Cite this article as:
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Primary Care Or Rural Training
Health Affairs, 32, no.1 (2013):102-110

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The Redistribution Of Graduate Medical Education Positions In 2005 Failed To Boost Primary Care Or Rural Training

ABSTRACT Graduate medical education (GME), the system to train graduates of medical schools in their chosen specialties, costs the government nearly $13 billion annually, yet there is little accountability in the system for addressing critical physician shortages in specific specialties and geographic areas. Medicare provides the bulk of GME funds, and the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 redistributed nearly 3,000 residency positions among the nation’s hospitals, largely in an effort to train more residents in primary care and in rural areas. However, when we analyzed the outcomes of this recent effort, we found that out of 304 hospitals receiving additional positions, only 12 were rural, and they received fewer than 3 percent of all positions redistributed. Although primary care training had net positive growth after redistribution, the relative growth of nonprimary care training was twice as large and diverted would-be primary care physicians to subspecialty training. Thus, the two legislative and regulatory priorities for the redistribution were not met. Future legislation should reevaluate the formulas that determine GME payments and potentially delink them from the hospital prospective payment system. Furthermore, better health care workforce data and analysis are needed to link GME payments to health care workforce needs.

Graduate medical education (GME), the medical training that follows graduation from medical school, consists of internships, residencies, and fellowships. Support for GME comes out of a number of public and private pots, including funding from federal and state governments. The way in which these monies are spent fundamentally shapes the US physician workforce—determining both the number of training slots and the distribution of these slots among physician specialties. Physicians must complete a US GME training program to be licensed in the United States, and it is during this training that physicians differentiate into specialties.

GME program characteristics further influence the geographic location of graduates because physicians often locate near where they have completed their residency programs. Training in rural and underserved areas increases the likelihood that physicians will establish their practices in these areas.

GME payments are the largest public investment in health care workforce development. Medicare paid teaching hospitals $9.7 billion in 2009 to support GME training. Medicaid provided $3.18 billion, and the Department of Veterans Affairs provided $800 million for GME training in 2008. Despite this sizable annual investment, the supply and distribution of the physician workforce remains problematic.
Although there is debate about the sufficiency of the overall number of physicians, most agree that specific specialties and geographic locations face significant shortages, limiting access to health care services. \(^{10-11}\)

Despite the size of GME investment in the physician workforce, there is little accountability for how these public investments affect workforce outcomes, such as specialty and geographic distribution. There is no detectable coordination of GME funding across the various federal programs, such as Medicare and Medicaid. And even though Medicare is the largest source of GME funding, and the Centers for Medicare and Medicaid Services supports residency slots in the nation’s hospitals, the program has no requirements about how these positions should be distributed to meet local and national physician workforce needs.

The convoluted Medicare GME payment formulas consist of two parts: direct payments to pay the salaries of the residents and the supervising physicians’ time, and indirect payments to subsidize other hospital expenses associated with running training programs, such as longer inpatient stays and more use of tests. These payments are based, in part, on the number of residents a hospital trains and the number of Medicare patients it treats.

The indirect payment is the larger of the two forms of payment and is tied to inpatient services, since it is an add-on percentage to the hospital prospective payment. Outpatient settings thus do not qualify for the indirect payment. Furthermore, the indirect payment is calculated based on the ratio of residents to hospital beds. Larger hospitals can support higher ratios of residents to beds, so smaller community and rural hospitals generally receive smaller GME payments per resident.

Overall, these policies place smaller community and rural hospitals, and the specialties most often sponsored by them, at a substantial disadvantage relative to larger and more urban hospitals. Tying funding to hospitals also provides a disincentive to moving training into the ambulatory setting where most people now get care—a mismatch that ultimately produces physicians less experienced with working in these settings.

As a result, Medicare GME payments have been the focus of recent reform discussions, in terms of both increasing accountability and reducing costs, particularly in the context of deficit reduction. \(^{14,15}\) A 2011 Josiah Macy Jr. Foundation report called for GME reform to “meet the needs of—and be accountable to—the public.”\(^{16}\) The Medicare Payment Advisory Commission’s June 2010 report to Congress recommended increasing transparency in the GME system and redirecting a portion of current funding to establish a performance-based payment system, which would link payments to program training characteristics relevant to public needs. \(^{17}\) The Affordable Care Act instructed the Council on Graduate Medical Education to develop and implement performance measures for GME programs.

The Affordable Care Act also included changes to the GME system, taking residency positions that were going unused at many hospitals and redistributing them to other hospitals, with a preference for primary care and general surgery programs focused on training for underserved areas. Earlier, the Balanced Budget Act of 1997 had created a residency cap per hospital, setting the number of residency positions that Medicare would support at each hospital. But as a result of program closures or reductions in the numbers trained at certain hospitals, some hospitals have been training numbers of residents below their “residency cap,” leaving vacant or unused positions in the system. The Affordable Care Act now requires collection and redistribution of these unused positions: 75 percent of positions must go to primary care or general surgery programs, and priority is given to hospitals located in states with the lowest resident-to-population ratios or the highest population ratios living in Health Professional Shortage Areas.

The Affordable Care Act’s GME redistribution is not the first of its kind. The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 included a similar GME redistribution that explicitly prioritized rural hospital training programs to receive additional positions. This redistribution was implemented in 2005.

Nearly eight years later, with a new GME redistribution under way and the GME system under increased scrutiny for funding and accountability, a look at the outcomes of the 2005 redistribution holds potential lessons for the current redistribution and for any future GME reforms. In the study reported in this article, we sought to answer these questions: Was there any shifting of resident positions between primary care and nonprimary care between the imposition of the GME cap of 1997 and the redistribution of 2005? What were the outcomes of the redistribution? Did the nation achieve the workforce goals set out by law, particularly in increasing training in rural areas? What policy lessons can be learned from this GME redistribution?

**Study Data And Methods**

**DATA SOURCE** We used the Centers for Medicare and Medicaid Services’ Healthcare Cost Report
Information System data supplied by hospitals from 1998 to 2008. The 2008 Hospital Cost Reports were the most recently finalized reports. All teaching hospitals submitting requests for direct Medicare GME payments report their total number of residents trained, number of primary care and obstetrics and gynecology physicians trained, number of all other physicians trained, and resident caps (the maximum number of residents who qualify for Medicare payments).

Teaching hospitals whose Medicare resident cap was reduced under the Medicare Modernization Act report their reduced resident caps. Teaching hospitals that received positions as a result of the redistribution report the number of additional positions received.

The Centers for Medicare and Medicaid Services defines primary care as family medicine, general internal medicine, general pediatrics, preventive medicine, geriatric medicine, or osteopathic general practice. For the purposes of this article, we refer to primary care and obstetrics and gynecology physicians trained as “primary care” and all other physicians trained as “nonprimary care.” Hospital Cost Reports also provided total hospital beds and hospital addresses.

**ANALYSIS** We assessed GME training levels during three time periods—pre-redistribution, at redistribution, and post-redistribution. We used Hospital Cost Reports to determine hospitals’ primary care and nonprimary care counts in 1998 (pre-redistribution), averaged for the years 2002 to 2004 (at redistribution), and in 2008 (post-redistribution). The 1998 count immediately follows the 1997 residency cap and therefore represents the number closest to the count at which the cap was set. The 2008 count was not averaged because of the length of residency training—that is, any increases in residency program size following redistribution would have only begun to stabilize by 2007–08.

Changes in primary care and nonprimary care positions among hospitals receiving additional positions were calculated as the difference between studied time periods (post-redistribution minus redistribution and redistribution minus pre-redistribution). Hospitals were aggregated based on their gain or loss of primary care and nonprimary care positions after redistribution. Changes in primary care and nonprimary care positions and the number of redistributed GME positions were summed for all hospitals in each category. The number of residents trained and number of hospital beds in 2004 at the time of redistribution were averaged for hospitals in each category.

The number of positions lost as a result of redistribution was calculated from the reported reduced resident cap subtracted from the resident cap prior to redistribution in 2003.

Hospital addresses were geocoded using ArcGIS 9.3 software. Rural status was determined using the county urban population size classification of the Department of Agriculture’s Rural Urban Continuum Codes (2003). A rural classification was given to any hospital in a “non-metro county” (codes 4–9).

The analysis is a descriptive comparison between residency counts in each of the periods described above.

**LIMITATIONS** Hospital Cost Reports do not provide the level of granularity necessary to determine precise numbers of specific specialties trained. Although resident counts are reported as primary care and obstetrics and gynecology versus all others, within these two broad categories, there is no designation for the exact specialties trained.

For example, within primary care counts reported in Hospital Cost Reports, a family medicine resident cannot be differentiated from an internal medicine resident. However, these two specialties have very different primary care career outcomes. Although there are few family medicine subspecialties, recent evidence suggests that up to 80 percent of internal medicine residents plan to subspecialize.

Hospital Cost Reports also limit the analysis to these two categories of specialty training rather than the broader workforce outcomes. To determine whether redistribution results in increased numbers of physicians in rural and underserved areas or in primary care practice, our analysis would need to be expanded to examine these outcomes.

It should be noted that the full-time equivalents reported in Hospital Cost Reports and in this article do not represent actual numbers of people. Medicare limits resident activities that can be counted for GME payments largely to activities associated with patient care. Excluded activities during the time of analysis included time spent in research activities, didactic conferences, and seminars. The Affordable Care Act modified this restriction to allow for time spent in didactic conferences and seminars to be included in payment calculations. Therefore, there are more actual people in the GME system than the full-time-equivalent numbers reflect.

**Study Results**

**HOSPITALS LOSING GME CAP** An analysis of Hospital Cost Reports between 2005 and 2008 found that 456 hospitals initially reported reduced GME caps as a result of redistribution.
Approximately 3,077 positions were collected for redistribution.

Within the pool of hospitals that lost positions, there are some oddities. For example, eighty hospitals initially reporting reduced caps in 2005 and 2006 reported no reduced caps in 2007 and 2008. Of these eighty hospitals, sixteen reported no resident training in 2007 or 2008, leaving sixty-four hospitals that reported initial cap reductions in 2005 and 2006 but no reduced caps in 2007 and 2008.

One potential explanation for why these sixty-four hospitals reported this way is that they filed appeals and had their cap reductions reversed. This explanation is consistent with the experiences of seven rural hospitals that had their resident caps reduced, two of which reported total bed sizes fewer than 250—criteria that should have protected them from a reduction—but that later showed no reduced caps in their cost reports. We found that two hospitals that lost positions also gained additional positions through the redistribution—in fact, they gained more positions than they lost.

Hospital Gaining GME Cap Three hundred and four hospitals gained approximately 3,000 positions through redistribution. Hospitals do not designate specific positions as redistributed positions; therefore, we are able to report only the change in positions following redistribution. The net change in primary care positions between 2004 and 2008 was an increase of 1,585. The net change in nonprimary care positions was a 3,433 count increase. Net growth in positions was larger than the number redistributed—some reflecting allowed growth because of other GME policies but most because of growth above the cap. Positions created above the cap are typically funded by the hospital.

Although the net change was positive for both primary care and nonprimary care positions, seventy-eight of the hospitals that received additional positions through the redistribution proceeded to reduce their number of primary care positions trained after redistribution. Forty-eight of these hospitals decreased their primary care training while increasing their nonprimary care training.

Exhibit 1 provides the GME positions gained through redistribution as well as the change in primary care and nonprimary care positions for the various categories of hospitals increasing or decreasing their primary care and nonprimary care positions after redistribution.

Among the 304 hospitals that received new positions under redistribution, 140 had decreased their primary care training by 946.6 positions prior to redistribution, between 1998 and 2004. Despite decreases in primary care training, seventy-six of these hospitals increased their total positions during the same period, suggesting that they were converting primary care positions to nonprimary care positions. A total of 494.8 primary care positions were converted to

### Exhibit 1

Characteristics of Hospitals Receiving Additional Cap as a Result of the Medicare Modernization Act Redistribution, 2004–08

<table>
<thead>
<tr>
<th>Change in primary and nonprimary care category</th>
<th>Number of hospitals</th>
<th>Total beds, 2004 (average)</th>
<th>Total resident FTEs, 2004 (average)</th>
<th>GME FTEs gained through redistribution (sum)</th>
<th>Change in primary care OB/GYN FTEs, 2004–08 (sum)</th>
<th>Change in nonprimary care FTEs, 2004–08 (sum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased primary care and decreased nonprimary care</td>
<td>24</td>
<td>217</td>
<td>36</td>
<td>104.0</td>
<td>−124.5</td>
<td>−77.4</td>
</tr>
<tr>
<td>Decreased primary care and no nonprimary care</td>
<td>6</td>
<td>282</td>
<td>14</td>
<td>19.0</td>
<td>−8.4</td>
<td>−a</td>
</tr>
<tr>
<td>Decreased primary care and increased nonprimary care</td>
<td>48</td>
<td>406</td>
<td>180</td>
<td>487.4</td>
<td>−244.9</td>
<td>845.0</td>
</tr>
<tr>
<td>Increased primary care and decreased nonprimary care</td>
<td>67</td>
<td>323</td>
<td>63</td>
<td>478.8</td>
<td>601.7</td>
<td>−165.4</td>
</tr>
<tr>
<td>Increased primary care and no nonprimary care</td>
<td>15</td>
<td>296</td>
<td>15</td>
<td>48.4</td>
<td>49.4</td>
<td>−a</td>
</tr>
<tr>
<td>Increased primary care and increased nonprimary care</td>
<td>133</td>
<td>423</td>
<td>188</td>
<td>1,831.3</td>
<td>1,311.3</td>
<td>2,830.5</td>
</tr>
<tr>
<td>Closed programs, no training reported in 2008</td>
<td>8</td>
<td>187</td>
<td>9</td>
<td>31.3</td>
<td>−a</td>
<td>−a</td>
</tr>
<tr>
<td>Total loss</td>
<td>−a</td>
<td>−a</td>
<td>−a</td>
<td>−a</td>
<td>−377.9</td>
<td>−242.8</td>
</tr>
<tr>
<td>Total gain</td>
<td>−a</td>
<td>−a</td>
<td>−a</td>
<td>−a</td>
<td>1,962.4</td>
<td>3,675.5</td>
</tr>
<tr>
<td>Total overall change</td>
<td>301b</td>
<td>−a</td>
<td>−a</td>
<td>3,000.1</td>
<td>1,584.6</td>
<td>3,432.7</td>
</tr>
</tbody>
</table>

**Source:** Centers for Medicare and Medicaid Services Healthcare Cost Report Information System data, 1998–2008. **Notes:** FTE is full-time equivalent. GME is graduate medical education. OB/GYN is obstetrics and gynecology. *Not applicable. *Three hospitals with missing data are not included in the calculations.
nonprimary care positions by these hospitals. Following redistribution, 110 of the 140 hospitals that had decreased primary care training again expanded primary care by 1,190.9 positions. Despite having rural training expansion as a goal of the redistribution, only twelve rural hospitals received new GME positions, for a total of eighty-three positions. One-third of hospitals receiving additional positions under the cap were located in the most populated urban areas. Exhibit 2 provides the number of redistributed positions per Rural Urban Continuum Code.

**Discussion**

The Medicare Modernization Act’s redistribution of unused resident positions explicitly prioritized rural programs to receive additional positions. The Centers for Medicare and Medicaid Services’ regulations further established priorities for specific workforce outcomes, such as training in primary care.19 Our analysis suggests that the redistribution fell far short of achieving the law’s rural training expansion goal. Although primary care training had net positive growth after redistribution, the relative growth of nonprimary care training was twice as large and had a net negative effect on primary care production by diverting would-be primary care physicians to subspecialty training. In the end, the two legislative and regulatory priorities for the redistribution were not met, and the effort did not address key national health care workforce needs.

Although primary care training did see an increase in those hospitals receiving redistributed positions, a much larger increase was seen in nonprimary care training (1,585 primary care positions versus 3,433 nonprimary care positions). Closer inspection reveals that forty-eight hospitals decreased their primary care training while increasing specialty training—after receiving additional Medicare funded positions. Our analysis also found that the redistribution was preceded by a relative expansion of nonprimary care training at the expense of primary care, and the redistribution maintained the momentum of this pattern of behavior on the part of hospitals.

**Policy Implications**

Analysis of the Medicare Modernization Act’s GME redistribution suggests that small changes made within the bounds of the larger, established GME system cannot sufficiently shift

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**EXHIBIT 2**

Rural-Urban Distribution Of The Medicare Modernization Act Of 2003 Redistributed Positions, 2005

<table>
<thead>
<tr>
<th>Rural-Urban Continuum Code</th>
<th>No. teaching hospitals, 2004</th>
<th>No. hospitals receiving additional cap</th>
<th>No. redistributed positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (metro area of 1 million people or more)</td>
<td>790</td>
<td>102</td>
<td>1,071.4</td>
</tr>
<tr>
<td>2 (metro area of 250,000–999,999 people)</td>
<td>270</td>
<td>122</td>
<td>1,309.5</td>
</tr>
<tr>
<td>3 (metro area of fewer than 250,000 people)</td>
<td>137</td>
<td>66</td>
<td>512.0</td>
</tr>
<tr>
<td>4 (urban population of 20,000 or more, adjacent to a metro area)</td>
<td>25</td>
<td>4</td>
<td>13.5</td>
</tr>
<tr>
<td>5 (urban population of 20,000 or more, not adjacent to a metro area)</td>
<td>22</td>
<td>5</td>
<td>43.8</td>
</tr>
<tr>
<td>6 (urban population of 2,500–19,999, adjacent to a metro area)</td>
<td>22</td>
<td>3</td>
<td>26.0</td>
</tr>
<tr>
<td>7 (urban population of 2,500–19,999, not adjacent to a metro area)</td>
<td>15</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>8 (completely rural or less than 2,500 urban population, adjacent to a metro area)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>9 (completely rural or less than 2,500 urban population, not adjacent to a metro area)</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

the system to address the nation’s health care workforce needs. Even though Congress and the Centers for Medicare and Medicaid Services made rural training the number one priority for redistribution, just 3 percent of the positions redistributed went to rural training. It is unclear why this was the case, but it reflects a fundamental failure of this first effort to purposefully redirect federal funding to producing physicians in areas where access to care is desperately needed.

Analysis of the redistribution also sheds light on outcomes that were unlikely to be intended by the legislation. Our findings suggest that redistribution largely supported hospitals in growing their specialty training. Some hospitals even converted primary care positions to specialty positions after receiving newly redistributed positions. Many hospitals receiving new positions had previously converted primary care positions to specialty positions. Although redistribution restored some of these lost primary care positions, it did not prevent continued conversion of primary care to specialty positions.

It is important to recognize that changes in primary care training levels reflect the overall primary care workforce environment as well as GME policy. Over time, programs may shift funded GME positions to more lucrative specialties. This shifting collectively perpetuates the nation’s physician workforce maldistribution, and our analysis demonstrates that Medicare continues to support these hospitals and even increases its support for them, regardless of the specialty mix of residents trained.

Our findings suggest that prioritization language is insufficient to redirect the GME system. Stronger safeguards are needed even to maintain current levels of primary care training, and larger reforms are needed to move the GME system to address the priority physician workforce needs of the nation.

The Affordable Care Act attempts to stem the loss of primary care positions by requiring hospitals receiving redistributed positions under the cap to maintain their baseline primary care training levels and dedicate at least 75 percent of the new positions to primary care or general surgery positions for a five-year period. Although these measures are more rigorous than the priority language of the Medicare Modernization Act, general internal medicine programs have seen the largest growth in numbers among primary care training programs over the past decade, which suggests that these programs have the greatest capacity to expand.

However, analysis of recent trends shows that 20 percent or fewer of internal medicine residents will go on to practice in primary care. These trends also suggest that the relatively small primary care gains seen after redistributions overestimate real workforce gains, given the loss of internal medicine physicians to further specialty training or to hospital-based careers.

Five years is also a short period in physician workforce production. Primary care residency programs generally require three years of training. Therefore, hospitals will reach their full complement of new residents only in year three after redistribution. In fact, the real impact of this growth on the primary care workforce will not be measurable for at least three more years, as these new physicians move out and settle into practice. This minimum six-year lag in ability to measure the outcomes of this latest redistribution means legislated restrictions on these positions will be lifted before teaching hospitals can be held accountable. For this reason, the Affordable Care Act’s redistribution is also unlikely to have a substantial impact on the primary care or rural workforce.

Stronger policy options are needed to address specialty and geographic physician workforce shortages. This perspective is consistent with recommendations made by many federal advisory commissions, councils, and institutions.

One option is to establish a primary care training maintenance level at which hospitals may reduce primary care training, but GME payments cannot be diverted to nonprimary care positions. Other specialties where shortages either exist or are anticipated, such as general surgery, could receive similar “most-favored-nation” status. This policy option creates an incentive for hospitals to maintain positions, reducing the erosion over time of shortage-specialty training programs. However, a maintenance level would only reduce further loss of primary care positions.

To fully address the health care workforce needs of the nation, reassessment of the current Medicare GME payment system is needed. Options include introducing accountability requirements into the current system with sufficient penalties and incentives to truly influence the system and ongoing evaluation to ensure desired outcomes are met. These accountability requirements could link significantly different levels of payments to evidence of addressing priority physician workforce needs, such as the production of physicians in high-need specialties or physicians who practice in underserved areas. Ongoing program reporting would be required to maintain or adjust any level of payment. This approach would require some expansion of the role of the Centers for Medicare and Medicaid Services to administer the GME payment system.
Otherwise, an overhaul of the current system is needed, reevaluating the formula system and potentially delinking payments from the hospital prospective payment system. For both approaches, better health care workforce data, analysis, and planning are needed to guide this system and link the GME system to local, regional, and national health care workforce needs. A related product of the Affordable Care Act, the National Health Care Workforce Commission, has been named but not funded.

Our analysis of the Medicare Modernization Act’s redistribution highlights the need to evaluate the outcomes of public GME investments and to create accountability for meeting the workforce needs of the nation. Although the Medicare Modernization Act and Affordable Care Act set specific workforce priorities for GME redistribution, neither required an evaluation of the outcomes.

Our analysis suggests that the Medicare Modernization Act had paltry success in increasing rural training and largely strengthened specialty training. An even deeper level of analysis is needed to understand the full outcomes of redistribution, such as whether or not the graduates of these programs located their practices in rural areas or in high-need specialties. This evaluation is a first step toward developing a mechanism for accountability within the GME system. As GME reform continues to be considered, answering these outcome questions becomes more and more relevant.

Conclusion

Graduate medical education is critical in the development of the physician workforce, and it represents the largest public investment in health care workforce development in the United States. Yet the health care system continues to face critical physician shortages in select specialties and geographic locations. The GME system is under scrutiny and faces potential reform, both to reduce costs and to increase accountability for meeting the health care needs of the nation.

An analysis of the outcomes of the 2005 redistribution of training positions produced by the Medicare Modernization Act suggests that redistributions and prioritization language within prevailing GME policy are insufficient to produce significant course corrections. Our findings suggest that clear guidance and accountability are needed to ensure that any future GME redistributions meet intent and, more importantly, meet need.

Our findings also suggest that future GME reforms must include evaluations of outcomes to create accountability for the results of public investments. More broadly, our findings suggest that an earnest public discussion about what the public should expect for this considerable investment is needed to inform a larger reform of GME funding.

Select findings from this study were presented at the Association of American Medical Colleges’ Physician Workforce Research Conference, Washington, D.C., May 3, 2012. The Josiah Macy Jr. Foundation supported this work. Candice Chen is supported through a Disparities Research and Education Advancing Mission (DREAM) Career Transition Award by the National Institute of Minority Health and Health Disparities, National Institutes of Health. Chen thanks Marion Danis, in the Department of Clinical Bioethics in the Clinical Center of the National Institutes of Health, for acting as intramural mentor for her DREAM Career Transition Award. The views expressed by Chen do not necessarily reflect the views or policy of the American Academy of Family Physicians.

NOTES


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ABOUT THE AUTHORS: CANDICE CHEN, IMAM XIERALI, KATIE PIWNICA-WORMS & ROBERT PHILLIPS

In this month’s Health Affairs, Candice Chen and coauthors report on their study of graduate medical education funding, and the effort under the Medicare Modernization Act of 2003 to redistribute nearly 3,000 residency positions among the nation’s hospitals. The intention was to train more residents in primary care and in rural areas, but the authors found that only twelve hospitals receiving additional positions were rural. They also found that although primary care training slots grew in number, the relative growth of nonprimary care training slots was twice as large, and would-be primary care physicians were drawn into these new positions. The authors call for changes in the structure of Medicare GME payments and better data and analysis to link the system more closely to actual workforce needs.

Chen is co–principal investigator of the Medical Education Futures Study, examining the social mission of medical education, and a researcher on the Medical Education Partnership Initiative. She is also a senior research fellow at the National Institute on Minority Health and Health Disparities in the Disparities Research and Education Advancing Mission program, as well as an assistant research professor in health policy at the George Washington University.

Chen’s domestic work focuses on the educational factors that influence primary care and underserved career choices, and
her international work focuses on the personnel and resource needs of medical education institutions in sub-Saharan Africa to strengthen human resources for health in the region.

Chen continues to practice primary care pediatrics in an underserved community in Washington, D.C. She received a master’s degree in public health, with a concentration in community-oriented primary care, from the George Washington University and a medical degree from Baylor University.

Imam Xierali conducted this work while acting as a research scientist and health geographer at the American Academy of Family Physicians’ Robert Graham Center for Policy Studies in Family Medicine and Primary Care. Xierali is manager for public health and diversity initiatives at the Association of American Medical Colleges. He has considerable experience in health services research, with a focus on the geospatial approach. Using Hospital Cost Report data, he recently completed a study on critical-access hospitals’ involvement in graduate medical training. His research interests are in spatial disparities in health and health care, statistical modeling, and spatial statistics.

Xierali earned a doctorate in geography from the University of Cincinnati.

Katie Piwnica-Worms is a third-year medical student at Jefferson Medical College, Thomas Jefferson University. After earning her undergraduate degree, she spent a year performing genetic research and analysis in the National Institutes of Health’s Office of Rare Diseases Research. Piwnica-Worms holds a bachelor’s degree in English literature from Washington University in St. Louis, where she conducted clinical research at the Alzheimer’s Disease Research Center. She also conducted research at the Dementia Research Centre, University College London.

Robert Phillips is a vice president of research and policy for the American Board of Family Medicine. He is principal investigator on a study of graduate medical education accountability measures that will inform issues of stewardship related to the $13 billion spent on these programs annually. He has considerable experience in health services and health policy research with a focus on primary care, health workforce, and evolving models of care organization.

Phillips is a member of the Institute of Medicine and a Fulbright Specialist, serving at the request of other countries to provide advice on various primary care research topics. He earned a master’s degree in public health from the University of Missouri and a medical degree from the University of Florida.