care that were assessed (ranging from highly managed to fee-for-service). Across sources, the highest and lowest estimates for each specialty were dropped and the remaining averaged. In addition to these benchmarks, HMA used data from prior engagements in safety net systems for select specialties when adequate data were available. Importantly, the safety net experience modifies, rather than substitutes for, the multiple sources above. The second column (Medicaid/Safety Net Population Served by One FTE) in Table A-1 shows this estimate.

To estimate the needs among those ages 65 and over, a Medicare adjustment was applied, derived from select specialties. To determine the adjustment, the total number of Medicare beneficiaries (52.5 million) was divided by a 2013 Medicare NPI analysis of number of specialists serving Medicare beneficiaries, adjusted for the percentage of Medicare patients likely in a given specialty practice (see Table A-2). The adjuster for each specialty is reflected in the fourth column of Table A-1. Finally, the sum of visits by Medicare beneficiaries within the model was summed and the population served for each specialty adjusted so that the total visits matched the Medicare published figures for specialty visits per

beneficiary. The resulting estimate of the population served by one specialist is in the 5th column of Table A-1.

The resultant model was tested against the actual number of specialists in Tarrant County in 2011 with an average result 109%, meaning that the actual number of specialists in Tarrant County is somewhat higher than predicted by the needs model, but very close. The number of specialists predicted in the model, which does not include all specialties, in Tarrant County is 1,624, and the actual in 2011 was 1,939. Both indicate the model is somewhat conservative, which is a reasonable outcome given that the analysis is for the safety net.

Table A-1: Specialty FTEs needed and model testing

Specialty FTEs needed and model testing									
	Estimated population served in population <250%				Test of model in *entire* population of Tarrant County (actual vs. predicted)				
Specialty	Medicaid/ Safety Net Population Served by One FTE[1]	Multi-source estimate[2]	Medicare Adjustment Factor[3]	Medicare Population Served by One FTE	Specialists per 100,000 Ft. Worth Hospital Referral Region 2011[4]	Total population served by one specialist Ft. Worth 2011	Predicted need for all Tarrant County in model	Actual FTEs in Tarrant County	Percent predicted
Allergy & Immun	96,967	96,967	70%	101,309	0.7	142,857	19.4	13.2	68%
Cardiology	32,258	31,256	15%	7,222	4.7	21,277	78.3	88.8	113%
CV Surgery	87,684	87,684	15%	19,631	no data	no data	28.8	n/a	n/a
Child Psychiatry	27,000	27,000	n/a	not applicable	no data	no data	20.5	n/a	n/a
Dermatology	45,455	44,883	35%	23,745	2.5	40,000	45.3	47.2	104%
Endocrinology	121,929	121,929	35%	63,694	0.6	166,667	16.9	11.3	67%
Gastroenterology	47,911	47,911	35%	25,028	3.5	28,571	42.9	66.1	154%
Hem-Onc	50,000	53,690	15%	11,194	2.9	34,483	50.5	54.8	108%
Infect. Disease	132,000	132,000	70%	137,910	0.9	111,111	14.3	17.0	119%
Neonatology[7]	105,263	187,000	n/a	not applicable	1.4	71,429	19.2	26.4	138%
Nephrology	111,995	111,995	15%	25,074	2.2	45,455	22.5	41.6	184%
Neurology	55,556	49,933	15%	12,438	2.9	34,483	45.5	54.8	121%
Neurosurgery	85,467	85,467	35%	44,647	no data	no data	24.1	n/a	n/a
Ophthalmology	30,303	21,103	35%	15,830	no data	no data	67.9	n/a	n/a
Ortho Surgery	21,235	21,235	35%	11,093	no data	no data	96.9	n/a	n/a
Otolaryngology	39,508	39,508	35%	20,639	no data	no data	52.1	n/a	n/a
Ped Allergy	271,000	271,000	n/a	not applicable	no data	no data	2.0	n/a	n/a
Ped Card	356,000	356,000	n/a	not applicable	no data	no data	1.6	n/a	n/a
Ped Endoc	304,000	304,000	n/a	not applicable	no data	no data	1.8	n/a	n/a
Ped Hem-Onc	148,000	148,000	n/a	not applicable	no data	no data	3.7	n/a	n/a
Ped Nephrology	696,000	696,000	n/a	not applicable	no data	no data	0.8	n/a	n/a
Phys Med& Rehab	76,000	76,000	35%	39,701	no data	no data	27.1	n/a	n/a
Plastic Surgery	70,000	70,000	70%	73,134	no data	no data	26.9	n/a	n/a
Psychiatry	11,757	11,757	70%	12,283	no data	no data	160.0	n/a	n/a
Pulm diseases	78,453	78,453	35%	40,983	0.8	125,000	26.2	15.1	58%
Rheumatology	83,333	120,348	35%	43,532	0.6	166,667	24.7	11.3	46%
Surgery, General	12,650	12,650	35%	6,608	no data	no data	162.6	n/a	n/a
Thoracic Surgery	128,991	128,991	15%	28,879	no data	no data	19.6	n/a	n/a
Urology	40,000	36,541	15%	8,955	no data	no data	63.1	n/a	n/a
Anesthesiology	15,332	15,332	35%	8,009	no data	no data	134.2	n/a	n/a
Emergency Med	19,798	19,798	35%	10,342	7.5	13,333	103.9	141.7	136%
Pathology	20,000	20,000	35%	10,448	no data	no data	102.8	n/a	n/a
Radiology	17,402	17,402	35%	9,091	no data	no data	118.2	n/a	n/a
						Total	1,624	Average	109%

Assumptions: Visits analysis adjustment[5]: 67%

[1]Includes modification based on data from multiple county-level safety net institutions for specialties where available.

Uses just the multi-source estimate where further safety net data not available.

[2]*Health Management Associates, based on multiple sources including but not limited to:*

Graduate Medical Education National Advisory Council

Health Manpower Report

Solucient (from Merritt and Hawkins paper), based on 2003 data

[3]*See Tab titled "Spc Bnchmrk Medicare Modifier"*

[4]*Dartmouth Atlas: http://www.dartmouthatlas.org/data/map.aspx?ind=141*

[5]*An adjustment to create a total Medicare visit rate that is in line with CMS visit numbers for beneficiaries*

[6]*Dartmouth atlas 2011 total specialist per 100,000 population was 104.8 multiplied by 1.85M in 2011*

[6]*Dartmouth atlas 2011 subspecialist per 100,000 population 50th percentile 0.95 per 100,000*

Table A-2: Total Specialty FTEs needed for population <250% poverty

Total Specialty FTEs needed for population <250% poverty								
	Existing JPS FTEs	Estimated need Tarrant County 2017	Percent of need met by FTEs	Wait times (months)	Estimated need Tarrant County (<250 FPL as per whole table)			
Specialties					2022	2027	2032	2037
Allergy & Immun	0	7.6	0%	no data	8.4	9.2	10.1	11.0
Cardiology	8	30.5	26%	no data	35.0	39.8	45.3	51.0
Cardiovasc Surgery	5	11.2	45%	1 to 2	12.9	14.6	16.7	18.8
Child Psychiatry	1	24.6	4%	no data	26.9	29.0	31.4	33.7
Dermatology	1	17.6	6%	12	19.8	22.0	24.4	26.9
Endocrinology	2.5	6.6	38%	4 to 10	7.4	8.2	9.1	10.0
Gastroenterology	7.8	16.7	47%	5 to 12	18.8	20.8	23.2	25.6
Hematology-Onc	8.0	19.7	41%	no data	22.6	25.7	29.2	32.9
Infectious Diseases	4	5.5	72%	8	6.2	6.8	7.4	8.1
Neonatology	11.5	6.3	182%	no data	6.9	7.5	8.1	8.6
Nephrology	6	8.8	68%	4 to 12	10.1	11.5	13.1	14.7
Neurology	4.4	17.7	25%	4 to 12	20.3	23.1	26.3	29.6
Neurosurgery	2	9.4	21%	2	10.5	11.7	13.0	14.3
Ophthalmology	7	26.4	26%	12	29.7	32.9	36.7	40.4
Orthopedic Surgery	9.7	37.7	26%	2 to 9	42.3	47.0	52.3	57.7
Otolaryngology	2.2	20.3	11%	3 to 4	22.7	25.3	28.1	31.0
Ped Allergy	0	2.5	0%	no data	2.7	2.9	3.1	3.4
Ped Cardiology	0	1.9	0%	no data	2.0	2.2	2.4	2.6
Ped Endocrinology	0	2.2	0%	no data	2.4	2.6	2.8	3.0
Ped Hem-Onc	0	4.5	0%	no data	4.9	5.3	5.7	6.1
Ped Nephrology	0	1.0	0%	no data	1.0	1.1	1.2	1.3
Phys Med & Rehab	5	10.5	47%	4	11.8	13.1	14.6	16.1
Plastic Surgery	1	10.5	10%	no data	11.6	12.7	14.0	15.2
Psychiatry	32	62.3	51%	no data	69.1	75.8	83.3	90.8
Pulmonary diseases	2	10.2	20%	10	11.5	12.7	14.2	15.6
Rheumatology	2.4	9.6	25%	4	10.8	12.0	13.3	14.7
Surgery, General	9	63.3	14%	2 to 5	71.0	78.9	87.8	96.8
Thoracic Surgery	1	7.6	13%	no data	8.8	9.9	11.3	12.8
Urology	2.6	24.6	11%	6 to 9	28.3	32.1	36.5	41.1
Anesthesiology	77	52.2	147%	no data	58.6	65.1	72.5	79.9
Emergency Med	90	40.4	223%	n/a	45.4	50.4	56.1	61.9
Pathology	8.5	40.0	21%	n/a	44.9	49.9	55.5	61.2
Radiology	6.5	46.0	14%	n/a	51.6	57.3	63.8	70.4
TOTAL	317	656			737	819	913	1007

Notes:

- *Cardiology, oncology, and psychiatry estimated based on number of outpatient visits*
- *Some specialties do not fully match between JPS and benchmark sources (e.g. 4 FTEs sports medicine placed in physical medicine, 3 FTE optometry added to ophthalmology)*
- *OB/Gyn not assessed, primary care separate*
- *Specialty FTEs not in table: 36.6 hospitalists, 6 intensivists, 7 pain management, 4.4 podiatrists, 43 OB/Gyn*

Table A-3: Medicare Modifiers for Population Served per FTE by Specialty Types

Medicare Modifiers for Population Served per FTE by Specialty Types					
Specialty	Number of providers[2]	Percent of usual practice[3]	Population served by one FTE	Safety net/Medicaid population served by one FTE	Percent of Safety Net/Medicaid Benchmark
Hematology/Oncology	10,323	65%	7,825	53,690	15%
Ophthalmology	14,473	50%	7,256	21,103	34%
Rheumatology	3,769	40%	34,828	120,348	29%
Radiation Oncology	3,912	65%	20,649	61,000	34%
Dermatology	7,492	40%	17,521	44,883	39%
Cardiology	19,650	60%	4,453	31,256	14%

Based on above analysis, the following modifiers to the Safety Net/Medicaid population served by one FTE are used in subsequent analysis:

- High geriatric concentration specialties 15%
- Medium geriatric concentration 35%
- Low geriatric concentration 70%
- Very low 140%
- Number of Medicare beneficiaries: 52,506,598

[1]Kaiser Medicare Number: http://kff.org/medicare/state-indicator/total-medicare-beneficiaries/?currentTimeframe=2

[2]2013 - NPI analysis for Medicare www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-sheets/2015-Fact-sheets-items/2015-06-01-2.html

[3]60% of all cancers occur in age > 65, 70% of cancer deaths: http://www.hopkinsmedicine.org/gec/series/cancer_aging.html

Projections for Psychiatric Bed Needs

Determining how many inpatient beds a community needs within the private or publicly funded behavioral health system is difficult at best. It is universally agreed across the behavioral health field that the need for inpatient psychiatric beds must be evaluated in the context of the full array of available state and community mental health services. The Treatment Advocacy Center (TAC), considered the experts on this topic, published a white paper in 2008, describing a standard ratio of 50 *public* behavioral health beds for every 100,000 people.[i] The recommendation includes adult, children and forensic beds but did not provide estimates for each group. In March of 2016, TAC updated its recommendations to 60-80 beds per 100,000 including adult, child and forensic beds.[ii] Per the American Association of Geriatric Psychiatry and American Academy of Child and Adolescent Psychiatry, experts assert that there is no existing information available to determine number of inpatient beds needed for children and adolescents[iii] or geriatric populations[iv] specifically.

In the United States, the average number of beds per 100,000 declined 34% between 1998 and 2013, from 34 to 22 beds per 100,000, while suicide rates increased between 1999 and 2014 by 24%.[v] In 2016, the ratio of State facility beds to United States residents was a mere 11.7 beds per 100,000 people across the country.[vi]

In Texas, the Joint Commission on Access and Forensic Services' 2016 Legislative Report Forensic Plan reported an existing 2,463 public psychiatric beds across the state, equating to 10.5 beds per 100,000 Texans, as well as an estimated need to add 1,800 beds over the next eight years—1,400 immediately and 50 more each year to keep up with population growth. The report recommended that beds be

added through "a significant initial expansion of state-operated and state-funded inpatient capacity," to include additional maximum security beds, followed by a gradual increase in beds to meet both the current and future demand.[vii] According to Cannon Design's 2015 report, the estimated total need for privately and publicly funded inpatient beds in Texas was 5,425 beds in 2014, a number that will increase to 6,032 by 2024, a growth of 607 beds in the next 10 years.[viii]

In 2016 existing bed estimates within Tarrant County for children and adolescents included:

- 11 beds dedicated to children <12 years old (Cook)
  - Millwood serves children (including under age 12), with a fluctuating, flexible total number of dedicated beds
- 16 beds dedicated to adolescents >12 years old (JPS)
- 60 beds dedicated to children and youth ages 5 – 18 years old (Sundance)

JPS inpatient beds represent approximately 24% of the total dedicated psychiatric beds (does not include the med/psych beds) in Tarrant County:

- 132 total psychiatric beds
  - 116 adult beds
  - 16 adolescent beds
- 15 med/psych beds

Due to lack of capacity, fiscal year 2015 JPS transferred 3,100 patients to other hospitals for inpatient admission. JPS paid $3.1M dollars to private hospitals for these patients who had no resources. Of the patients admitted at JPS, 80% are civil commitment or involuntary admissions. There are no dedicated forensic beds at JPS currently.

For the purpose of estimating future psychiatric bed needs, the following assumptions were used:

1. Over time with the development and investment of community-based services, diversion programming and enriched evidence based services, Tarrant County will be able to effectively manage inpatient psychiatric admissions with lower bed numbers. Therefore, estimates used half of the public bed estimate from the current literature, equating to 35 public beds/100,000 people.
2. Given JPS' positive performance with the most complex patients, 50% of public bed need in Tarrant County should be located within the JPS facility.
3. Given lack of available beds within the state psychiatric facilities and similar growth needs, estimates do not include these beds. If new state beds become available or JPS is able to refer more patients to these facilities bed recommendations should be revised.
4. JPS will continue to contract with private facilities and identify opportunities to support improved outcomes for complex patients at these facilities, as well as direct lower need patients to private facilities.
5. If any of the above assumption is not correct, revised estimates will be required.

Projections for Acute Medical Hospital Bed Needs

In determining bed acute medical hospital bed needs, an assumption was made that the current beds in all of Tarrant County, taken as a whole, are just adequate to meet the needs of the population. This assumption is supported by the fact that the area is near the 50th percentile of beds per population per Dartmouth Atlas data. Bed needs have been steadily falling throughout the U.S. and are significantly lower than Tarrant County in many areas (see Table A-4). Some continued reduction should be assumed when estimating bed needs. For this bed estimate, a 5% reduction in bed needs in each five year period

is assumed, eventually lowering beds per thousand from the 50th percentile of hospital service areas to what would have been the 10th percentile in 2012 (1.65 beds per thousand).

The bed estimates for the target population, defined as the JPS Connection-eligible population and Medicare below 250% poverty, were derived by creating a beds per 1,000 specific to the population mix and adjusted to the projected rate in Tarrant County. JPS Connection population was assumed to have a hospitalization rate similar to other uninsured populations in US, in terms of ratios, not absolute numbers. A hospital bed rate was calculated for the whole US and this was then adjusted to a bed rate consistent with Tarrant County.

Table A-4: Method for defining bed demand in target population of JPS Connection-eligible and Medicare < 250% FPL

Payer bed demand rates*							
Payer	Total Admits in US, 1,000s	Length of Stay	Bed-days in 1,000s	Beds filled if 100% occupancy	Estimated Population in 2012, Millions	Beds filled (if 100% occupancy) per 1,000	Adjusted to weighted average of 2.0 beds per 1,000
Medicare	14,300	5.2	74,360	203,726	52.0	3.9	5.7
Medicaid	7,600	4.3	32,680	89,534	54.1	1.7	2.4
Insured	11,200	3.8	42,650	116,603	159.9	0.7	1.1
Uninsured	2,000	4.0	8,000	21,918	48.0	0.5	0.7
			Total	431,781	314.0	1.4	2.0

*Overview of Hospital Stays in the United States, Statistical Brief #180, 2012, AHRQ

The rates of 5.7 beds per thousand for Medicare and 0.7 for uninsured were then used to define the blended rate for target population in each of the years based on the population blend in those years. The hospital rate for this target population was fairly steady because the increasing proportion of elderly increased the rate at the same time that assumed improvements in care coordination and primary care access pushed the rate down, reflected in Beds per Thousand in Table A-1.

[i] Torrey F, Entsminger K, Geller J, Stanley J, Jaffe DJ: The Shortage of Public Hospital Beds for the Mentally Ill, Treatment Advocacy Center (TAC) white paper, 2008

[ii] Interview with Torrey Fuller MD, Treatment Advocacy Center – 12/16/2016

[iii] Interview Dan Sewell, MD, President of the American Association of Geriatric Psychiatry – 12/20/2016

[iv] Interview Gregory Fritz, MD, President American Association of Child and Adolescent Psychiatry - 12/22/2016

[v] http://jamanetwork.com/journals/jama/fullarticle/2580183

[vi] Torrey, E. F., Fuller, D. A., Geller, J., Jacobs, C., & Ragosta, K. (2012). No room at the inn: Trends and consequences of closing public psychiatric hospitals. Arlington, VA: Treatment Advocacy Center.

[vii] Retrieved from https://www.dshs.texas.gov/mhsa/SB1507/SB-1507.aspx

[viii] http://www.dshs.texas.gov/legislative/2015/Rider83-state-hospital-long-term-plan.pdf