



# Financing graduate medical education: challenges for training the next generation of electrophysiologists

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## Abstract

The system for graduate medical education (GME) in the USA is vital to maintaining a well-trained physician population to meet the needs of the nation. The funding of this system over the last several decades has been complicated, and the government's role in funding GME is controversial. In this paper, the current mechanisms for funding residency and fellowship training are outlined as well as proposed changes to system. The current system has made funding electrophysiology training difficult, and the proposed changes have profound implications. It is important for the electrophysiology community to be educated and advocate for electrophysiology fellowship training such that Americans continue to have appropriate access to arrhythmia care.

**Keywords** Graduate medical education · Medicare · Clinical cardiac electrophysiology fellowship · Accreditation council on graduate medical education

## 1 Introduction

“Educational activities enhance the quality of care in an institution, and it is intended, until the community undertakes to bear such education costs in some other way, that a part of the net cost of such activities (including stipends of trainees, as well as compensation of teachers and other costs) should be borne to an appropriate extent by the hospital insurance program.”

(House Report, Number 213, 89th Congress, 1st session 32 (1965) and Senate Report, Number 404, Pt. 1 89th Congress 1 Session 36 (1965))

When the congress passed the Social Security Amendments of 1965, in addition to creating Medicare and Medicaid, they included a provision for the funding of graduate medical education (GME) [1]. They created a system to reimburse hospitals that train medical school graduates in residency and fellowship programs. It was not envisioned at that time that over 50 years later, this system would remain the predominant means of financing the training of future

physicians [2]. There have been a number of concerns regarding this funding system, and the congress has enacted several changes to address them over the years [3]. However, as health care in the USA has come under increased scrutiny in general, the issue of federal funding for GME has again risen to the forefront [4, 5]. Essentially, American taxpayers are funding the majority of physician training, and there are concerns that the current system is not optimally producing physicians that will meet the future needs of the nation [2]. Specific concerns include a perceived lack of transparency in several areas, including how funds are distributed, use of the funds by individual institutions, and training outcomes, particularly for surgical and procedural subspecialties [6]. In addition, graduating physicians are not distributed optimally either across specialties, with an anticipated shortage of primary care physicians, or geographically, with physician shortages in inner cities and rural areas [7, 8].

As the debate continues as to the role of the federal government in financing and regulating the training of future doctors in the USA, it is important for current physicians, who have participated in the GME system, to have a voice. Physicians have unique perspectives as to what is needed for training in their respective fields, particularly in very specialized fields, such as clinical cardiac electrophysiology (CCEP) [9–11]. In this paper, we review the current funding system for GME, challenges that the system faces, and proposals that have been made to improve the system and, finally, place these issues in the context of the field of electrophysiology.

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## 2 Financing GME—the historical context

Prior to inception of the current model, there was no standardized system for GME funding or oversight [12]. Teaching institutions would “hire” medical school graduates who would spend several years at the institution to complete their graduate medical training. They generally received very little in the way of salary and worked very long hours, but often received room and board at the hospital which led to the enduring titles of “resident” and “housestaff” that we still use to describe trainees to this day. Premier programs particularly provided very little compensation to their residents and fellows since trainees would be willing to forgo compensation for the opportunity to train at an elite program.

The Social Security Amendments of 1965 created the Centers for Medicare and Medicaid Services (CMS) and fundamentally changed the way teaching hospitals fund GME [1, 2]. As part of this sweeping legislation, the congress wanted to ensure that Medicare beneficiaries had access to high-quality care at academic hospitals and recognized that providing funding for educational programs would facilitate this. Initially, the GME reimbursement to hospitals was based solely upon the hospital expenditure towards GME. In 1983, however, the prospective payment system (PPS) was implemented and established two separate funding pathways [13, 14]. Payments were to be provided for direct graduate medical education (DGME) and indirect medical education (IME). DGME funds were to cover resident salaries and benefits, as well as administrative and teaching personnel for the programs. IME funds were established to offset the costs of complex and specialized programs that are often associated with teaching institutions. IME payments are derived from Medicare Part A which is funded by the payroll tax. DGME payments are derived from Medicare Part A and Medicare Part B, the latter of which is funded by insurance premiums.

Until 1986, the amount of DGME reimbursement to teaching hospitals was directly related to the institutions’ DGME costs incurred. That is, if the hospital paid more for resident and fellow education, they could expect to receive more compensation from Medicare at the same rate. The Consolidated Omnibus Budget Reconciliation Act (COBRA) of 1985 changed this. This created a hospital-specific “per resident amount” (PRA) which is based upon DGME costs for an institution in a base year divided by the number of residents during that year [3]. This PRA is updated by an inflation factor each year and the reimbursement is based upon multiplying the PRA by the weighted number of trainees and Medicare-funded inpatient days (Fig. 1). Reimbursement for fellowship training was reduced, with fellow trainee DGME compensation by Medicare provided at only 50% of the compensation provided for a resident. The congress has made further refinements to the PRA over the years, with alterations in how it is calculated and how it is used, but it continues to be a core

determinant as to how teaching hospitals are reimbursed by Medicare.

The Balanced Budget Act (BBA) of 1997 included several important features that were designed to control costs. Most importantly, it capped the number of graduate medical trainees that Medicare would provide funding for on an institutional level [15]. Institutions were capped at their 1996 levels and would not receive additional funds if those caps were exceeded by the institution. This means that at a national level, Medicare only provides funds for approximately 100,000 resident or fellow trainees. The Balanced Budget Refinement Act (BBRA) of 1999 increased the caps for rural teaching hospitals. However, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 and the Patient Protection and Affordable Care Act (PPACA) of 2010 laid out guidelines for redistributing and reducing existing GME trainee positions [16]. The former law reduced funded positions at programs chronically below their caps and only offered 75% of those positions to other hospitals. The PPACA similarly redistributed funded positions, with an emphasis on adding funded residents in rural, inner city, or otherwise underserved areas. There has been no serious congressional effort to increase the number of GME positions that are funded by Medicare [17].

## 3 The current GME funding model

While Medicare finances a large proportion of GME training, it is by no means the only entity that teaching institutions rely upon to cover the costs associated with their residents and fellows. Many hospitals rely on a complex network of sources to cover their expenses (Fig. 2 [2]). Resources also come from other governmental organizations, including state Medicaid (variable from state to state) and for affiliated institutions, the Department of Defense and the Veterans Health Administration. Overall, the total federal annual expenditures for GME training exceed 15 billion dollars. Other support comes from hospitals’ physician practice plans, indigent funds, private payers, philanthropy, and grants from the pharmaceutical and medical device industry. The contributions of these various entities are variable from institution to institution. Further, there is extremely little published data about national trends and little transparency as to the use of funds by individual hospitals. The annual contributions from non-governmental sources to support residency programs are not known [2]. However, it is important to note that despite the reduction in Medicare funding for GME training, the number of residency and fellowship training positions has increased nationwide, suggesting that training centers have been able to secure funding for positions not covered by the Medicare financing [18].

**Fig. 1** Formula used to calculate Medicare direct graduate medicine education (DGME) payments [3]

$$\text{DGME Payment} = \frac{\text{Adjusted Rolling Average FTE}}{\text{Count}} \times \text{PRA} \times \left( \frac{\text{Medicare Part A Inpatient Days}}{\text{Total Inpt Days}} + \frac{\text{Medicare Part C Inpatient Days}}{\text{Total Inpt Days}} \times 0.86 \right)$$

### 4 Problems with the current GME funding model

Concerns about the Medicare GME financing model became apparent almost immediately after its inception in 1965 [2]. Residents and fellows provide a relatively inexpensive workforce, especially if governmental funds are being provided for their training. Thus, when Medicare had no limits on the number of trainees it would cover, hospitals had every incentive to

increase their trainee complements and even develop new residency and fellowship programs in specialized areas. Creating caps prevented some of this. However, the caps worsened the problem of inappropriate distribution of Medicare-funded trainee positions. When positions were capped in 1996, hospitals in New England had a disproportionately higher number of funded positions. Subsequent legislation has tried to correct some of this with redistributing unused positions to states with a lower proportion of residency positions, but inequity

**Fig. 2** Financing of graduate medicine education in the USA [2]

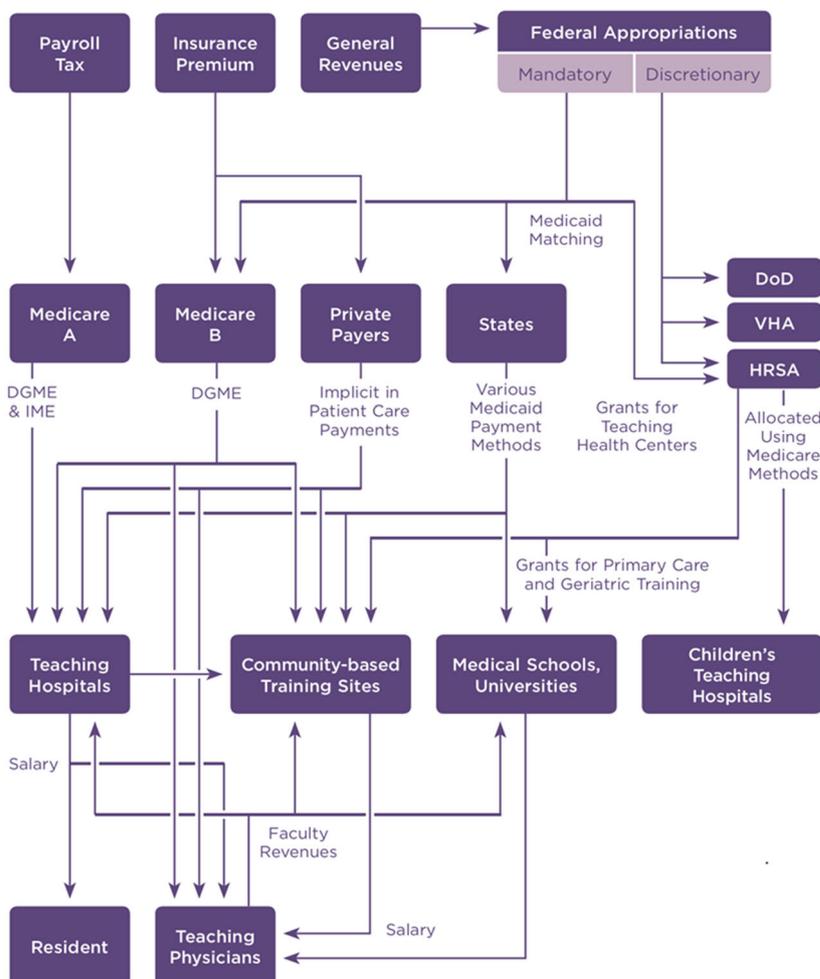


Figure reproduced with permission from the National Academies Press. DGME- Direct Graduate Medical Education, IME- Indirect Medical Education, DoD- Department of Defense, VHA- Veteran’s Health Administration, HRSA- Health Resources and Services Administration.

remains. In addition, Medicare does not specify how teaching institutions use the positions and how hospitals use these funds as best to meet their own financial and labor needs [19]. There is data to suggest that trainees in subspecialties are more cost-efficient for hospitals than those in primary specialties, particularly primary care [20]. This means there is no guarantee that these funds, which are generated from American tax dollars, will go towards training doctors in fields where regional or national shortages are predicted. It is also important to remember that the Medicare GME financing model links reimbursement to the treatment of Medicare patients. Thus, the original model discriminated against institutions that have a younger population, particularly children's hospitals. The IME funding pathway also discriminates against community-based, small residency programs, as they do not have the complex and specialized programs that the IME funding was designed to compensate. Legislation has attempted to address some of these concerns, for example, creating separate funding models for children's, psychiatric, and rehabilitation hospitals, but again, inequities remain [21].

Another major concern for Medicare-funded GME training is that there is little reporting and transparency as to the use of funds and outcomes of training programs. In fact, there is so little reporting available on this subject that performing research on Medicare-funded GME, particularly to determine its costs and benefits to the American health care system, is quite difficult [2]. Without quality or efficiency reporting, there is no financial incentive for teaching hospitals to improve their programs or to address the needs of the American health care system. The ACGME developed the Clinical Learning Environment Review (CLER) program several years ago in an attempt to address these issues [22].

If performing research regarding the costs and benefits of the Medicare-funded GME system is difficult, it is nearly impossible to assess the ancillary systems that contribute to the financing of GME. In their 2014 report, Graduate Medical Education that Meets the Nation's Health Needs, the Institute of Medicine (IOM) was unable to even provide an estimate of the financial contributions of private insurance, physician practice plans, philanthropy, and industry [2]. Further, GME funding from state Medicaid systems require no better reporting and transparency than Medicare does. Most of the private-entity GME financing is driven by self-interest, particularly hospital- and industry-related funding.

## 5 Proposed improvements to the current GME funding model

In 2014, the Institute of Medicine (IOM, now known as the National Academy of Medicine) convened a committee to perform a comprehensive assessment of the USA's GME system, including the financial aspects, as well as to make

suggestions to improve the program for the benefit of all Americans [2]. The goals of the IOM committee were straightforward. They wished to make recommendations that would assist in production of a modern physician workforce that is able to meet the needs of the nation through a GME system that is innovative, efficient, transparent, and accountable as to the use of public funds. The American health care system has changed. No longer predominantly hospital-based, there is greater emphasis on community programs, continuity, and multi-disciplinary care. Ultimately, the IOM made a series of recommendations that would create a new framework for administration, distribution, and oversight of federal funds for residency and fellowship training (Table 1).

Broadly, the IOM recommended maintaining Medicare funding for GME at the current level and eliminating the caps on residency programs. However, they also recommended leveraging the funds in a different way which would better serve the nation's needs and create more oversight over existing GME training positions while developing clear guidelines for the creation of new positions. They recommended eliminating the DGME and IME funding streams and replacing these with the GME operation fund to fund existing training positions and the transformation fund to develop innovative GME programs, particularly those that create performance measures. The operation fund would distribute the funds in accordance with a PRA, but the PRA would be set as the total fund divided by the total number of funded training positions. This PRA would then be further adjusted by factors including geography. In addition, they recommended the implementation of performance-based metrics which would also be tied to reimbursement. Finally, the IOM recommended the

**Table 1** Recommendations for the Reform of GME. Adapted from the 2014 Institute of Medicine Report [2]

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Recommendation 1:	Maintain Medicare GME reimbursement at the current total aggregate levels. However, the current payment model should be replaced.
Recommendation 2:	Develop a more robust administrative framework for GME.
(1)	GME policy committee within the Office of the Secretary of the US Department of Health and Human Services.
(2)	GME center within the Centers for Medicare and Medicaid Services.
Recommendation 3:	Replace the current payment model with the GME Fund, which will be divided into the GME operational fund and the GME transformation fund.
Recommendation 4:	The current payment model should be replaced. GME sponsoring institutions should receive one direct payment base upon a PRA, adjusted for geography. The PRA should be set at the total GME operational fund divided by the total number of Medicare-funded positions. Performance metrics, as developed by the transformation fund, should be tied to payment.
Recommendation 5:	State administered Medicaid Funds should be held to the same standards of transparency and accountability as federal funds.

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*GME* graduate medical education, *PRA* per resident amount

creation of new offices within the Department of Health and Human Services and within the Centers for Medicare and Medicaid Services to maintain appropriate governance and oversight of GME and GME funding. The IOM recommended similar transparency for state-distributed Medicaid funds.

The IOM report raised the profile of the issue of GME governance and financing. It was also not without controversy [23, 24]. The report brought into sharp focus the complete dearth of real data that is available as to how GME is funded, outcomes of residency training, and its benefit to society. Some questioned how useful the report could be as there was such limited information. In fact, the IOM did not even attempt to render a cost analysis of their proposal due to incomplete data. Since the report was published, some have begun work to attempt to identify useful metrics to evaluate these issues [25]. Another controversy was that the IOM proposal would keep the total funding at similar rates, but funds would be diverted to the new administrative offices and the transformation fund, which would effectively reduce direct payments for GME trainees. The IOM report also does not address the issue of skyrocketing medical school tuition. As the GME training model evolves for the future, it must take into account that if the process of financing undergraduate medical education through student tuition continues unchecked, students will graduate with several hundred thousand dollars of debt [23]. Entities other than the IOM have developed their own recommendations for restructuring of the USA's GME system. Most of these incorporate performance-based metrics in some capacity recognize both the public's legitimate interest in how their funds are being used and that transparency is needed to improve quality [24, 26–29].

Any discussion of GME governance and funding would be incomplete without the acknowledgment that there is a great deal of controversy and change in the American medical care system currently. While the PPACA currently remains in place, there continue to be challenges to the law. Different states have handled the prospective Medicaid expansion in different manners. There are concerns about the very health and stability of social security and Medicare. As these issues evolve, GME must evolve with them, but improved data and defined performance metrics will facilitate the process. At this time, the ACGME is considering changes to the Common Program Requirements, one of which would allow fellows to work as attendings for up to 10 h a week in their primary specialty. This could represent a new funding stream to pay for fellow training [30].

## 6 GME financing—challenges for clinical cardiac electrophysiology

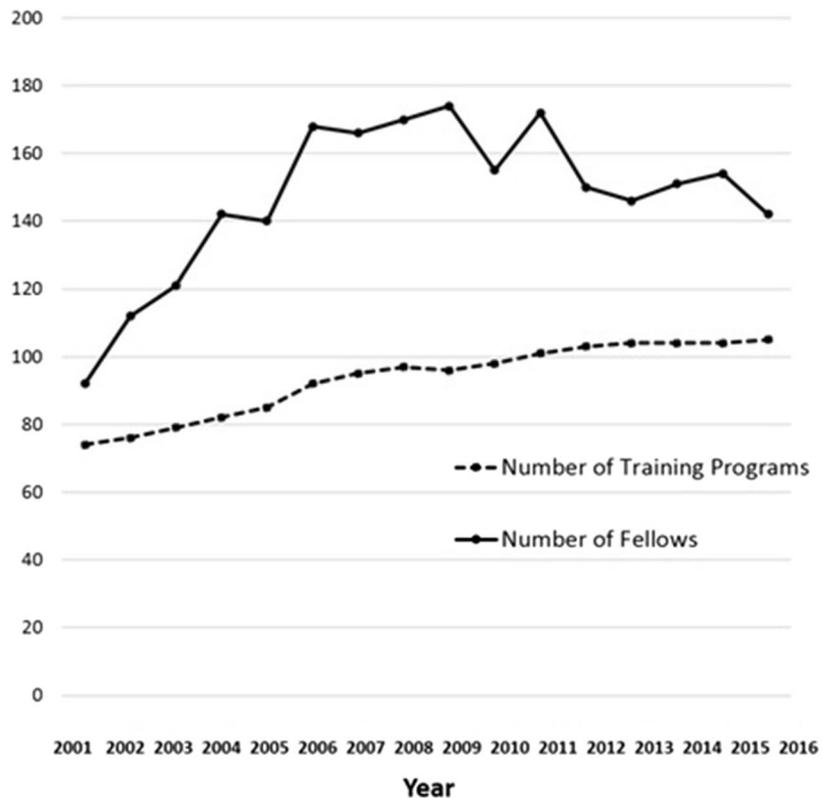
The debate around GME governance and financing has been somewhat unsettling to subspecialists, particularly tertiary

subspecialists, such as clinical cardiac electrophysiologists (CCEP). Fellowship positions have been reimbursed at a lower rate than residency positions for years [2]. Some of the more recent legislation regarding Medicare funding has already made moves to distribute excess funded residency slots to more community-based and geographically underserved areas. The PPACA of 2010 created an expansive new program, Teaching Health Center Graduate Medical Education, which provide dollars directly to community-based health centers and new primary care residencies [31]. With the increased emphasis on primary care and shifting training away from large, academic teaching centers, there is concern that hospital-based fields such as CCEP will become undervalued and receive fewer resources [32].

Funding for CCEP fellowship positions has been problematic for some time. Until 2017, CCEP was accredited by the American Council on Graduate Medical Education (ACGME) as a 1-year fellowship program. For years, many academic CCEP training programs felt this was not adequate for training and were mandating a second year. In addition, some programs have been mandating training beyond 24 months for specialized skills, including epicardial ablation, lead extraction, and left atrial appendage occlusion. None of this would have any expectation for Medicare funding. Starting in 2017, the ACGME accredited CCEP as a 2-year fellowship program and many training programs applied to the ACGME to increase their fellow complement to account for the second-year fellows that they were already training, but were not officially accredited [33]. As Medicare-funded positions remain capped, this still did not translate into increased funding for CCEP fellows.

Different training programs have been managing this in various ways, including hospital funding, physician practice funding, philanthropy, and industry grants [2]. There is essentially no data available as to CCEP fellowship funding streams. It is clear that electrophysiology programs, in general, are lucrative and hospitals and physician practice programs have interest in supporting them. Further, the medical device industry has particular interest in supporting programs and fellows, and historically, they have provided grants to fellows for training [34, 35]. This funding source is being challenged at some institutions due to increased scrutiny of hospital-vendor relationships, particularly as they apply to residents and fellows. Institutions are increasingly attempting to prevent undue industry influence on trainees. Further, they wish to shield trainees from being publicly named as per the Physician Payment Sunshine Act (PPSA, 2010) as a side effect of a hospital accepting funds to support their training [36]. Some hospitals with strict industry policies will accept unrestricted grants from vendors which they can then direct towards fellowship support, but this funding source continues to be increasingly challenged [37, 38].

**Fig. 3** CCEP fellowship training in the USA: 2001–2016 [18]



Data after 2016 was not included as CCEP fellowship became accredited as a two year fellowship program starting July 2017.

While the mechanisms that CCEP training programs are using to fund their fellowships are ill-defined, this has not been a deterrent towards the maintenance of existing programs and the establishment of new programs (Fig. 3 [18]). In 2001, there were 77 CCEP fellowship programs. As of 2016, there were 105. Interestingly, while the number of programs has been steadily climbing, the number of accredited CCEP fellows is not. Per ACGME data, since 2009, when the number of accredited CCEP fellows peaked, there has been steady decline, and this is presumed to be due to decreased applications based upon market forces [39]. In 2009, there were 96 programs and 174 accredited fellows. In 2016, there were 105 programs but only 142 fellows. Thus, on average, the number of accredited fellows per program in 2009 was 1.8 vs 1.4 in 2016. It should be noted, again, that during this time period, many programs had second-year fellows that are unrecorded as that training year was not accredited. Nonetheless, as there are large academic programs that routinely support three or more fellows per class, the implication is that many of these CCEP training programs have unfilled fellowship positions and a number of them only have one fellow at a time. It should also be noted that many programs will take international unaccredited fellows. As most of those fellows would be on J-1 visas that limit training in the USA to 7 years, adding a

mandatory second year to EP training may decrease international applicants further worsening the mismatch between programs and trainees.

This disparity has been a source of discussion in the electrophysiology community. Any training program requires resources to operate regardless of the number of trainees enrolled in the program [40]. The CCEP community needs to consider the costs, not just monetarily, but educationally of the continued expansion of fellowship programs and fellowship positions, when there is a reasonable expectation that a number of programs, at various points, will be under filled or unfilled. Starting this year, CCEP is, for the first time, entering the Electronic Residency Application Service (ERAS) and the National Residency Match Program (NRMP) [41]. These services may provide useful data that will allow for a more nuanced analysis of the trends to guide future decision-making.

## 7 Conclusions

The issues of GME governance and financing are going to continue to be part of the global discussion about health

care in the USA. It is likely that there will be continued significant contributions from the federal government towards residency and fellowship training. How these funds will be distributed and how government-funded training outcomes are evaluated is going to evolve. It is also likely that the contributions from private entities are going to become more of a factor, especially for fellowship programs. The CCEP community needs to work on several fronts to ensure that the importance of the work we do is recognized and that the CCEP needs of the USA will continue to be met in the future [32]. First, advocacy at a governmental level needs to continue. Second, the CCEP community internally needs to grapple with the mismatch between training positions and applicants. The Heart Rhythm Society is active on both of these fronts already with an active advocacy group and an active program director's subcommittee that has moved training programs towards ERAS and the NRMP [42, 43]. However, involvement of the entire membership is critically important to ensure the future of electrophysiology and electrophysiology fellowship training in the future.

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