

APPENDIX 2

NARRATIVE

2. Project Description

Mass General Brigham Incorporated (“Applicant” or “MGB”), with a principal place of business located at 800 Boylston Street, Suite 1150, Boston, Massachusetts 02199, is filing a Notice of Determination of Need (“Application”) with the Massachusetts Department of Public Health (“Department” or “DPH”) to acquire a computed tomography (“CT”) unit for operation at Cooley Dickinson Hospital (“CDH” or the “Hospital”), located at 30 Locust Street, Northampton, Massachusetts 01060. CDH currently has two CT units. The proposed third CT unit will be located in the Emergency Department (“ED”). With the addition of the proposed unit, CDH will have CT imaging capacity to meet the needs of its Patient Panel.

The Applicant is a non-profit corporation with its principal office located at 800 Boylston Street, Suite 1150, Boston, Massachusetts 02199. The Applicant is the parent organization of a charitable, integrated health care system and it includes community and specialty hospitals, hospitals specialized in inpatient and outpatient services in behavioral health, rehabilitation medicine and ophthalmology and otolaryngology, a home health agency, a nursing home and a physician network with approximately 7,500 employed and affiliated primary care and specialty care physicians. The Applicant also operates a non-profit managed care organization and a for-profit insurance company that collectively provide health insurance and administrative services products to the MassHealth Program (Medicaid), ConnectorCare, and commercial populations. The Applicant maintains the largest non-university-based, non-profit, private medical research enterprise in the United States, and its hospitals are principal teaching affiliates of Harvard University’s medical and dental schools, and it operates a graduate level program for health sciences.

The need for the Proposed Project is based on existing and future needs of CDH’s Patient Panel. Currently, CDH offers patients access to CT imaging on two units. Both CT units are operating near capacity as evidenced by historical CT volume trends and long wait times to schedule outpatient scans. Population projections substantiate the need for access to expanded CT imaging services as CDH’s Patient Panel is expected to grow, particularly with respect to the 65+ age patient cohort who require CT services to diagnose and treat age-related conditions. With a third CT unit, CDH also can provide expanded access to interventional radiology procedures.

The Proposed Project is consistent with Massachusetts’ goals for cost containment. With a third CT unit, patients will have timely access to CT, and as a result, timely diagnosis. Timely diagnosis allows for treatment to begin before the patient requires more costly care due to advanced disease. The new CT unit will be reimbursed at the same rate as the existing units and will not impact costs for payers or patients. Consequently, the Proposed Project will contribute to the Commonwealth’s goal of containing the rate of growth of total medical expenses and total healthcare expenditures.

In summary, the Proposed Project will meet an identified need for CDH’s patients. Approval of Applicant’s request for a third CT unit will increase CT capacity, thereby improving public health outcomes, patient experience and meaningfully contributing to Massachusetts’ goals for cost containment. Accordingly, the Proposed Project meets the Determination of Need factors of review.

Factor 1: Applicant Patient Panel Need, Public Health Values and Operational Objectives

F1.a.i Patient Panel:
Describe your existing Patient Panel, including incidence or prevalence of disease or behavioral risk factors, acuity mix, noted health disparities, geographic breakdown expressed in zip codes or other appropriate measure, demographics including age, gender and sexual identity, race, ethnicity, socioeconomic status and other priority populations relevant to the Applicant’s existing patient panel and payer mix.

A. Mass General Brigham Incorporated Patient Panel

MGB¹ serves a large and diverse Patient Panel as demonstrated by the utilization data for the 36-month period covering Fiscal Years² ("FY") 2020 through FY22. The number of patients utilizing MGB's services has increased since FY20, with 1,567,944 unique patients in FY20; 1,725,378 unique patients in FY21; and 1,792,288 unique patients in FY22, an increase of 14.31% from FY20 to FY22. The following table illustrates the demographics of MGB's Patient Panel.

TABLE 1: MGB Patient Panel

Patient Demographics	FY20 Count	FY20 %	FY21 Count	FY21 %	FY22 Count	FY22 %
MGB Total	1,567,944	N/A	1,725,378	N/A	1,792,288	N/A
Gender - Female	901,965	57.5%	991,605	57.5%	1,030,477	57.5%
Gender - Male	665,825	42.5%	733,594	42.5%	761,516	42.5%
Gender -Other/Unknown	154	0.0%	179	0.0%	295	0.0%
Age - 0-17	146,914	9.4%	171,720	10.0%	192,945	10.8%
Age - 18-64	935,519	59.7%	1,045,615	60.6%	1,087,412	60.7%
Age - 65+	485,464	31.0%	508,022	29.4%	511,899	28.6%
Age - Unknown	47	0.0%	21	0.0%	32	0.0%
Race - American Indian or Alaska Native	3,061	0.2%	3,306	0.2%	3,503	0.2%
Race - Asian	70,070	4.5%	79,049	4.6%	88,137	4.9%
Race - Black or African American	86,510	5.5%	95,367	5.5%	99,490	5.6%
Race - Hispanic/Latino	226	0.0%	221	0.0%	192	0.0%
Race - Native Hawaiian or Other Pacific Islander	1,106	0.1%	1,242	0.1%	1,344	0.1%
Race - Other/Unknown	223,127	14.2%	253,400	14.7%	276,741	15.4%
Race - White	1,183,844	75.5%	1,292,793	74.9%	1,322,881	73.8%
Patient Origin - HSA 1	99,772	6.4%	107,934	6.3%	111,279	6.2%
Patient Origin - HSA 2	55,629	3.5%	70,848	4.1%	72,924	4.1%
Patient Origin - HSA 3	96,078	6.1%	103,048	6.0%	105,250	5.9%
Patient Origin - HSA 4	660,451	42.1%	726,474	42.1%	754,979	42.1%
Patient Origin - HSA 5	185,016	11.8%	205,036	11.9%	214,108	11.9%
Patient Origin - HSA 6	207,877	13.3%	226,181	13.1%	233,937	13.1%
Patient Origin - In MA but not in HSA 1-6	25	0.0%	28	0.0%	38	0.0%
Patient Origin - Outside of MA	259,006	16.5%	282,420	16.4%	295,425	16.5%
Patient Origin - Unknown	4,090	0.3%	3,409	0.2%	4,348	0.2%

¹ Utilization of patient care services at the following MGB provider organizations was used to determine the Applicant's Patient Panel: Massachusetts General Hospital, Brigham and Women's Hospital, Newton Wellesley Hospital, North Shore Medical Center, Brigham and Women's Faulkner Hospital, Martha's Vineyard Hospital (post-Epic data only), Nantucket Cottage Hospital (post-Epic data only), Cooley Dickinson Hospital (post-Epic data only), Massachusetts Eye and Ear Infirmary (post-Epic data only), Spaulding Rehabilitation Hospital (Telehealth, Partners Mobile Observation Unit (PMOU), Home Hospital (HH) programs for GH and BWH, Stay Connected with GH, Lifeline, CareSage programs are not included), McLean Hospital (post-Epic data only), Massachusetts General Physicians Organization, Brigham and Women's Physicians Organization, North Shore Physicians Group, Newton Wellesley Medical Group, Cooley Dickinson PHO (post-Epic data only), Partners Community Physicians Organization (excluding pre-Epic non-risk patients), and Wentworth-Douglas Hospital (out-of-state hospital included in FY20 data, resulting in increased unique patients from out-of-state patients for FY20).

² The Applicant's fiscal year is from October 1 – September 30. The fiscal year data was pulled as of January 3, 2023.

Age: Data for FY20-FY22 show that the majority of MGB's Patient Panel is between the ages of 18-64 (ranging from 59.7%-60.7%), followed by 65+ and 0-17 age cohorts, respectively.

Gender: MGB's Patient Panel is approximately 57.5% female and 42.5% male. These percentages remained unchanged between FY20 and FY22.

Race and Ethnicity: Data based on self-reporting demonstrates that between FY20 and FY22, the majority of MGB's patients self-identified as White (74.73%). Patients also self-identified as African American (5.53%); Asian (4.67%); American Indian or Alaska Native (0.2%); Native/Hawaiian or Other Pacific Island (0.1%); and Hispanic/Latino (0%). Since patients were grouped into these categories based on how they self-identified, there is a portion of the patient population (14.77% on average) that either chose not to report their race or identified as a race that did not align with the above categories. As a result, it is important to note that the racial composition of MGB's patients may be understated. Also, all percentages were largely unchanged between FY20 and FY22.

Payer Mix: Between FY20 and FY22, on average 37.61% of all MGB patients were covered by Commercial PPO/Indemnity Plans; followed by, on average, approximately 22.05% of patients covered by Medicare, 19.64% of patients covered by Commercial HMO/POS, 6.59% of patients covered by Commercial Medicare, 5.97% of patients covered by Other, 5.93% of patients covered by MassHealth, and 2.22% of patients covered by Managed Medicaid. Percentages were largely unchanged between FY20 and FY22. Payer mix for MGB is illustrated in the table below.

Payer Group	FY20	FY21	FY22
Commercial (PPO/Indemnity) ³	37.95%	37.44%	37.45%
Commercial (HMO/POS) ⁴	19.94%	19.78%	19.19%
Medicare ⁵	22.39%	22.16%	21.59%
Commercial Medicare	5.68%	6.63%	7.45%
MassHealth	5.94%	5.80%	6.04%
Managed Medicaid	2.27%	2.15%	2.25%
Other ⁶	5.83%	6.04%	6.03%
Total	100.00%	100.00%	100.00%

MGB provides care to patients from a broad range of geographies. Although MGB's patients reside mainly in eastern Massachusetts, there is a sizeable portion of its Patient Panel who reside outside of Massachusetts. On average, between FY20 and FY22, 278,950 patients or 16.5% of patients were not residents of Massachusetts. Applying DPH Health Services Area ("HSA") categories to FY20-FY22 data, approximately 42.1% of MGB's patients reside in HSA 4 (713,968 patients); 13.2% reside in HSA 6 (222,665 patients); 11.9% reside in HSA 5 (201,386 patients); 6.3% reside in HSA 1 (106,328 patients); 6% reside in HSA 3 (101,458 patients); 3.9% reside in HSA 2 (66,467 patients); and 0% reside in Massachusetts but outside of HSAs 1-6 (28 patients). The remaining approximately 0.2% of MGB's patients (3,949 patients) have an unknown origin.

B. Cooley Dickinson Hospital Patient Panel

CDH⁷ has 140 licensed beds for the following services: medical/surgical, intensive care unit, pediatric, obstetrics, and psychiatric. In addition to its main hospital campus in Northampton, CDH offers services to

³ Commercial plans without an identified product type were included in the PPO/Indemnity product category.

⁴ Includes ConnectorCare plans.

⁵ Includes Medicare supplements.

⁶ Includes Free Care, TriCare, VA, Uninsured COVID-19 tests, Workers Compensation, International, and other uncategorized plans.

⁷ Utilization of patient care services at the following MGB organizations was used to determine CDH's Patient Panel: Cooley Dickinson Hospital and Cooley Dickinson Physicians Organization.

patients at hospital satellite locations throughout the Pioneer Valley in Western Massachusetts. Like MGB, the number of patients utilizing CDH's services increased from FY20 to FY22, with 94,912 unique patients in FY20; 106,054 unique patients in FY21; and 108,778 unique patients in FY22, an increase of 14.61%. Between FY20 and FY22, CDH's primary service area included: Cummington, Goshen, Williamsburg, Chesterfield, Florence, Westhampton, Northampton, Easthampton, Southampton, Hatfield, Whately, Amherst, and Pelham. The following table illustrates the demographics of CDH's Patient Panel.

TABLE 2: CDH Patient Panel

Patient Demographics	FY20 Count	FY20 %	FY21 Count	FY21 %	FY22 Count	FY22 %
CDH Total	94,912	N/A	106,054	N/A	108,778	N/A
Gender - Female	55,686	58.7%	61,997	58.5%	62,880	57.8%
Gender - Male	39,194	41.3%	44,009	41.5%	45,795	42.1%
Gender - Other/Unknown	32	0.0%	48	0.0%	103	0.1%
Age - 0-17	8,797	9.3%	10,825	10.2%	11,125	10.2%
Age - 18-64	55,448	58.4%	62,650	59.1%	65,977	60.7%
Age - 65+/Unknown ⁸	30,667	32.3%	32,579	30.7%	31,676	29.1%
Race - American Indian or Alaska Native	203	0.2%	237	0.2%	244	0.2%
Race - Asian	2,195	2.3%	2,407	2.3%	2,848	2.6%
Race - Black or African American	2,374	2.5%	2,594	2.4%	2,801	2.6%
Race - Native Hawaiian or Other Pacific Islander	45	0.0%	50	0.0%	51	0.0%
Race - Other/Unknown	16,397	17.3%	18,686	17.6%	19,226	17.7%
Race - White	73,698	77.6%	82,080	77.4%	83,608	76.9%
Race - Hispanic/Latino	0	0.0%	0	0.0%	0	0.0%
Patient Origin - HSA_1	87,940	92.7%	96,967	91.4%	99,866	91.8%
Patient Origin - HSA_2	866	0.9%	2,148	2.0%	1,184	1.1%
Patient Origin - HSA_3	255	0.3%	296	0.3%	373	0.3%
Patient Origin - HSA_4	1,314	1.4%	1,687	1.6%	1,770	1.6%
Patient Origin - HSA_5	559	0.6%	614	0.6%	693	0.6%
Patient Origin - HSA_6	279	0.3%	342	0.3%	398	0.4%
Patient Origin - Outside of MA	3,654	3.8%	3,964	3.7%	4,430	4.1%
Patient Origin - Unknown/In MA but not in HSA 1-6 ⁹	45	0.0%	36	0.0%	64	0.1%

Age: Similar to MGB's Patient Panel, data for FY20-FY22 show that the majority of CDH's Patient Panel is between the ages of 18-64 (ranging from 58.4%-60.7%), followed by 65+ and 0-17 age cohorts, respectively.

Gender: CDH's Patient Panel is approximately 58.3% female, 41.6% male, and 0% unknown. These percentages remained largely unchanged between FY20 and FY22.

Race and Ethnicity: Data based on self-reporting demonstrates that between FY20 and FY22, the majority of CDH's Patient Panel self-identified as White (77.3%). Patients also self-identified as African American (2.5%); Asian (2.4%); American Indian or Alaska Native (0.2%); Native/Hawaiian or Other Pacific Island (0.1%); and Hispanic/Latino (0%). Since patients were grouped into these categories based on how they self-identified, there is a portion of the patient population (17.53% on average between FY20-FY22) that either chose not to report their race or ethnicity or identified as a race or ethnicity that did not align with the

⁸ Includes both "65+" and "Unknown" for confidentiality due to regulations around data with counts less than 11.

⁹ Includes both "Unknown" and "In MA but not in HSA 1-6" due to regulations around data with counts less than 11.

above categories. Therefore, it is important to note that the racial/ethnic composition of CDH's patients may be understated. All percentages were largely unchanged between FY20 and FY22. MGB's Patient Panel followed a similar order in predominance with respect to race and ethnicity.

Payer Mix: Between FY20 and FY22, on average, 37.17% of all CDH patients were covered by Medicare; followed by, on average, approximately 17.7% of patients covered by Commercial HMO/POS; 15.63% of patients covered by Commercial PPO/Indemnity; 11.87% of patients covered by Commercial Medicare, 9.4% of patients covered by MassHealth, 5.5% of patients covered by Other, and then 2.7% of patients covered by Managed Medicaid. Commercial (HMO/POS) percentages decreased by 3.7% from FY20 to FY22, and other payer group percentage were largely unchanged between FY20 and FY22. Payer mix for CDH is illustrated in the table below.

Payer Group	FY20	FY21	FY22
Commercial (PPO/Indemnity) ¹⁰	15.2%	15.7%	16.0%
Commercial (HMO/POS) ¹¹	19.7%	17.4%	16.0%
Medicare ¹²	37.8%	37.0%	36.7%
Commercial Medicare	10.0%	12.1%	13.5%
MassHealth	9.1%	9.7%	9.4%
Managed Medicaid	2.5%	2.7%	2.9%
Other ¹³	5.6%	5.4%	5.5%
Total	100.00%	100.00%	100.00%

CDH's Patient Panel mainly resides in Western Massachusetts. However, there is a small portion of its Patient Panel who reside outside of Massachusetts. On average, between FY20 and FY22, 4,016 patients or 3.9% of patients were not residents of Massachusetts. Applying DPH's HSA categories to FY20-FY22 data, approximately 91.97% of CDH's patients reside in HSA 1 (94,924 patients); 1.5% reside in HSA 4 (1,590 patients); 1.3% reside in HSA 2 (1,399 patients); 0.6% reside in HSA 5 (622 patients); 0.3% reside in HSA 6 (339 patients); and 0.3% reside in HSA 3 (308 patients). The remaining approximately 0.03% of CDH's patients (48 patients) either reside in Massachusetts but outside of HSAs 1-6 or their origin is unknown.

F1.a.ii Need by Patient Panel:

Provide supporting data to demonstrate the need for the Proposed Project. Such data should demonstrate the disease burden, behavioral risk factors, acuity mix, health disparities, or other objective Patient Panel measures as noted in your response to Question F1.a.i that demonstrates the need that the Proposed Project is attempting to address. If an inequity or disparity is not identified as relating to the Proposed Project, provide information justifying the need. In your description of Need, consider the principles underlying Public Health Value (see instructions) and ensure that Need is addressed in that context as well.

Applicant seeks to add a third CT unit at CDH to meet growing demand for CT imaging by CDH's Patient Panel. CDH currently operates two CT units in the Hospital's radiology suite. For the past three years, CT utilization at CDH increased significantly and CDH projects that the need for CT services will continue to increase into the future. The addition of a third CT unit within the ED will ensure continued and timely access to CT for the Patient Panel.

¹⁰ Commercial plans without an identified product type were included in the PPO/Indemnity product category.

¹¹ Includes ConnectorCare plans.

¹² Includes Medicare supplements.

¹³ Includes Free Care, TriCare, VA, Uninsured COVID-19 tests, Workers Compensation, International, and other uncategorized plans.

A. Historical Utilization

Since FY20, CT volume at CDH has increased each year. As illustrated in the table below, from FY20 to FY22 there was a 43.34% increase in total CT scan volume; a 63.58% increase in ED CT volume; and a 32.77% increase in all other CT scans volume. Further, in FY22, ED CT scan volume accounted for approximately 60% of CDH's CT volume.

Table 3: Historical CT Volume

CT Volume	FY20	Percent Change	FY21	Percent Change	FY22	Percent Change from FY20 to FY22
Emergency Department	5,005	25.45%	6,279	30.39%	8,187	63.58%
Total CT Volume (Excluding ED)	9,584	22.20%	11,712	8.65%	12,725	32.77%
Total	14,589	23.32%	17,991	16.24%	20,912	43.34%

As detailed in F1.a.i., from FY20 to FY22, the CDH's Patient Panel 65 and older age cohort grew by 3.29%. Notably, the number of patients 65 and older that received a CT scan (from 4,655 unique patients in FY20 to 6,358 unique patients in FY22) increased by 36.5%. In FY21 and FY22, over half of patients receiving CT scans were age 65 and older: 51.53%, 51.95%, respectively.

B. Impact of Demand on Access

The high utilization of CDH's existing CT service impacts CDH's ability to provide timely care. This impacts not only patients requiring CT for emergent conditions, but also scheduled outpatients. The Hospital's two CT units operated at 86% capacity in FY22. This high utilization indicates the need for an additional unit to support projected demand. The addition of a CT unit embedded in the ED will improve access and operational efficiencies for all patients in need of CT imaging.

CT is widely used to diagnose stroke. As a Primary Stroke Services Hospital¹⁴, the Emergency Medical Services system sends patients experiencing symptoms of a stroke to the CDH ED. Clinical guidelines for stroke recommend that stroke patients receive CT imaging within 25 minutes of arrival at the ED.¹⁵ CDH is able to achieve the recommended 25 minute door to CT scan time 81.2% of the time (the Massachusetts average is 70.7%). Although CDH performs better than many hospitals, CDH continues to work to improve door to CT scan time for all cases. Additionally, as a Stroke Center of Excellence, CDH is required to meet time requirements for patients eligible to receive tissue plasminogen activator ("TPA"), which is the gold standard treatment for ischemic stroke. Timely access to CT imaging is imperative to make a diagnosis and timely administer TPA. With additional capacity created by a third CT unit located in the ED, CDH will ensure timely access to CT for stroke patients.

¹⁴ To be designated a PSS Hospital, a hospital must be equipped to readily provide timely acute stroke evaluation and treatment, and "must provide emergency diagnostic and therapeutic services 24 hours-a-day, seven days-a-week to patients presenting with symptoms of acute stroke." *Primary Stroke Service validation*, Mass. Dep't of Pub. Health, <https://www.mass.gov/info-details/primary-stroke-service-pss-validation> (last visited Feb. 24, 2022). See also, *Designated Primary Stroke Services Hospitals*, Mass. Dep't of Pub. Health, <https://www.mass.gov/info-details/designated-primary-stroke-services-hospitals> (last visited Feb. 24, 2022).

¹⁵ See *Primary Stroke Services Time Target Recommendations*, Mass. Dep't of Pub. Health (June, 2009), <https://www.mass.gov/doc/pss-time-target-recommendations-0/download>; *Get With the Guidelines – Stroke Fact Sheet*, Am. Heart/Am. Stroke Ass'n (2018), https://www.heart.org/-/media/files/professional/quality-improvement/get-with-the-guidelines/get-with-the-guidelines-stroke/stroke-fact-sheet_final_ucm_501842.pdf?la=en&hash=7FA33C71D753DF7AB1D4850451C95BBE25BEA622.

Similar to stroke patients, other patients requiring an emergent CT scan are prioritized over less urgent exams. With only two CT units, scheduled outpatient CT scans are often delayed to accommodate ED patients. With ED CT volume increasing, the impact to scheduled CT patients increases. The average wait time for a CT from time ordered to CT scan is 14 days for outpatient imaging.¹⁶ With the proposed unit in the ED, outpatients will have full access to the existing two units, reducing wait times and delays currently experienced to accommodate emergent patients.

CT also is used for CT-guided interventional radiology procedures. Currently, CDH has limited interventional CT block times due to lack of flexibility in the schedule. Once an interventional procedure begins, it cannot be interrupted. Due to the need for access for emergent and inpatient cases and a full outpatient schedule, interventional procedures can only be scheduled on a limited basis. The addition of a third CT unit will allow the Hospital to increase the number of time slots for interventional radiology and thereby increase interventional CT access for patients. Ultimately, the addition of a third CT unit in the ED will allow CDH to address the high demand for CT services and ensure timely access to imaging services.

A third CT unit will also allow the Hospital to expand its lung cancer screening program. On February 10, 2022, the Centers for Medicare & Medicaid Services announced that it would expand eligibility coverage for low dose computed tomography ("LDCT") by lowering the starting age for screening from 55 to 50 years and reducing history of tobacco smoking from at least 30 packs per year to at least 20 pack per year. The expanded eligibility is expected to result in increased CT volume.

Finally, having a CT unit embedded in the ED will allow the hospital to shift ED volume to the new unit. ED patients will no longer need to be transported to the radiology department for CT, providing efficiencies and timely access to imaging. This also will allow the existing units to be utilized for scheduled outpatients, including increased interventional procedures.

C. Projected Growth and Future Demand

Based on historical volume trends that support projections for future demand, CDH expects CT volume will continue to grow. The projected volume increase is largely due to the opportunity the third unit will bring to allow the Hospital to meet unmet demand on its existing CT units for interventional radiology procedures and LDCT screening, as well as expected demand from an aging population. Following the first year, CT volume is projected to level off with approximately a 1% increase in volume for each fiscal year through 2027.

Further, the population of CDH's primary service area is projected to increase by approximately 2.68% from 2020 to 2035.¹⁷ In particular, the age 65 and older cohort is expected to grow by approximately 40.45% from 2020 to 2035.¹⁸ As the Patient Panel ages, CDH patients will present with higher acuity and more frequently require advanced diagnostic imaging, including CT. Table 4 below details the Hospital's CT volume projections following implementation of the Proposed Project.

¹⁶ This value does not include patients who need 3-month, 6-month or annual CT exams that are schedule in advance.

¹⁷ *Mass. Population Projections*, Univ. of Mass.: Donahue Inst. (Sept. 2018), <http://www.pep.donahue-institute.org/>.

¹⁸ *Id.*

Table 4: Projected CT Volume

CT Volume	FY23	Percent Increase	FY24	Percent Increase	FY25	Percent Increase	FY26	Percent Increase	FY27	Percent Change from FY23 – FY27
Emergency Department	8,701	0.00%	8,701	1.00%	8,788	2.00%	8,963	2.00%	9,143	5.08%
Total CT Volume (Excluding ED)	15,293	29.08%	19,740	1.06%	19,950	0.61%	20,070	0.58%	20,187	32.00%
Total	23,994	18.53%	28,441	1.04%	28,737	1.03%	29,033	1.02%	29,330	22.24%

As described throughout this section, the Proposed Project will address current and future needs of the Patient Panel for access to increased CT capacity at CDH. A third unit will provide capacity to accommodate emergent patients without disrupting timely access to CT for inpatients and outpatients. Acquiring a third CT unit will also improve door to CT time for stroke patients and create scheduling capacity for interventional radiology procedures and LDCT. Therefore, the Proposed Project will improve access to care, health outcomes and patient experience.

F1.a.iii**Competition:**

Provide evidence that the Proposed Project will compete on the basis of price, total medical expenses, provider costs, and other recognized measures of health care spending. When responding to this question, please consider Factor 4, Financial Feasibility and Reasonableness of Costs.

The Proposed Project will not have an adverse effect on competition in the Massachusetts Health Market based on price, total medical expenses, provider costs or other recognized measures of health care spending. To deliver quality, timely care, improve health outcomes, and contain overall medical costs, hospitals must have the ability to provide access to CT imaging. As discussed in Factors F1.a.i and F1.a.ii, CDH's existing CT service is operating near full capacity, which can cause delayed access to CT imaging particularly for outpatients and patients requiring interventional CT. Delayed diagnosis through CT imaging can delay treatment, increasing the overall cost of care as the patient's medical condition worsens. The third CT unit will allow CDH to improve access to CT interventional procedures that expedite diagnosis and ultimately treatment thereby initiating care when the acuity of a patient's medical condition is less costly to treat.

The third CT unit will be in the Emergency Department. CDH anticipates it will need to hire one full time CT technologist, which will have a minimal impact on operating costs. Based on these considerations, the Proposed Project is necessary to meet the Patient Panels' need, ensure timely access to care, provide timely diagnosis and treatment, and contain health care costs.

F1.b.i**Public Health Value /Evidence-Based:**

Provide information on the evidence-base for the Proposed Project. That is, how does the Proposed Project address the Need that Applicant has identified.

The addition of a third CT unit at CDH will advance and support the needs of CDH's Patient Panel by increasing timely access to CT imaging, decreasing delay in diagnosis and treatment, and increasing access to interventional CT procedures. The use of diagnostic imaging in the United States, including imaging with CT, has increased significantly over the last two decades.¹⁹ Several factors have contributed

¹⁹ Rebecca Smith-Bindman et al., *Rising Use Of Diagnostic Medical Imaging In A Large Integrated Health System*, 27 Health Affairs 1491 (2008), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2765780/pdf/nihms-137739.pdf>; Rebecca Smith-Bindman et al., *Use of Diagnostic Imaging Studies and Associated Radiation Exposure For Patients Enrolled in Large Integrated Healthcare Systems, 1996-2010*, JAMA Network (June 13, 2012), <https://jamanetwork.com/journals/jama/fullarticle/1182858>; Robert J. McDonald et al., *The Effects of Changes in*

to this increase, including advancements in technology (e.g., improvements in techniques, resolution, and acquisition time), expansion of clinical applications (particularly to diagnose and treat age-related conditions), and patient and physician generated demand.²⁰ The development and improvement in these advanced diagnostic imaging technologies is widely credited with leading to improved patient outcomes, through earlier and more accurate diagnoses of disease using noninvasive techniques, as well as improved patient care processes.²¹ As provided in greater detail below, the Proposed Project is supported by extensive evidence-based literature regarding the efficacy and utility of CT technology, which the Applicant relies on to demonstrate that routine and emergency CT imaging is an essential component of hospital care.

CT is an imaging tool that utilizes x-ray beams to generate cross-sectional images - or “slices” - of the bones, blood vessels and soft tissue.²² As a result, CT imaging produces more clear, detailed images than conventional x-rays, making CTs extremely useful in detecting, for example, tumors or lesions within the abdomen and lungs; heart disease or abnormalities of the heart; head injuries; and blood clots and embolisms.²³ CT is also useful in diagnosing disease, trauma, and abnormality; planning and guiding procedures; and monitoring the effectiveness of therapy.²⁴ CT-guided interventional radiology is used to perform diagnostic and therapeutic medical procedures to treat neurological conditions, cancer, heart disease, spinal problems, and vascular disease, among others.²⁵ CT imaging can also be used for cardiac coronary computed tomography angiography (“CTA”) to visualize coronary arteries and help aide in the diagnosis and need for intervention.²⁶ CT scans can generally be performed in minutes, which means providers can quickly detect and diagnose emergent conditions.

In addition to its general diagnostic utility, CT is the preferred diagnostic tool for patients presenting with symptoms of stroke. CT imaging is used to diagnose strokes and to determine the type of stroke a patient is experiencing.²⁷ Timely CT scanning ensures timely treatment, when it is most likely to be successful with the best chance for positive patient outcomes.²⁸ Additionally, the detailed images produced by the CT scan

Utilization and Technological Advancements of Cross-Sectional Imaging on Radiologist Workload, 22 Academic Radiology 1191 (2015); Michael Walter, *Feeling overworked? Rise in CT, MRI images adds to radiologist workload*, Radiology Business (Jul. 31, 2015), <https://radiologybusiness.com/topics/medical-imaging/magnetic-resonance-imaging-mri/feeling-overworked-rise-ct-mri-images-adds>; *Increases in Imaging Procedures, Chronic Diseases Spur Growth of Medical Imaging Informatics Market*, Imaging Technology News (Oct. 28, 2016), <https://www.itnonline.com/content/increases-imaging-procedures-chronic-diseases-spur-growth-medical-imaging-informatics>.

²⁰ Health Affairs, *supra* note 19; Jama Network, *supra* note 19; McDonald et al., *supra* note 19; Walter et al., *supra* note 19; Imaging Technology News, *supra* note 19.

²¹ Health Affairs, *supra* note 19; Jama Network, *supra* note 19; McDonald et al., *supra* note 19; Walter et al., *supra* note 19; Imaging Technology News, *supra* note 19.

²² See *Computed Tomography (CT)*, Nat'l Inst. of Biomedical Imaging and Bioengineering, <https://www.nibib.nih.gov/science-education/science-topics/computed-tomography-ct> (last visited Feb. 24, 2022); *CT Scan*, Mayo Clinic, <https://www.mayoclinic.org/tests-procedures/ct-scan/about/pac-20393675> (last visited Feb. 24, 2022).

²³ See Yvette Brazier, *How Does a CT or CAT scan work?*, MedicalNewsToday, <https://www.medicalnewstoday.com/articles/153201#procedure> (last modified June 23, 2017).

²⁴ Carlo Liguori et al., *Emerging clinical applications of computed tomography*, 8 Med. Devices 265 (2015), available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4467659/>; *Computed Tomography*, RadiologyInfo.org, <https://www.radiologyinfo.org/en/submenu.cfm?pg=ctscan> (last visited Jun. 29, 2018); *Computed Tomography (CT)*, U.S. Food & Drug Administration, <https://www.fda.gov/radiation-emitting-products/medical-x-ray-imaging/computed-tomography-ct> (last updated Mar. 7, 2018).

²⁵ Elizabeth Hanes, RN, *What is Interventional Radiology?*, DignityHealth, <https://www.dignityhealth.org/articles/what-is-interventional-radiology> (Aug. 26, 2017).

²⁶ Coronary CTA, RadiologyInfo.org available at <https://www.radiologyinfo.org/en/info/angiocorocroct> (last visited March 8, 2023).

²⁷ See *Id.* (indicating there are two main types of strokes are ischemic stroke i.e. blocked artery or hemorrhagic stroke, a blood vessel bursting or leaking and indicating individuals may also experience a temporary disruption of blood flow to the brain, called a transient ischemic attack, but this does not tend to cause lasting symptoms).

²⁸ Jeffrey L. Saver, M.D. et al., *Time to Treatment With Intravenous Tissue Plasminogen Activator and Outcome From Acute Ischemic Stroke*, JAMA Network (June 19 2013), <https://jamanetwork.com/journals/jama/fullarticle/1697967>

can rule out other brain abnormalities.²⁹ According to the Massachusetts Department of Health's Time Target Recommendations and the American Heart Association/American Stroke Association's "Get With the Guidelines – Stroke", CT imaging should be completed within 25 minutes of arrival to the hospital, and IV thrombolytic ("tPA") treatment should begin within one hour of patient arrival.³⁰

The new CT scanner will be a dual source energy scanner with improved imaging characteristics. A dual-source energy scanner uses two x-ray sources simultaneously to capture image data.³¹ CT has an inherent limitation in soft tissue differentiation whereas dual-energy can improve material differentiation by using two different x-ray energy spectra.³² While CT scanners expose patients to small amounts of radiation, the new CT will reduce the radiation dose by expanding imaging protocols to include multiphase imaging into one single acquisition.³³ CDH will also have the ability to perform Cardiac CTA imaging to visualize coronary arteries and help aide in diagnosis and the need for intervention.

Finally, literature on patterns of CT use indicate that imaging rates tend to be higher among older adults.³⁴ According to a study published in 2013, average CT utilization rates were approximately 24, 72, 159, and 240 per 1,000 persons for ages <18, 18-44, 45-54 and 65+ years, respectively.³⁵ The high CT imaging rates among older adults are likely related to the modalities' abilities to diagnose and treat age-related conditions.

F.1.b.ii Public Health Value /Outcome-Oriented:
Describe the impact of the Proposed Project and how the Applicant will assess such impact. Provide projections demonstrating how the Proposed Project will improve health outcomes, quality of life, or health equity. Only measures that can be tracked and reported over time should be utilized.

A. Improving Health Outcomes and Quality of Life

The Proposed Project will provide public health value by increasing timely access to CT imaging and thereby improving health outcomes and patient satisfaction.

B. Assessing the Impact of the Proposed Project

To assess the impact of the Proposed Project, the Applicant developed the following quality metrics, including baseline and metric projections. The measures are discussed below:

(stating "In a registry representing US clinical practice, earlier thrombolytic treatment was associated with reduced mortality and symptomatic intracranial hemorrhage, and higher rates of independent ambulation at discharge and discharge to home following acute ischemic stroke.").

²⁹ *Id.*

³⁰ See *Primary Stroke Services Time Target Recommendations*, *supra* note 17.

³¹ What is Dual Source Energy? Siemens Healthineers <https://www.siemens-healthineers.com/en-us/computed-tomography/dual-energy/dual-source-dual-energy#:~:text=With%20Dual%20Source%20CT%20it,reducing%20the%20radiation%20dose%20significantly> (last visited March 7, 2023).

³² Hyun Woo Goo, MD, Jin Mo Goo, MD PhD, *Dual-Energy CT: New Horizon in Medical Imaging*, [Korean J Radiol.](https://pubmed.ncbi.nlm.nih.gov/pmc/articles/PMC5447632/) 2017 Jul-Aug; 18(4): 555–569 (available at <https://pubmed.ncbi.nlm.nih.gov/pmc/articles/PMC5447632/>).

³³ See Dual Source CT Scanner, <https://www.legacyhealth.org/Services-and-Resources/services/adult/imaging/dual-source-ct-scanner#:~:text=A%20dual%2Dsource%20CT%20scan%20uses%20two%20x%2Dray%20sources,or%20to%20study%20blood%20vessels> (last visited March 7, 2023). See also *Dual energy CT*, Radiopaedia <https://radiopaedia.org/articles/dual-energy-ct-2?lang=us> (Feb. 17, 2022).

³⁴ Smith-Bindman et al., *supra* note 19; Kathleen Lang et al., National trends in advanced outpatient diagnostic imaging utilization: an analysis of the medical expenditure panel survey, 2000-2009, *BMC Med. Imaging*, (2013) available at <https://pubmed.ncbi.nlm.nih.gov/24279724/>.

³⁵ Lang et al., *supra* note 30.

1. Timely Access – Door to CT for Stroke Patients: Adding a third CT unit in the ED will likely decrease time from door to CT for stroke patients. As a result, stroke patients will receive a timely diagnosis that will direct subsequent medical treatment.

Measure: Length of time between when patient reaches the Hospital to when a CT scan begins.

Baseline: Average door to CT scan time: 62.80 minutes

Projections: Year 1: 56.51 minutes; Year 2: 50.86 minutes; and Year 3: 45.77 minutes

2. Access – Outpatient wait times will decrease.

Measure: Median days for patient to get scheduled for CT scan.³⁶

Baseline: Average wait time is 14 days.

Projections: Year 1: 7 days; Year 2: 6 days; and Year 3: 5 days

3. Patient Experience Scores: Patients that are satisfied with care are more likely to seek additional treatment when necessary. Timely access to CT scans likely will improve patient experience.

Measure: Overall rating of experience.

Baseline: 83%³⁷

Projections: Year 1: 85%; Year 2: 87%; and Year 3: 89%

F1.b.iii Public Health Value /Health Equity-Focused:

For Proposed Projects addressing health inequities identified within the Applicant's description of the Proposed Project's needbase, please justify how the Proposed Project will reduce the health inequity, including the operational components (e.g. culturally competent staffing). For Proposed Projects not specifically addressing a health disparity or inequity, please provide information about specific actions the Applicant is and will take to ensure equal access to the health benefits created by the Proposed Project and how these actions will promote health equity.

To ensure health equity to all populations, including those deemed underserved, the Proposed Project will not affect accessibility of CDH's services to economically disadvantaged, medically indigent and/or Medicaid eligible individuals. CDH does not discriminate based on ability to pay or payer source and this practice will continue following implementation of the Proposed Project. As further detailed throughout this narrative, the Proposed Project will increase access to CT imaging for CDH's Patient Panel.

The Applicant addresses health inequities in a variety of ways. As part of this mission, CDH collects patient demographic data including race, ethnicity, language, disability, sexual orientation, and gender identity, and plans to add veteran status in 2023. The Applicant and CDH then analyze data to identify areas of disparity.

Medical interpreter services are also available at CDH, including interpreters for radiology and CT patients. CDH has a Qualified Bilingual Support program where staff and providers are assessed for competence in a language other than English, and who can speak directly with patients in that language. Bilingual staff are

³⁶ This value will not include patients who need 3-month, 6-month or annual CT exams that are schedule in advance.

³⁷ Measured from March 2022 through February 2023.

available to provide direct services to Spanish-speaking patients, and outside vendors are retained for other languages. CDH also offers video remote interpreter services.

Further, MGB launched United Against Racism, a statewide initiative for becoming an anti-racist organization. In doing so, MGB committed to a series of specific timelines and metrics of success based on input from staff, leadership, and the Board. Highlights of those efforts include, among others: removing race in clinical protocols – where too often in the healthcare system a patient's race has played a role in clinical decision tools and policies; increased screening and resources to reduce health gaps such as food insecurity, housing needs, and other determinants of health across 22 primary practices; improving access for all patients by hiring 11 bilingual digital access coordinators who collectively speak Spanish, Portuguese, Haitian, Creole, Arabic, Russian, Mandarin, Cantonese, and Cape Verdean Creole, and translating MGB's Patient Gateway platform into languages most commonly spoken by its patients; building a culture of health equity improvement by funding 18 grants that aims to reduce racial disparities in patient experience and/or outcomes, such as reducing disparities in the use of physical restraint in emergency departments and improving access to mental health treatment for non-English speaking trauma survivors; expanding on mobile community care that began during the COVID-19 pandemic; improving accuracy of patient race, ethnicity and language data to better identify and address health disparities; enhancing health equity leadership and accountability by hiring a chief community health equity officer and senior medical director for health equity - both highly respected clinicians with a lifelong dedication to providing all patients with exceptional care; and becoming a greater force for equity and inclusion. These examples and MGB's recent \$50 million investment in community and mental health are just some of the ways MGB strives to making real progress.

Through the Applicant's United Against Racism program, staff training is offered to increase cultural competency including unconscious bias. Leaders are required to participate in diversity, equity, and inclusion training. The Applicant and CDH also participate in the Health Equity Index program of the Human Rights Campaign Foundation, which promotes policies and practices in health care settings that lead to greater equity for LGBTQ patients. The Applicant scored 100% in its most recent survey.

F1.b.iv Provide additional information to demonstrate that the Proposed Project will result in improved health outcomes and quality of life of the Applicant's existing Patient Panel, while providing reasonable assurances of health equity.

The Proposed Project will facilitate improved health outcomes and quality of life for the Applicant's Patient Panel by ensuring patients in need of CT imaging will have timely access as demand for CT grows. Access to CT imaging will ultimately improve health outcomes for all patients whose condition requires CT to facilitate a diagnosis and treatment planning. CDH is committed to promoting health equity, ensuring patients can access the Hospital's services and effectively communicate with their providers, and offers a variety of services to address social determinants of health ("SDoH") and health care disparities. The Applicant anticipates the Proposed Project will result in improved patient experience and quality outcomes while assuring health equity.

F1.c Provide evidence that the Proposed Project will operate efficiently and effectively by furthering and improving continuity and coordination of care for the Applicant's Patient Panel, including, how the Proposed Project will create or ensure appropriate linkages to patients' primary care services.

The Proposed Project will ensure continuity of care, improved health outcomes, and enhanced quality of life by providing case management/social work support and integration and coordination of care for Applicant's patients. CDH's electronic medical record ("EMR") serves as the primary linkage within the Hospital and between community primary care and other providers. With respect to the Proposed Project, having the CT scanner embedded in the ED will increase efficiency and collaboration between the ED team and Radiology. Radiology will have ED resources more readily available to help with the clinical care of patients requiring imaging. Establishing Radiology as part of the ED team will help to enhance workflows,

morale and collaboration within the department. Further, ED critical findings will be communicated using the Critical Results System - Alert Notification of Critical Results ("ANCR"), which is a closed loop communication for all ED cases 24 hours a day, 7 days a week, that provides immediate results for critical findings, which are automatically provided to the referring physicians.

F1.d Provide evidence of consultation, both prior to and after the Filing Date, with all Government Agencies with relevant licensure, certification, or other regulatory oversight of the Applicant or the Proposed Project.

The Applicant consulted with numerous individuals at multiple regulatory agencies regarding the Proposed Project. The following individuals were consulted with regards to the Proposed Project:

- Dennis Renaud, Director of Determination of Need Program, Massachusetts Department of Public Health; and
- Jennica Allen, Manager of Community Engagement Practices, Massachusetts Department of Public Health;
- MassHealth
- The Centers for Medicare & Medicaid Services

F1.e.i Process for Determining Need/Evidence of Community Engagement: For assistance in responding to this portion of the Application, Applicant is encouraged to review *Community Engagement Standards for Community Health Planning Guideline*. With respect to the existing Patient Panel, please describe the process through which Applicant determined the need for the Proposed Project.

In addition to relying on the data described throughout this application that demonstrates the need for the Proposed Project, the Applicant also sought to engage the community to elicit feedback from patients and families regarding the Proposed Project. The presentations reviewed the purpose of the Proposed Project, what it would mean for patients and the community, and provided a general overview of the Proposed Project's process. The Proposed Project was presented to the following groups:

- Community
- Patient and Family Advisory Council ("PFAC")
- Healthy Communities Committee

F1.e.ii Please provide evidence of sound Community Engagement and consultation throughout the development of the Proposed Project. A successful Applicant will, at a minimum, describe the process whereby the "Public Health Value" of the Proposed Project was considered, and will describe the Community Engagement process as it occurred and is occurring currently in, at least, the following contexts: Identification of Patient Panel Need; Design/selection of DoN Project in response to "Patient Panel" need; and Linking the Proposed Project to "Public Health Value".

To ensure sound community engagement throughout the development of the Proposed Project, the Applicant took the following actions:

- PFAC presentation on November 15, 2022. Fourteen (14) individuals were in attendance.
- Healthy Communities Committee presentation on February 13, 2023. Sixteen (16) individuals were in attendance.
- Public Forum presentation on March 2, 2023. Sixteen (16) individuals were in attendance.

Factor 2: Health Priorities

Addresses the impact of the Proposed Project on health more broadly (that is, beyond the Patient Panel) requiring that the Applicant demonstrate that the Proposed Project will meaningfully contribute to the Commonwealth's goals for cost containment, improved public health outcomes, and delivery system transformation.

F2.a. Cost Containment:

Using objective data, please describe, for each new or expanded service, how the Proposed Project will meaningfully contribute to the Commonwealth's goals for cost containment.

The goals for cost containment in the Commonwealth center around providing low-cost care alternatives without sacrificing high-quality care. In fact, the Health Policy Commission, Massachusetts' independent state agency that develops policy to reduce health care cost growth and improve the quality of patient care, has a stated goal of bettering health and care at a lower cost across the Commonwealth. The Proposed Project seeks to align with these goals and meaningfully contribute to cost containment in Massachusetts by providing high-quality imaging services for patients in a cost-effective, community-based setting. As discussed throughout this Application, the Proposed Project seeks to improve access to an essential component of hospital care. Timely access to CT imaging improves timely diagnosis. Timely diagnosis allows for treatment to begin before the patient requires more costly care due to advanced disease. Moreover, there will be no change in CDH's contracted rates for CT services resulting from the Proposed Project. Accordingly, the Proposed Project will contribute to the Commonwealth's goals of cost containment by having negligible to positive impact on costs while ensuring timely access to care.

F2.b. Public Health Outcomes:

Describe, as relevant, for each new or expanded service, how the Proposed Project will improve public health outcomes.

As discussed in this Application, the Applicant anticipates demand for CT imaging will continue to increase as the CDH Patient Panel grows and ages. To ensure timely access to CT imaging it is necessary to have adequate capacity. The addition of a third CT unit will increase capacity and provide timely access to CT imaging. Timely access will be achieved by improving door to CT time for stroke patients, reducing wait times for outpatients and expanding availability of interventional procedures using CT. More timely access will facilitate treatment and result in improved patient experience and public health outcomes.

F2.c. Delivery System Transformation:

Because the integration of social services and community-based expertise is central to goal of delivery system transformation, discuss how the needs of their patient panel have been assessed and linkages to social services organizations have been created and how the social determinants of health have been incorporated into care planning.

The Applicant and CDH have numerous programs in place to ensure linkages to social service organizations. For instance, patients of Cooley Hospital Physicians' Organization, the Hospital's affiliated medical group, are screened for SDoH including housing, access to food, transportation, and education. Patients complete the screening using an iPad and are offered staff assistance as needed. Patients who screen positively are offered referrals to community-based programs. An interdisciplinary team of nurses and social workers identify patients' health risks, coordinate care between providers and services, and facilitate communications and transitions between hospital, rehabilitation facilities and home. The program also maintains a database of local resources for patients.

Factor 5: Relative Merit

F5.a.i Describe the process of analysis and the conclusion that the Proposed Project, on balance, is superior to alternative and substitute methods for meeting the existing Patient Panel needs as those have been identified by the Applicant pursuant to 105 CMR 100.210(A)(1). When conducting this evaluation and articulating the relative merit determination, Applicant shall take into account, at a minimum, the quality, efficiency, and capital and operating costs of the Proposed Project relative to potential alternatives or substitutes, including alternative evidence-based strategies and public health interventions.

This Proposal: The Proposed Project is for the expansion of imaging capacity at CDH through the addition of one CT unit in the emergency department.

Quality: The Proposed Project is the superior option because of the impact it will have on patient outcomes. With expanded access to CT, CDH will have capacity to address the high volume of patients presenting to the ED in need of CT. With a third CT unit, inpatient and outpatient access will improve by eliminating disruptions to scheduled CT caused by emergent cases. CDH also will have availability to accommodate interventional radiology procedures.

Efficiency: The acquisition of a third CT unit will minimize delays in access and care currently caused by limited capacity to meet the high demand. Through a dedicated ED CT unit, the Hospital can operate all units more efficiently.

Capital Expense: The total capital expenditure for the CT unit is \$2,516,623.00.

Operating Costs: The first-year incremental operating expense of the Proposed Project is \$229,830. By year five (5), operating costs are estimated at \$468,845.

Alternative Proposal: Forego the acquisition of a third CT unit and continue to serve patients with two CT units.

Alternative Quality: This alternative does not address CDH's Patient Panel's need for expanded access to CT imaging.

Alternative Efficiency: CDH resources will continue to be strained under this alternative. As demand for CT continues to grow, outpatients will continue to experience delayed access to CT imaging as wait times increase. In addition, when emergent patients, such as patients with potential stroke, require CT, outpatient scans are delayed or must be rescheduled.

Alternative Capital Expenses: There are no capital expenses under this alternative.

Alternative Operating Costs: There are no additional operating costs under this option.