



**U.S. Department of Health and Human Services
Health Resources and Services Administration**

REPORT TO CONGRESS

**Teaching Health Center Graduate Medical Education
Direct and Indirect Training Expenses Report**

Executive Summary

Section 50901(d) of the Bipartisan Budget Act of 2018 (P.L. 115-123) provided changes to the Teaching Health Center Graduate Medical Education (THCGME) Program statute. This Report to Congress is in response to section 50901(d)(4), which requires:

4) REPORT ON TRAINING COSTS. — Not later than March 31, 2019, the Secretary of Health and Human Services shall submit to the Congress a report on the direct graduate expenses of approved graduate medical residency training programs, and the indirect expenses associated with the additional costs of teaching residents, of qualified teaching health centers (as such terms are used or defined in section 340H of the Public Health Service Act (42 U.S.C. 256h)).

The THCGME Program was established in 2011 to support the expansion of primary care medical and dental residency training in community-based ambulatory settings. The initial 5-year, \$230 million THCGME appropriation ended on September 30, 2015, and the Medicare Access and CHIP Reauthorization Act of 2015 provided \$60 million in THCGME program funding for each of fiscal years (FYs) 2016 and 2017. The Bipartisan Budget Act of 2018 appropriated \$126.5 million for the THCGME program for each of FYs 2018 and 2019.

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Direct and Indirect Training Report**

Report to Congress

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Acronym List

AHC	Academic Health Center
AY	Academic Year
DGME	Direct Graduate Medical Education
FQHC	Federally Qualified Health Center
FTE	Full-Time Equivalent
FY	Fiscal Year
GAO	Government Accountability Office
GME	Graduate Medical Education
HHS	Department of Health and Human Services
HRSA	Health Resources and Services Administration
IME	Indirect Medical Education
IPPS	Inpatient Prospective Payment System
PGY	Post-Graduate Year
THC	Teaching Health Center
THCGME	Teaching Health Center Graduate Medical Education

I. Legislative Language

Section 50901(d) of the Bipartisan Budget Act of 2018 (P.L. 115-123) provided changes to the Teaching Health Center Graduate Medical Education (THCGME) Program statute. This Report to Congress is in response to section 50901(d)(4), which requires:

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II. Introduction

The THCGME Program is authorized by Section 340H of the Public Health Service Act (42 U.S.C. 256h) to support the expenses associated with training residents in community-based ambulatory patient care settings.

Per the THCGME Program statute, payments are made for direct and indirect medical education expenses to qualified Teaching Health Centers (THC) that are listed as sponsoring institutions by the relevant accrediting body for maintenance of filled positions at existing approved graduate medical residency training programs as well as expansion of existing or establishment of new approved graduate medical residency training programs. The amounts payable include a direct expense amount (i.e., an amount for the direct expenses of sponsoring an approved graduate medical residency training program such as salary and benefits of program residents as well as faculty and staff associated with the program) and an indirect expense amount (i.e., an amount for indirect expenses associated with the additional costs arising from teaching residents in such programs).

The primary goal of the THCGME Program is to increase the number of primary care physician and dental residents training in community-based ambulatory patient care settings. The training opportunities created for THCGME-supported residents build the workforce and improve the distribution of the nation's primary care workforce in economically disadvantaged areas, through an emphasis on rural and other underserved communities and populations. Teaching Health Centers are located predominantly (80 percent) in community based health centers, such as Federally Qualified Health Centers (FQHCs), FQHC Look-Alikes, Rural Health Clinics, and Tribal Health Centers that provide primary care services in underserved areas. In Academic Year (AY) 2016-2017, the majority of THCGME residents (83 percent) spent part of their training in medically underserved and/or rural communities, and these residents provided more than 795,000 hours of patient care.

In AY 2017-2018, the Health Resources and Services Administration (HRSA) supported the training of over 700 resident full-time equivalents (FTEs),¹ across all years of training, in 57 primary care residency programs across the United States. Of these supported programs, a total of 6 specialties were represented – 37 in Family Medicine, 8 in Internal Medicine, 4 in Psychiatry, 3 in Pediatrics, 3 in General Dentistry, and 2 in Obstetrics/Gynecology. Fifteen programs were expansion programs (i.e., those in existence prior to expanding the number of resident FTEs trained in their residency with THCGME funding support) while the remaining 42 programs were newly-established primary care training programs primarily funded by the THCGME Program.

Since the program was established in fiscal year (FY) 2011, the THCGME Program has produced 632 new primary care physicians and dentists. The number of program completers for each AY is as follows:

Table 1: THCGME Program Completers, Academic Years 2011-2017

Academic Year	No. of Program Completers
2011-2012	6
2012-2013	23
2013-2014	47
2014-2015	98
2015-2016	210
2016-2017	248
Total	632

Of the AY 2016–2017 program completers with available employment data (70 percent of completers), most currently practice in a primary care setting (69 percent) and in a medically underserved and/or rural community (55 percent).² In contrast, only 32 percent of graduates from traditional primary care training programs intend to pursue primary care practice, and just 14 percent of primary care physicians in the United States practice in rural areas.^{3,4}

¹ Full-Time Equivalent (FTE) is the ratio of a resident’s time required to fulfill a full-time residency slot for one Academic Year. Multiple individuals’ FTE time can sum to equal one full-time resident.

² HRSA Teaching Health Center Graduate Medical Education Program, Academic Year 2016-2017 Program Highlights. Available at: <https://bhw.hrsa.gov/sites/default/files/bhw/health-workforce-analysis/program-highlights/THCGME-program-2017.pdf>.

³ Jolly P, Erikson C, Garrison G. US graduate medical education and physician specialty choice. *Acad Med.* 2013;88(4):468–474.

⁴ Gamm L, Hutchison L, Dabney B, et al. Rural Healthy People 2010: A Companion to Healthy People 2010, Vol 1. College Station: The Texas A&M University System Health Science Center, School of Rural Public Health, Southwest Rural Health Research Center; 2003.

III. Overview of Residency Training Costs

The modern system of funding for graduate medical education (GME) dates from the post-World War II period when the federal government began to fund residency training for returned service members. This funding was incorporated into the Medicare and Medicaid programs in 1965, and established in the Social Security Act in the form of payments to acute care sites, almost exclusively hospitals, which then served as the locus for the majority of resident training. While the Medicare program is the largest source of funding for residency training, in the Department of Health and Human Services (HHS), GME is also funded through Medicaid and HRSA's Children's Hospitals Graduate Medical Education and THCGME programs. The Departments of Veterans Affairs and Defense both sponsor GME programs focused on building a pipeline of physicians to serve in their respective target populations of service members, military families, and veterans.

In 1983 Congress adopted the Medicare Inpatient Prospective Payment System (IPPS) for acute care hospitals and established the current architecture for Medicare's support for GME through its creation of two separate funding streams for IPPS teaching hospitals: Direct Graduate Medical Education (DGME) and Indirect Medical Education (IME). DGME payments are made to teaching hospitals to cover the Medicare share of the direct expenses associated with residency training (e.g., resident and faculty salaries and benefits) while IME payments are made as an add-on to diagnosis-related group payments to help defray the additional costs of providing care thought to be associated with sponsoring residency programs, including those not otherwise captured by the IPPS.⁵ These additional patient care costs reflect the more complex care delivery required for the typically higher acuity patients receiving care at teaching hospitals, and may be due to factors such as longer hospital lengths of stay, required standby capacity in burn and trauma centers, patients costs associated with training, and higher utilization of more advanced diagnostic and therapeutic modalities. The equivalent factors comprising IME costs in the ambulatory setting have not historically been well-defined or documented.

A 2018 Government Accountability Office (GAO) report on the Physician Workforce found that GME training costs vary by program characteristics, and that challenges exist in measuring and comparing GME training costs due to a lack of standard cost methodologies across teaching sites and some training costs being difficult to measure.⁶ The GAO report also highlighted teaching health centers' challenges in identifying and capturing GME training costs due to factors specific to their individual teaching sites. The varying relationships and financial arrangements that exist between a teaching site, its partners, and its faculty affect how it allocates and reports training costs. For example, a residency program may have various educational partners, such as medical schools, community-based training sites, office-based preceptors, and multiple hospitals, each of which captures and tracks training costs differently within their respective institution. Different financial relationships, such as when teaching sites directly employ faculty versus faculty billing for their services, can create challenges in accounting for training time and costs. Costs can also

⁵ Institute of Medicine. 2014. Graduate medical education that meets the nation's health needs. Washington, DC: The National Academies Press.

⁶ United States Government Accountability Office. 2018. Physician Workforce: HHS Needs Better Information to Comprehensively Evaluate Graduate Medical Education Funding. Available at <https://www.gao.gov/products/GAO-18-240>.

vary due to the characteristics that exist among those sites, such as the number of residents trained and their specialty.

Direct Graduate Medical Education Costs – Published Studies

The majority of studies on the cost of residency training focus on DGME costs (aka direct costs). Studies have shown that training costs are influenced by several factors, including 1) inpatient versus outpatient hospital settings, 2) size of the residency program - also called resident complements, and 3) specialty mix of the residency training program.

In a study of the direct costs of GME reported to Minnesota's Department of Health by both hospital and community-based sites, the average direct cost of clinical training in 1997 was found to be \$130,843.⁷ Faculty costs were 52 percent, resident costs were 26 percent, and administrative costs were 20 percent of the total. Another study examining the cost of a psychiatry residency training program, based on a faculty time survey and yearly residency program budget at Michigan State University in 1996, identified the program costs of supporting 20 psychiatry residents, excluding donated time, were \$1,563,193 or \$78,159 per resident; 84 percent of costs were for personnel.⁸

Other studies found training costs differed based on inpatient versus outpatient focus, size of the residency program, and specialty mix of the residency training programs. One study quantified the costs in 1999 of meeting the minimum accreditation standards for an internal medicine residency program and analyzed the impact of resident complement (i.e., the breakdown of the number of residents in each post-graduate year, or PGY, of training) and program curricular emphasis (outpatient⁹, inpatient¹⁰, or traditional¹¹) on the per-resident cost. The study primarily found that the minimum cost per resident varies inversely with program size within the sizes examined. The estimated direct costs for an outpatient intensive residency program were \$102,107, \$86,935, \$79,976, and \$77,656 for resident complements of 21, 42, 84, and 126, respectively.¹² For an inpatient intensive program, the estimated direct costs were \$94,730, \$79,558, \$72,599, and \$70,279 for resident complements of 21, 42, 84, and 126, respectively. Direct costs for programs based on a traditional model were estimated to be \$95,143, \$79,972, \$73,012, and \$70,692 for resident complements of 21, 42, 84, and 126, respectively.

A more recent study updating the costs of internal medicine residency training based on 2013 accreditation requirement, estimated direct costs for resident complements of 24, 65, 120, and

⁷ Blewett LA, Smith MA, Caldis TG. Measuring the Direct Costs of Graduate Medical Education Training in Minnesota, *Academic Medicine*. 2001; 76(5): 446-452.

⁸ Magen J, Banazak D. The Cost of Residency Training in Psychiatry, *Academic Psychiatry*. 2000; 24(4): 195-201.

⁹ A program with the minimum amount of inpatient experience (total, 33 percent of time) coupled with the maximum allowable number of ambulatory rotations (total, 67% of time).

¹⁰ A program with the minimum amount of ambulatory exposure (total, 33 percent of time) with the maximum inpatient and critical care unit rotations permitted.

¹¹ A model where approximately 40 percent of resident time is spent in the outpatient setting and 60 percent is spent in an inpatient environment.

¹² Nasca TJ, Veloski JJ, Monnier JA, Cunningham JP, Valerio S, Lewis TJ, Gonnella JS. Minimum Instructional and Program-Specific Administrative Costs of Educating Residents in Internal Medicine, *Archives of Internal Medicine*. 2001; 161(5): 760, 764.

160 to be \$224,668, \$203,291, \$199,486, and \$198,085, respectively.¹³ Direct costs for programs based on a traditional model were estimated to be \$209,999, \$188,622, \$184,817, and \$183,416 for resident complements of 24, 65, 120, and 160, respectively.

One study of 2008 Medicare cost reports found key factors that affect variation in the direct costs of GME programs include program size, attending physician compensation levels, and malpractice insurance.¹⁴ Direct costs were found to be higher for programs that are predominantly primary care as they tend to be smaller and less likely to benefit from economies of scale (i.e., a saving in costs due to an increased level of production). The study calculated a total DGME cost of \$141,452 per resident across all hospitals, but found that median DGME costs per resident are higher for hospital GME programs with 75 percent or more primary care residents (\$150,490) than for hospitals with less than 25 percent primary care residents (\$116,626). Direct costs were also found to be higher for residency training that is predominantly based in ambulatory care settings within communities, rather than in the hospital setting. Teaching in ambulatory settings is typically considered to be less efficient (and more costly) than inpatient teaching for a number of reasons cited in the literature. Preceptors must be continually available to provide teaching based on patient availability and needs, to typically a smaller number of trainees rotating in ambulatory settings. In addition, the study found that residency training was more costly when it occurs in safety net care facilities, which may have fewer resources to devote to GME activities, and also in rural locations, that typically have higher administrative costs related to recruitment, the coordination of rural training sites, and oversight of the quality of the educational experience.

Indirect Medical Education Costs – Published Studies

Limited literature is available on IME cost estimates related to residency training, as IME costs can be difficult to quantify across institutions. According to one study of 46 non-academic health center teaching hospitals in Maryland, IME costs may be caused by more frequent errors and additional diagnostic tests ordered by interns and residents, and by decreased productivity of other workers due to their presence.¹⁵ The study estimated per resident IME costs for an average (44 resident) non-Academic Health Center (AHC) of \$83,703 per year in 1984 dollars. Per resident IME costs for a smaller (12 resident) program were estimated at \$103,522 per year in 1984 dollars, and at \$61,541 per year in 1984 dollars for a larger (76 resident) program. As referenced in this particular study, earlier studies of GME suggested that small teaching programs either lowered or did not affect hospital costs. However, this study found that this was not the case in Maryland. Even small programs were found to be costly, and economies of scale for non-AHC hospitals appear to exist in the production of interns and residents. The literature assessing IME costs in the ambulatory setting is even more limited than it is for hospital-based training, and the components comprising an outpatient “equivalent” for IME expenses remain

¹³ Ben-Ari R, Robbins RJ, Pindiprolu S, Goldman A, Parsons PE. The Costs of Training Internal Medicine Residents in the United States, *The American Journal of Medicine*. 2014; 127(10): 1017-23.

¹⁴ Wynn BO, Smalley R, Cordasca KM. Does It Cost More to Train Residents or to Replace Them?: A Look at the Costs and Benefits of Operating Graduate Medical Education Programs, *Rand Health Quarterly*. 2013; 3(3): 8, 44, 52.

¹⁵ Duffy SQ, Ruseski JE, Cavanaugh S. Graduate Medical Education Costs in Nonacademic Health Center Teaching Hospitals: Evidence from Maryland, *Medical Care Research and Review*. 2000; 57(1): 16-17.

poorly defined and without general consensus. One review paper cites a number of potential factors to include in assessments of IME costs for ambulatory training programs, which include factors such as decreased preceptor productivity and billing, increased resident test-ordering behavior, longer hours/increased teaching time, lower resident-to-patient ratios, and patient demographic factors.¹⁶

Total Net Cost Study Literature

The University of Washington Family Medicine Residency Network has examined the total net costs of residency training (i.e., total residency expenses minus residency related revenue, including clinical revenue associated with resident service) since 2003.¹⁷ A group of family medicine residency programs within the Network have submitted a biannual survey of program revenues, expenses, and staffing since 2002. The most recent publication estimated total expenses of \$322,786 per resident per year and a median cost per resident per year, excluding federal and state GME funding streams, of \$179,353 in 2016. This represented a 93.7 percent increase between 2006 (\$92,614) and 2016, reflecting increasing costs relative to patient care partially offset by other non-GME revenues (such as payments for health care services) of primary care residency training, particularly in the discipline of family medicine. Increased costs related to residency programs meeting accreditation requirements, such as meeting specific requirements related to faculty, administration, and facility needs, also played an important role in this cost assessment.

A full listing of referenced GME cost study literature has been included in Appendix A of this report.

IV. HRSA Evaluation of Costs of Training in a Teaching Health Center

In 2012, following a competitive application process, HRSA awarded the *Evaluation and Initial Assessment of HRSA Teaching Health Centers* contract to the George Washington University to identify the unique characteristics of this model of community-based residency training, evaluate the costs of GME training in this model, and initiate a longitudinal evaluation of THCs' contributions to the primary care workforce, particularly in underserved communities. As part of the costing evaluation, the contractor developed a costing instrument to collect information from HRSA-funded THCs on expenses and revenues associated with resident training. Key components of this study have been published in the peer-reviewed literature.^{18,19}

¹⁶ Adams M, Eisenberg JM. What is the cost of ambulatory education? *J Gen Intern Med.* 1997 Apr;12 Suppl 2:S104-10.

¹⁷ Pauwels J, Weidner A. The Cost of Family Medicine Residency Training: Impacts of Federal and State Funding, *Family Medicine*, 2018; 50(2): 123-7.

¹⁸ Regenstein M, Nocella K, Jewers MM, Mullan M. The Cost of Residency Training in Teaching Health Centers. *NEJM.* 2016; 375:612-4.

¹⁹ Regenstein M, Snyder JE, Jewers, MM, Nocella K, Mullan F. Comprehensive Revenue and Expense Data Collection Methodology for Teaching Health Centers: A Model for Accountable Graduate Medical Education Financing. *JGME.* 2018; 10:157-64.

Costing Instrument Development and Implementation

The costing instrument was developed, collaboratively with subject matter experts inside and outside HRSA, through an iterative process. The initial draft instrument was created based on a review of relevant literature on GME costing,^{20,21} findings from site visits to 12 THCs, and an in-depth review of THC financial documents, such as submitted residency program budgets. Additional site visits, between January and February of 2014, were conducted to further refine the costing instrument. A panel of experts in Medicare and Medicaid GME and THC programs and operations reviewed the costing instrument, as well as three completed instruments that included financial information derived through visits and program documentation. A certified public accountant also reviewed the costing instrument to ensure the tool would yield useful data and was consistent with sound accounting principles. The final costing instrument went through Office of Management and Budget review and public comment periods²² and was approved on March 8, 2015.

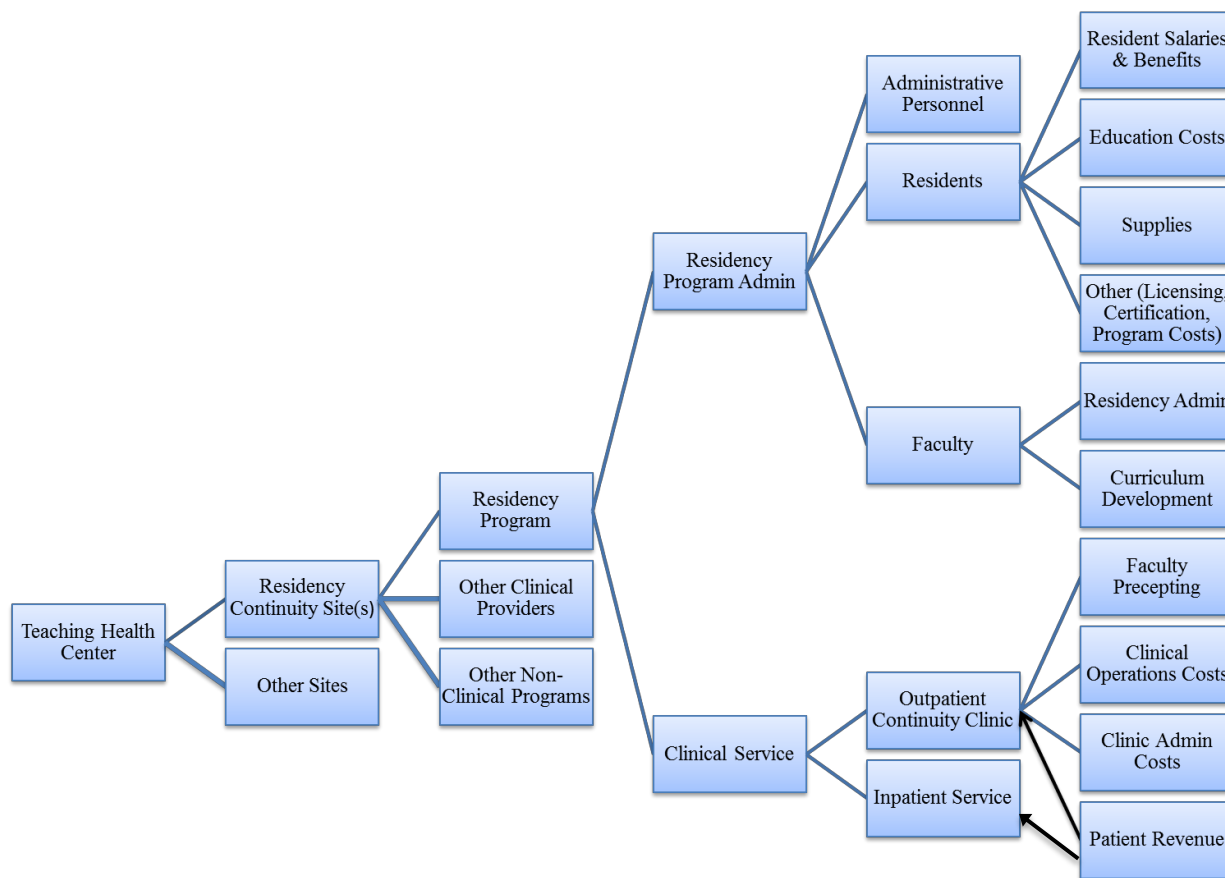
The costing instrument follows a conceptual framework developed based on required components of accredited residency programs (Figure 1). Residency training is divided between two principal components: 1) residency program administration, which represents residents' non-clinical training; and 2) clinical service, both in the outpatient continuity clinic and inpatient service. To capture the most complete financial picture possible, the instrument collected in-kind residency expenses, which are necessary to operate a residency program but are paid for or donated by another entity. To go beyond what many prior GME costing studies had previously done, the costing instrument assessed both expenses and patient service revenues associated with residency training programs, which experts consider to be a more accurate approach to approximating the financial burden of residency programs on sponsoring institutions. It additionally collected select information relevant to the HRSA mission-related goal of providing direct care services to underserved populations, such as the share of under- and uninsured patients receiving care through THCGME-supported residency programs.

²⁰ Jones, T. F., Culpepper, L., & Shea, C. (1995). Analysis of the cost of training residents in a community health center. *Academic Medicine: Journal of the Association of American Medical Colleges*, 70(6), 523–531.

²¹ Zweifler, J. (1995). Family practice residencies in community health centers--an approach to cost and access concerns. *Public Health Reports (Washington, D.C.: 1974)*, 110(3), 312–318.

²² 79 FR 67439, 80 FR 5561

Figure 1: Teaching Health Center Costing Framework



Between April and November of 2015, the costing instrument was fielded with the 43 THC that had residents in training in AY 2013-2014. Sixteen newly-funded THC, that started training residents in AY 2014-2015, were excluded from instrument fielding as they had recently started and had limited data. Thirty-six of the 43 THC submitted a complete costing instrument with direct GME (labor) costs, consisting of salaries, stipends, and fringe benefits for program staff, residents, and faculty, for an overall response rate of 84 percent. The contractor worked extensively with many of the THC to maximize data quality. Some THC reported challenges requesting information from partnering organizations or other entities, and others reported difficulties because their financial systems were not designed or aligned to provide the information requested. After data cleaning, 26 THC were included in the final analysis and costing estimates (see Appendix B). Eight of the 36 programs were excluded from this final analysis due to incomplete or internally inconsistent costing information, and two dental programs were excluded because they presented too few cases to develop meaningful findings.

Expenses Associated with THC Residency Training

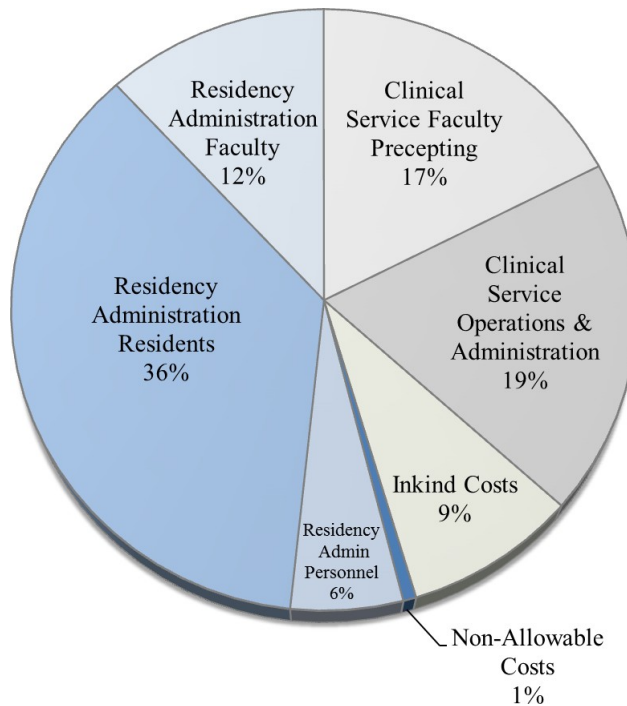
Based on the data provided by the 26 HRSA-funded THC's, the George Washington University found that residency administration expenses—comprised of administrative personnel (6 percent), faculty time on non-clinical educational activities (12 percent) and resident expenses, such as resident compensation and other educational expenses (36 percent) — together accounted for 54 percent of all expenses for training a resident. An additional 1 percent of residency related non-clinical expenses were traditionally not “allowed” for GME support based on the equivalent Centers for Medicare & Medicaid Services standards for hospital-based GME training costs.²³ Clinical service expenses—faculty precepting²⁴ of residents providing clinical services (17 percent) and clinical operations and administration (19 percent)—accounted for 36 percent of the total expenses. In-kind expenses,²⁵ which span both clinical service and residency administration, represented an additional 9 percent of total expenses. Distribution of THC residency expenses are shown in Figure 2.

²³ Expenses commonly seen in residency programs but not considered allowable expenses to be funded using federal funds, such as expenses associated with recruitment, graduation celebration, promotion and advertising, meals, and uniforms.

²⁴ Preceptors also known as teaching physicians supervise trainees, model best practices, provide feedback and evaluate clinical competency.

²⁵ In-kind expenses represent goods and services that are provided at below market cost or at no cost to the THC by faculty, organizational sponsors, partners, or others to support training activities. Six THC's did not report any in-kind support. Twenty programs reported at least some level of in-kind support, primarily in the form of residency administrative personnel, faculty preceptors, educational supplies and equipment, and donated office and/or training space.

Figure 2: Distribution of Expenses Associated with selected THCGME Residency Training, AY 2013 – 2014*



* Previously published in: Regenstein M, Nocella K, Jewers MM, Mullan M. The Cost of Residency Training in Teaching Health Centers. NEJM. 2016; 375:612-4.

Estimating the Per Resident Cost of Training THC Residents

Per resident THC cost estimates were calculated using the data collected from the costing instruments. Gross cost per resident was calculated, applying an in-kind expense cap. The in-kind expense cap recognized the importance of services provided on an in-kind basis but capped them at 10 percent to avoid over-representing their importance to total THCGME funding. A net cost per resident was calculated subtracting residency-related revenues per resident from the gross cost per resident. Net cost per resident was then adjusted for full or partial complements of resident classes in AY 2013-2014 (e.g., THCs with only first year class residents versus THCs with all residency year classes filled), weighted by the size of the program, and adjusted to FY 2017 cost of living. The estimated median net cost per resident, adjusted for partial complement and weighted for size, was \$157,602 in FY 2017.

Little variation was observed in the median net cost per resident across a number of key THC characteristics, including whether the residency program was newly established or an expansion of an existing program, small versus large size, rural versus non-rural, based in an FQHC versus other type of facility, or residency specialty (Family Medicine versus other). However, a comparative cost analysis of THC programs by such subsets is limited by sample size. See Table 2 for estimates of net costs of training THC residents by select THC characteristics.

Table 2: Estimates of Costs of Training a Resident in a THC, Overall and by Selected THC Characteristics, FY 2017 dollars

THC Characteristics	N	25th Percentile	Median	75th Percentile	P-value
Overall	26	\$145,114	\$157,602	\$217,160	
Awardee					0.202
New	18	155,247	169,339	292,621	
Expansion	8	138,970	144,999	156,910	
Size					0.193
Small	14	145,114	163,046	292,621	
Large	8	139,251	149,106	156,910	
Location					0.671
Rural	8	144,999	169,161	290,785	
Non-Rural	18	145,114	159,311	217,160	
Model					1.000
FQHC	15	146,999	157,452	292,621	
Other	11	142,437	161,019	174,583	
Specialty					1.000
Family Medicine	21	145,114	161,019	281,793	
Other	5	151,213	157,602	161,999	

Source: GW THCGME Costing Instrument Analysis, February 2016.

Notes:

The overall estimate is weighted by size but the other estimates by THC characteristics are not.

New programs are largely small and the majority of residents in small programs are training in new THCs.

Of the total costing instruments received, only 26 programs reported complete data on expenses and revenues associated with the residents' continuity outpatient clinics.

N: Number of THCs.

P-values: K-sample nonparametric significance test on the equality of the medians across subgroups found no significant differences at the $p < 0.05$ level.

V. Summary and Conclusions

There are challenges in determining direct and indirect GME costs, and most studies to date have focused on direct GME costs since IME costs can be difficult to quantify across institutions, and there is additionally little consensus on how to best assess IME costs – particularly in the ambulatory setting. These studies generally find that outpatient-intensive, smaller, primary care residency programs have higher direct costs per resident. Some studies have looked at the total net costs (i.e., total residency expenses minus residency related revenue, including clinical revenue associated with resident service), including the HRSA evaluation which estimated the median net cost per resident was \$157,602 in FY 2017.

Appendix A. Select Graduate Medical Education Cost Study Literature

Year of Publication	Authors	Title	Analysis Year	Residents Supported	GME Costs
2014	Ben-Ari et al	The Costs of Training Internal Medicine Residents in the United States	2013		
				24	\$209,999
				65	\$188,622
				120	\$184,817
				160	\$183,416
				24	\$224,668
				65	\$203,291
				120	\$199,486
160	\$198,085				
2013	Wynn et al	Does It Cost More to Train Residents or to Replace Them?: A Look at the Costs and Benefits of Operating Graduate Medical Education Programs	2008	N/A	\$141,452
2001	Nasca et al	Minimum Instructional and Program-Specific Administrative Costs of Educating Residents in Internal Medicine	1998		
				21	\$95,143
				42	\$79,972
				84	\$73,012
				126	\$70,692
				21	\$102,107
				42	\$89,935
				84	\$79,976
126	\$77,656				
2001	Blewett et al	Measuring the Direct Costs of Graduate Medical Education Training in Minnesota	1997	N/A	\$130,843
2000	Magen et al	The Cost of Residency Training in Psychiatry	1997	N/A	\$78,159

Year of Publication	Authors	Title	Analysis Year	Residents Supported	GME Costs
2000	Duffy et al	Graduate Medical Education Costs in Nonacademic Health Center Teaching Hospitals: Evidence from Maryland	1984	N/A	\$83,703
2018	Pauwels et al	The Cost of Family Medicine Residency Training: Impacts of Federal and State Funding	2016	N/A	\$179,353

Appendix B. Initial HRSA Evaluation of Costs of Training in a Teaching Health Center Program Characteristics

Name of THC	Location	Status ²⁶	Enrolled Size per Year ²⁷	Specialty ²⁸	Model
A-Optic, Inc.	Pikeville, KY	New	2/0/0	FM	Consortium
Cahaba Medical Care Foundation	Centreville, AL	New	3/2/0	FM	FQHC
Community Health of Central Washington	Yakima, WA	Expansion	10/10/8	FM	FQHC
Community Health Systems, Inc.	Beckley, WV	New	4/4/0	FM	FQHC
Connecticut Institute for Communities, Inc.	Danbury, CT	New	3/0/0	IM	FQHC
Cornerstone Care, Inc.	Greensboro, PA	New	4/0/0	FM	FQHC
Family Medicine Residency of Idaho	Boise, ID	Expansion	16/15/15	FM	FQHC
Fresno Healthy Communities Access Partners	Fresno, CA	New	4/0/0	FM	Consortium
Hidalgo Medical Services	Lordsburg, NM	New	0/2/0	FM	FQHC
Institute for Family Health (Harlem)	New York, NY	New	12/12/0	FM	FQHC
Institute for Family Health (Mid-Hudson)	New York, NY	Expansion	10/11/9	FM	FQHC
Lone Star Community Health Center, Inc.	Conroe, TX	Expansion	10/10/8	FM	FQHC
Long Island FQHC, Inc.	Hempstead, NY	New	6/4/4	FM	FQHC
Montana Family Medicine Residency	Billings, MO	Expansion	8/8/8	FM	FQHC
Mountain Area Health Education Center, Inc.	Hendersonville, NC	Expansion	4/4/3	FM	Consortium
Northwestern University	Evanston, IL	New	8/8/7	FM	Consortium
Osteopathic Medical Education Consortium of Oklahoma	Tulsa, OK	New	6/4/0	FM	Consortium
Osteopathic Medical Education Consortium of Oklahoma	Tulsa, OK	New	3/3/0/0	OB/GYN	Consortium
Osteopathic Medical Education Consortium of Oklahoma	Tulsa, OK	New	5/5/0	PEDS	Consortium
Ozark Center	Joplin, MO	New	3/1/0/0	PSYCH	Consortium

²⁶ An Expansion program refers to a residency program that was in existence prior to expanding the number of resident FTEs trained in their residency with THCGME funding support. A New program refers to a newly-established primary care training program that is primarily funded by the THCGME program.

²⁷ The number of enrolled residents in each program, broken down by Post-Graduate Year of training (e.g., a program labeled as “3/2/0” trained 3 PGY-1 residents, 2 PGY-2 residents, and 0 PGY-3 residents at time of evaluation.

²⁸ Refers to the residency program specialty or discipline. FM = Family Medicine, IM = Internal Medicine, OB/GYN = Obstetrics/Gynecology, PEDS = Pediatrics, and PSYCH = Psychiatry.

Name of THC	Location	Status²⁶	Enrolled Size per Year²⁷	Specialty²⁸	Model
Primary Health Care Inc.	Des Moines, IA	New	9/0/0	IM	FQHC
Puyallup Tribe of Indians	Tacoma, WA	New	4/2/0	FM	Tribal Health Authority
Shasta Community Health Center	Redding, CA	New	2/2/0	FM	FQHC
University of Arkansas System	Little Rock, AR	Expansion	10/10/8	FM	Other-State
Valley Consortium for Medical Education	Modesto, CA	Expansion	12/12/12	FM	Consortium
Yakima Valley Farm Workers Clinic	Toppenish, WA	New	2/0/0	FM	FQHC