

## SPECIAL COMMUNICATION

## Match Rates into Family Medicine among Regional Medical Campus Graduates, 2007–2009

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**Background:** Regional medical campuses (RMCs) are geographically separate from parent campuses, have administrative ties to deans' offices, and offer at least 4 third-year clerkships. This study sought to describe the match rates into family medicine for graduates of RMCs and non-RMCs.

**Methods:** The authors obtained the 2007 to 2009 match lists from schools participating in the Association of American Medical College's Group on Regional Medical Campuses. RMC match numbers for family medicine were subtracted from the total number of family medicine matched US seniors as published by the National Residency Match Program. The outcome of interest was the relative frequencies of RMC and non-RMC graduates matching into family medicine.

**Results:** Between 2007 and 2009, 261 graduates from 29 RMCs accounted for 8% of all family medicine matches. During the study period, the match rate into family medicine for RMC graduates was 80% higher than that of non-RMC graduates (14.2% vs 7.9% for all 3 years). In 2009, only 3 of the RMCs had family medicine match rates lower than that of non-RMCs (7.5%).

**Conclusions:** The RMC match rate into family medicine was nearly twice that of non-RMCs. RMCs may play a role in addressing physician workforce imbalances. (J Am Board Fam Med 2012;25:894–907.)

**Keywords:** Career Choice, Family Medicine, Health Policy, Medical Education

In 2005, after 25 years of relatively stable matriculation into allopathic medical schools, the Council on Graduate Medical Education and the Association of American Medical Colleges (AAMC) called for existing medical school enrollment to increase by 15% and 30%, respectively.<sup>1,2</sup> Medical schools and state legislatures responded to these calls by increasing capacity at existing campuses, building new medical schools, and developing regional medical campuses (RMCs).<sup>3</sup> Simultaneously, osteopathic school capacity expanded nearly 50% between 2000 and 2008, whereas offshore training opportunities also increased.<sup>4,5</sup>

There has long been debate about the adequacy of our medical workforce. Recent commentary has focused on purported shortages in the physician workforce, whereas others contend that the real issue is inadequate distribution into specialties and geographies where need is greatest and a composition unrepresentative of the US population.<sup>6–8</sup> The future primary care workforce is an area of particular concern with Colwill<sup>9</sup> projecting that an increased primary care workload, due to population growth and aging, and shrinking pipeline will lead to a shortage of 44,000 generalists by 2025. Massachusetts' experience with longer wait times for the publicly insured seeking primary care after insurance expansion has many worried about the impact of not having appropriate access.<sup>10</sup> Insurance expansion for 34 million additional Americans after passage of the Patient Protection and Affordable Care Act provides another incentive for medical education to respond to community workforce needs so that access does not suffer.<sup>11–13</sup> Numerous factors influence specialty composition and distribution. The absence of coordinated planning and targeted policies has contributed to our current

This article was externally peer reviewed.

Submitted 14 December 2011; revised 30 May 2012; accepted 31 May 2012.

From Virginia Commonwealth University, Fairfax, VA (WL, CC, SL, MS); and the Robert Graham Center, Washington, DC (AB, RLP).

Funding: none.

Conflict of interest: none declared.

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state of physician maldistribution and increasing specialization.<sup>14,15</sup> Policymakers now have an opportunity to collaborate with educators to ensure that the medical workforce can appropriately respond to the anticipated surge in demand.

RMCs have been promoted as a cost-effective way to increase enrollment. By using existing infrastructure and faculty, RMCs benefit from lower startup costs compared with the construction of new medical schools although the data regarding their cost-effectiveness are anecdotal.<sup>16</sup> According to an AAMC report on RMCs, the 1970 Carnegie Commission on Higher Education called for an increase in medical school enrollment and identified 9 cities that would benefit from new medical schools.<sup>17</sup> Six of the 9 cities decided to develop RMCs affiliated with existing schools rather than build new schools. In Florida, state officials weighed various options regarding medical education expansion such as building a new medical school or developing an RMC. They ultimately chose to create an RMC because it proved to be the more cost-effective option.<sup>18</sup>

Many RMCs were created after policymakers recognized the potential of these campuses to improve the health of surrounding communities, but data are lacking regarding their impact on medical student career choice. Two examples of RMCs designed to address the needs of rural communities suffering from a shortage of physicians are the WWAMI program (Washington, Wyoming, Alaska, Montana, and Idaho) and the University of Alabama Huntsville Campus. The WWAMI program through the University of Washington, School of Medicine was created to address the needs of adjacent states. Because these states are mostly rural, they contain significant underserved regions but lack the funds to build their own in-state medical schools.<sup>19</sup> The University of Alabama School of Medicine developed the Huntsville Campus with the belief that community-based branch campuses would produce more primary care physicians for the region.<sup>17</sup> Assessments of RMCs, thus far, have focused on campuses affiliated with a single parent institution, and few that we know of have assessed their impact on career paths. A study of students at a medical school in Kentucky with an RMC reported that 33% of the RMC graduates went into family medicine compared with 13% from the non-RMC campus.<sup>20</sup>

Over the past 15 years, primary care production has dropped to <25% of all residency training and

primary care residency fill rates by US graduates is near a nadir—only 42.4% of family medicine residency positions filled in the annual match with US medical graduates in 2009 (compared with 72.6% in 1996).<sup>21,22</sup> This decline in interest in family medicine and primary care has dire consequences as studies have found that lower primary care physician-to-population ratios are associated with higher per beneficiary Medicare expenditures and lower quality.<sup>23</sup> In response to this precipitous decline, educators and policymakers have sought to identify the curricular, institutional, and student factors that will bolster the primary care workforce.<sup>24</sup> To our knowledge, this is the first analysis of RMCs on an aggregate level to examine whether exposure to RMCs is associated with differences in specialty selection. Our objective was to determine whether students graduating from RMCs in 2007 to 2009 were more likely than those graduating from non-RMCs to enter family medicine residencies.

## Methods

The study design was a retrospective cohort analysis. We included US medical school graduates from 2007 to 2009 who successfully matched in the National Residency Matching Program match. The RMC cohort consisted of graduates from 2007 to 2009 who successfully matched and attended an RMC. We obtained the residency match lists from RMCs participating in the AAMC's Group on Regional Medical Campuses (GRMC). We focused on match information because it is more reflective of student choice than postscramble residency fill rates (ie, students who do not match and the residencies in which they ultimately enter). At the time of the study, there were 42 individual RMCs in the GRMC. Members of the GRMC are self-identified as RMCs. Some parent schools have multiple regional campuses, whereas several schools have not yet produced graduates. This analysis was part of a larger GRMC initiative to determine whether graduates of RMCs were more or less likely than graduates of non-RMCs to match into any particular specialties.

The AAMC now recognizes a variety of RMC models, depending on the amount of time spent at the RMC. These categories are currently being refined and are not yet publicly available. Generally, RMCs can be grouped into 3 categories: (1) basic science RMCs (where students spend their

first and second years at the RMCs); (2) clinical RMCs (where students spend their third and fourth years at the RMCs); and (3) combined RMCs (where students spend a portion of basic science and clinical years at the RMCs). Our sample consisted of RMCs that satisfied the criteria published by the AAMC in 2003, defining RMCs as entities that are geographically separate from the parent campus, have an administrative tie to the office of the dean (not just departmental ties), and offer at least 4 of the required third-year clerkships.

We excluded (1) graduates who matched in specialties that do not participate in the National Residency Matching Program such as ophthalmology and urology; (2) those who did not match (including those graduates who ultimately scrambled for residency positions after the match); and (3) transitional and preliminary program matches. For graduates matching into transitional and preliminary programs, we assessed their specialty after intern year to avoid counting them twice. We subtracted RMC match numbers for each specialty from the total number of matched US seniors per specialty as published by the National Residency Matching Program.<sup>25</sup> The outcome of interest was the percentage of matched graduates matching in family medicine residencies for RMC and non-RMC US seniors. This was calculated by dividing the number of graduates matched into family medicine by the total number of matched graduates for RMCs and non-RMCs.

The null hypothesis was that there was no difference in the frequency of matches into family medicine residencies by RMC and non-RMC graduates. A Pearson  $\chi^2$  test was used to refute the null hypothesis with a threshold of  $P < .05$  for statistical significance. All analyses were conducted using SAS software (Version 9.2; SAS Institute, Cary, NC).

The Institutional Review Board of Inova Health System issued a Certificate of Exemption for this study under DHHS 45-CFR-46-101.b.

## Results

Twenty-nine RMCs participated in this analysis (Table 1), whereas 4 RMCs were excluded because they had not yet participated in the match.<sup>26</sup> Our sample consisted of the 1832 graduates from RMCs and the 38,955 graduates from non-RMCs who successfully matched (Table 2). On average, 5.8 third and 1.9 fourth-year (or 7.7 third- and fourth-

year courses) courses are required to be taken at each of the RMCs (Table 3).

Between 2007 to 2009, the match rate into family medicine for RMC graduates was 80% higher than that of non-RMC graduates (14.2% vs 7.9% for all 3 years; Figure 1). Therefore, compared with non-RMCs, for every 16 medical students trained in RMCs, 1 additional student will match in a family medicine residency. Despite this difference, RMC graduates represent a small percentage of the total medical student population, making up 8% of all the family medicine matches. For individual years, the match rate into family medicine for RMCs was nearly twice that of non-RMCs. The differences within each year were statistically significant ( $P < .0001$ ). The majority of RMCs in our sample demonstrated a high percentage of RMC graduates going into family medicine. In 2009, only 3 of the RMCs had a family medicine match rate lower than the non-RMC rate (Figure 2).

## Discussion

From 2007 to 2009, graduates from RMCs were nearly twice as likely as those graduating from non-RMCs to match in family medicine. Primary care is struggling to attract students, and this association has important implications regarding how medical school expansion can address physician workforce composition deficiencies. It can also impact the distribution of the workforce because family physicians are more likely to practice in rural and underserved areas than most other specialties with approximately 20% of family physicians practicing in rural geographies.<sup>27,28</sup> This latter outcome was not measured directly but will be important to monitor as these graduates complete their residencies and move into direct patient care.

Little is known about RMCs on an aggregate level. Most of the existing data is based on individual schools, although medical student evaluations of these entities have generally been positive.<sup>17</sup> With fewer residents and fellows at these campuses, medical students often benefit from more direct and prolonged interaction with attendings, more intense involvement with patient care, and support from an infrastructure whose primary focus is typically on medical student education. Furthermore, educators at RMCs are often less burdened by administrative layers, allowing for the development of innovative, responsive curricula.<sup>17</sup> Historically,

**Table 1. Graduates Matching into Family Medicine per Year per Regional Medical Campus**

| Parent University/Regional Campus Location(s)                                                                             | Number of Matched Graduates |      |      |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------|------|------|
|                                                                                                                           | 2007                        | 2008 | 2009 |
| Florida State University College of Medicine:<br>Daytona Beach, Orlando, Sarasota, Fort<br>Pierce, Pensacola, Tallahassee | 46                          | 47   | 62   |
| Michigan State University College of Medicine:<br>Flint, Grand Rapids, Kalamazoo, Lansing, Saginaw, Upper Peninsula       | 110                         | 92   | 79   |
| Robert Wood Johnson Medical School:<br>Camden                                                                             | 53                          | 47   | 41   |
| University of Alabama School of Medicine:<br>Huntsville                                                                   | 23                          | 26   | 25   |
| Tuscaloosa                                                                                                                | 21                          | 25   | 22   |
| University of California, Los Angeles:<br>Charles Drew                                                                    | 19                          | 19   | 26   |
| University of Illinois College of Medicine:<br>Rockford                                                                   | 42                          | 42   | 41   |
| Urbana                                                                                                                    | 20                          | 28   | 15   |
| University of Kansas School of Medicine Wichita:<br>Wichita                                                               | 49                          | 47   | 59   |
| University of Oklahoma College of Medicine:<br>Tulsa                                                                      | 22                          | 24   | 33   |
| University of Texas Medical Branch:<br>Austin                                                                             | 15                          | 15   | 29   |
| University of Washington—WWAMI:<br>Washington, Wyoming, Alaska, Montana, Idaho                                            | 127                         | 115  | 148  |
| Virginia Commonwealth University School of Medicine:<br>Fairfax                                                           | 24                          | 24   | 20   |
| West Virginia University School of Medicine:<br>Charleston                                                                | 29                          | 24   | 33   |
| Eastern                                                                                                                   | 7                           | 8    | 9    |
| Total                                                                                                                     | 607                         | 583  | 642  |

RMCs have been geographically characterized by their distance from urban academic health centers and typically situated in suburban and rural communities. The exposure to rural and community-based practices may be more nurturing to medical students interested in primary care. However, more research is needed to explain the mechanisms be-

hind this relationship and to confirm that this relationship holds when controlling for the numerous confounders that influence specialty choice.

### **Limitations**

Interpretation of these results requires caution, and numerous limitations should be taken into account.

**Table 2. Graduates Matching into Family Medicine by Regional Medical Campus**

| Year  | Regional Medical Campuses  |               | Nonregional Medical Campuses |               |
|-------|----------------------------|---------------|------------------------------|---------------|
|       | Matched in Family Medicine | Total Matched | Matched in Family Medicine   | Total Matched |
| 2007  | 87                         | 607           | 1009                         | 12,788        |
| 2008  | 88                         | 583           | 1068                         | 12,950        |
| 2009  | 86                         | 642           | 985                          | 13,217        |
| Total | 261                        | 1832          | 3062                         | 38,955        |

Table 3. Curricular Characteristics of Included Regional Medical Campuses

| Parent Institution        | Regional Medical Campus(es) (RMC)                                           | Selection Mechanism into the RMC, 2007 to 2009                                                                                                                                                                                  | Medical School Year | Required Rotations                 |              |                       | Notes |
|---------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------|--------------|-----------------------|-------|
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Course                             | No. of Weeks | No. of Hospital Weeks |       |
| Florida State University  | Daytona Beach                                                               | Lottery: Students with lower lottery numbers have first choice for campus placement*                                                                                                                                            | Third               | Pediatrics                         | 6            | 2                     |       |
|                           | Orlando                                                                     |                                                                                                                                                                                                                                 |                     | Family medicine                    | 6            | 0                     |       |
|                           | Sarasota                                                                    |                                                                                                                                                                                                                                 |                     | Internal medicine                  | 8            | 3                     |       |
|                           | Fort Pierce                                                                 |                                                                                                                                                                                                                                 | Fourth              | Obstetrics and gynecology (OB/GYN) | 6            | Variable              |       |
|                           | Pensacola                                                                   |                                                                                                                                                                                                                                 |                     | Surgery                            | 8            | Variable              |       |
|                           | Tallahassee                                                                 |                                                                                                                                                                                                                                 |                     | Psychiatry                         | 6            | Variable              |       |
| Michigan State University | Flint<br>Grand Rapids<br>Kalamazoo<br>Lansing<br>Saginaw<br>Upper Peninsula | Rank order: Students express preferences for RMCs in rank order listing; consideration is given to those with special circumstances                                                                                             | Fourth              | Emergency medicine                 | 4            | 4                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Advanced family medicine           | 4            | Variable              |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Advanced internal medicine         | 4            | 4                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Primary care geriatrics            | 4            | Variable              |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Internal medicine                  | 8            | 2                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 | Third               | Pediatrics                         | 8            | 4                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Family medicine                    | 8            | 6.4                   |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | OB/GYN                             | 8            | 2                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Psychiatry                         | 8            | 2                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Surgery                            | 8            | 0.8                   |       |
| Robert Wood Johnson       | Camden                                                                      | First-come, first served: On admission, students choose a campus in a first-come, first-served fashion; if unsatisfied with their assignment, they can submit for a position in their preferred campus through a lottery system | Fourth              | Advanced medicine                  | 4            | 0                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Senior surgery                     | 4            | 2.8                   |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Family medicine                    | 9            | 0                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Internal medicine                  | 8            | 6+                    |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Neurology                          | 3            | 1                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 | Third               | OB/GYN                             | 6            | Variable              |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Pediatrics                         | 6            | 3                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Psychiatry                         | 9            | 1.5                   |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Surgery                            | 8            | 4+                    |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Critical care                      | 4            | 4                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Emergency medicine                 | 4            | 4                     |       |
|                           |                                                                             |                                                                                                                                                                                                                                 |                     | Subinternship                      | 4            | 4                     |       |

Continued

**Table 3. Continued**

| Parent Institution    | Regional Medical Campus(es) (RMC) | Selection Mechanism into the RMC, 2007 to 2009                                                                                                   | Required Rotations  |                                    |              |                       | Notes                                                                                                     |
|-----------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------|--------------|-----------------------|-----------------------------------------------------------------------------------------------------------|
|                       |                                   |                                                                                                                                                  | Medical School Year | Course                             | No. of Weeks | No. of Hospital Weeks |                                                                                                           |
| University of Alabama | Huntsville                        | First-come, first served: On admission, students state a preference for 1 of the campuses and are assigned in a first-come, first-served fashion | Third               | Family medicine                    | 4            | Variable              | Students rotate at the family medicine center, the family medicine inpatient service, and 2 nursing homes |
|                       |                                   |                                                                                                                                                  |                     | Internal medicine                  | 8            | 8                     | Teams also include third-year family medicine residents and family medicine interns                       |
|                       |                                   |                                                                                                                                                  |                     | Neurology                          | 4            | ~3.2                  |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | OB/GYN                             | 8            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Pediatrics                         | 8            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Psychiatry                         | 4            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Rural medicine                     | 4            | 0                     |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Surgery                            | 8            | 6+                    |                                                                                                           |
|                       |                                   |                                                                                                                                                  | Fourth              | Subinternship                      | 4            | 4                     |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Family medicine                    | 4            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Rural medicine                     | 4            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Internal medicine                  | 8            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | OB/GYN                             | 8            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Pediatrics                         | 8            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Psychiatry and behavioral medicine | 4            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  | Third               | Neurology                          | 4            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Surgery                            | 8            | Variable              |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Scholarly activity                 | 8            | 0                     |                                                                                                           |
|                       |                                   |                                                                                                                                                  |                     | Subinternship                      | 4            | 4                     |                                                                                                           |

*Continued*



**Table 3. Continued**

| Parent Institution                    | Regional Medical Campus(es) (RMC) | Selection Mechanism into the RMC, 2007 to 2009                                                                                                                                                                                                                            | Required Rotations  |                              |              |                       | Notes                                                                                  |
|---------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------|--------------|-----------------------|----------------------------------------------------------------------------------------|
|                                       |                                   |                                                                                                                                                                                                                                                                           | Medical School Year | Course                       | No. of Weeks | No. of Hospital Weeks |                                                                                        |
| University of California, Los Angeles | Charles Drew University           | Direction admission: Students are admitted into the UCLA/Charles Drew Medical Education Program at the beginning of the admissions process; a UCLA admissions subcommittee conducts separate interviews and uses criteria that consider interest in underserved medicine. | Third               | Family medicine              | 4            | 0                     |                                                                                        |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | Internal medicine            | 12           | 8                     |                                                                                        |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | OB/GYN                       | 6            | Variable              |                                                                                        |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | Neurology                    | 3            | Variable              |                                                                                        |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | Psychiatry                   | 5            | Variable              |                                                                                        |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | Pediatrics                   | 6            | Variable              |                                                                                        |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | Radiology                    | N/A          | N/A                   | Radiology lectures are longitudinal, incorporated into the curriculum of each rotation |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | Surgery                      | 12           |                       |                                                                                        |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | Primary care clinic          | 2.4          | 0                     | This is a longitudinal experience throughout the third year                            |
|                                       |                                   |                                                                                                                                                                                                                                                                           | Fourth              | Medicine selective           | 3            | Variable              |                                                                                        |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | Critical care                | 3            | 3                     |                                                                                        |
|                                       |                                   |                                                                                                                                                                                                                                                                           |                     | Primary care research thesis | N/A          | N/A                   |                                                                                        |

*Continued*

Table 3. Continued

| Parent Institution     | Regional Medical Campus(es) (RMC) | Selection Mechanism into the RMC, 2007 to 2009                                                                                                                                                                                                                                                                                                                         | Required Rotations  |                           |              |                       | Notes                                                                                          |
|------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|--------------|-----------------------|------------------------------------------------------------------------------------------------|
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        | Medical School Year | Course                    | No. of Weeks | No. of Hospital Weeks |                                                                                                |
| University of Illinois | Rockford                          | First-come, first-served: On admission, students rank order their preference with campuses filling in a first-come, first-served fashion; students in specific tracks (such as Medical Scientist Training Program in Chicago, Medical Scholars Program in Urbana, and the Rural Medical Education Program in Rockford) are automatically assigned to a specific campus | Third               | Family medicine           | 9.6          | 0                     | Students are assigned a panel of patients; the course is longitudinal across a 30-month period |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Internal medicine         | 12           | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Surgery                   | 12           | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | OB/GYN                    | 8            | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Pediatrics                | 8            | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Psychiatry                | 8            | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        | Fourth              | Family medicine selective | 4            | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Family medicine           | 4            | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Internal medicine         | 12           | 10                    |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | OB/GYN                    | 8            | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Pediatrics                | 8            | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Psychiatry                | 8            | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Surgery                   | 8            | Variable              |                                                                                                |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        | Fourth              | Medicine 2                | 4            | 4                     | Expected to be done at the campus, but exceptions are granted in rare cases                    |
|                        |                                   |                                                                                                                                                                                                                                                                                                                                                                        |                     | Surgical subspecialty†    | 4            | Variable              | Typically done at the campus, but students can request alternate placements                    |

Continued



**Table 3. Continued**

| Parent Institution     | Regional Medical Campus(es) (RMC) | Selection Mechanism into the RMC, 2007 to 2009                                                                                                                                                                                                                                                                   | Required Rotations  |                      |              |                       | Notes                                                                                                                                                      |
|------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|--------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                                   |                                                                                                                                                                                                                                                                                                                  | Medical School Year | Course               | No. of Weeks | No. of Hospital Weeks |                                                                                                                                                            |
| University of Kansas   | Wichita                           | Rank order: During the first year, students indicate their preferred campus; consideration is given for those with special circumstances; if there are open slots at either campus, anyone without special circumstances is placed in a lottery where those with lower numbers can choose their preferred campus | Third               | Family medicine      | 8            | 0                     |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Internal medicine    | 8            | 8                     |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Surgery              | 8            | 8                     |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Pediatrics           | 6            | 4                     |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | OB/GYN               | 6            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Psychiatry           | 4            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Geriatrics           | 4            | 0                     |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  | Fourth              | Neurology            | 4            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Rural preceptorship  | 4            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Critical care        | 4            | 4                     |                                                                                                                                                            |
| University of Oklahoma | Tulsa                             | First-come, first served: During the second year, students enter the RMC in a first-come, first-served fashion*                                                                                                                                                                                                  | Third               | Health of the public | 4            | 0                     |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Subinternship        | 4            | 4                     |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Family medicine      | 4            | Variable              | Before matriculation, RMC students participate in a weeklong immersion experience where they learn about the community and interdisciplinary collaboration |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Pediatrics           | 6            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Surgery              | 8            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Psychiatry           | 6            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  | Fourth              | Neurology            | 4            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Internal medicine    | 8            | 8                     |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | OB/GYN               | 6            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Ambulatory medicine  | 4            | 0                     |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Geriatrics           | 4            | Variable              |                                                                                                                                                            |
|                        |                                   |                                                                                                                                                                                                                                                                                                                  |                     | Rural preceptorship  | 4            | Variable              |                                                                                                                                                            |

*Continued*

Table 3. Continued

| Parent Institution                 | Regional Medical Campus(es) (RMC) | Selection Mechanism into the RMC, 2007 to 2009                                                                                                                                                                                                                                                              | Required Rotations  |                                |              |                       | Notes                                                             |
|------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------|--------------|-----------------------|-------------------------------------------------------------------|
|                                    |                                   |                                                                                                                                                                                                                                                                                                             | Medical School Year | Course                         | No. of Weeks | No. of Hospital Weeks |                                                                   |
| University of Texas Medical Branch | Austin                            | First-come, first served: During the second year, students select the campus in a first-come, first-served fashion though consideration is given for special circumstances                                                                                                                                  | Third               | Family medicine                | 4            | 0                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Surgery                        | 8            | 8                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Psychiatry                     | 6            | 6                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Pediatrics                     | 8            | 5                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | OB/GYN                         | 6            | 6                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Internal medicine              | 12           | 12                    |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             | Fourth              | Subinternship†                 | 4            | 4                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Ambulatory community selective | 4            | 0                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | ER                             | 4            | 4                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Senior surgery                 | 4            | 4                     |                                                                   |
| University of Washington           | Washington                        | Direct assignment: Students are placed at the state campus of their residence; out-of-state students are assigned to the Seattle campus; first year occurs at the state campus; all students are in Seattle for second year; third- and fourth-year students can do rotations throughout the 5-state region | Third               | Neurology                      | 4            | 4                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Family medicine                | 6            | Variable              | Sites include tribal, rural, and community health center settings |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Internal medicine              | 12           | Variable              |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Pediatrics                     | 6            | Variable              |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | OB/GYN                         | 6            | Variable              |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Surgery                        | 6            | Variable              |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             | Fourth              | Psychiatry                     | 9            | Variable              |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Emergency medicine             | 4            | 4                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Chronic care/rehabilitation    | 4            | Variable              |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Neurology                      | 4            | Variable              |                                                                   |
| Virginia Commonwealth University   | Fairfax                           | First-come, first-served: On admission, students choose their preferred campus in a first-come, first-served fashion                                                                                                                                                                                        | Third               | Family medicine                | 4            | 0                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Internal medicine              | 12           | 8                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Neurology                      | 4            | Variable              |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | OB/GYN                         | 6            | Variable              |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Pediatrics                     | 8            | 4                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Psychiatry                     | 9            | 6                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             | Fourth              | Surgery                        | 8            | Variable              |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Sub-internship                 | 4            | 4                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     | Critical care                  | 4            | 4                     |                                                                   |
|                                    |                                   |                                                                                                                                                                                                                                                                                                             |                     |                                |              |                       |                                                                   |

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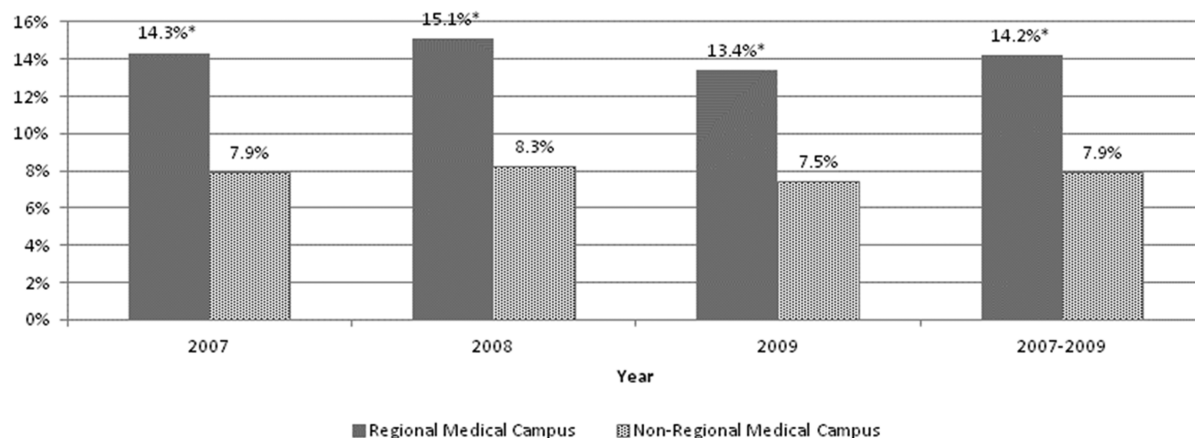
Table 3. Continued

| Parent Institution       | Regional Medical Campus(es) (RMC) | Selection Mechanism into the RMC, 2007 to 2009                                                                                                           | Required Rotations  |                   |              |                       | Notes                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|--------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                                   |                                                                                                                                                          | Medical School Year | Course            | No. of Weeks | No. of Hospital Weeks |                                                                                                                                                                                                                                                   |
| West Virginia University | Charleston                        | Direct assignment: On admission, students are preassigned to one of the campuses although students can trade slots with classmates before the third year | Third               | Family medicine   | 8            | 0                     | 4 weeks are spent in a rural setting                                                                                                                                                                                                              |
|                          |                                   |                                                                                                                                                          |                     | Internal medicine | 8            | 8                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Surgery           | 8            | 8                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | OB/GYN            | 8            | 8                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Pediatrics        | 8            | 4                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Psychiatry        | 6            | 6                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          | Fourth              | Neurology         | 2            | 0                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Subinternship     | 4            | 4                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Critical care     | 4            | 4                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Rural health      | 4            | 0                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          | Third               | Internal medicine | 8            | Variable              | Family medicine is the only residency at the clinical site                                                                                                                                                                                        |
|                          |                                   |                                                                                                                                                          |                     | Surgery           | 8            | Variable              | The curriculum is longitudinally integrated and organized into 2 6-month modules; the first module consists of medicine, surgery, psychiatry, and neurology; the second module consists of family medicine, pediatrics, and obstetrics/gynecology |
|                          |                                   |                                                                                                                                                          |                     | Neurology         | 8            | Variable              |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Psychiatry        | 9            | Variable              |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Neurology         | 2            | Variable              |                                                                                                                                                                                                                                                   |
| Eastern                  |                                   |                                                                                                                                                          | Fourth              | Family medicine   | 8            | Variable              |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Pediatrics        | 8            | 2                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | OB/GYN            | 8            | Variable              |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Subinternship†    | 4            | 4                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Critical care†    | 4            | 4                     |                                                                                                                                                                                                                                                   |
|                          |                                   |                                                                                                                                                          |                     | Rural medicine†   | 4            | Variable              |                                                                                                                                                                                                                                                   |

ER, emergency room; N/A, not applicable; RMC, regional medical campus.

\*The selection process has subsequently changed.

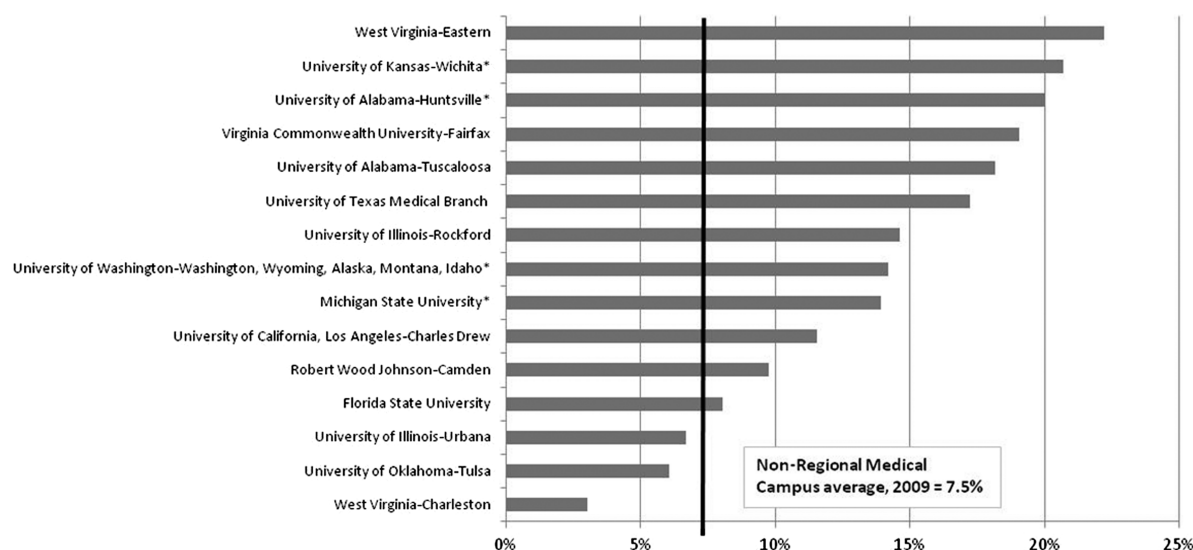
†The course does not need to be taken at the RMC.

**Figure 1. Percentage of graduates matching in family medicine, by regional medical campus.**

\*  $p < 0.0001$

Lacking a consensus definition for RMCs, we studied the cohort of RMCs who were self-identified members of a national RMC coalition (GRMC) who also satisfied a definition of RMC published by the AAMC in 2003.<sup>17</sup> It is possible that this selection process excluded RMCs who were not GRMC members. Currently, the GRMC is working to standardize RMC definitions. Second, the amount of time spent away from the parent campus and type of training exposure may vary across RMCs. For example, students participating in WWAMI typically spend the first year at their assigned state

campus. All students are in Seattle for the second year, whereas the third and fourth years can be spent doing rotations throughout the 5-state region. Pure RMC and non-RMC cohorts do not exist in this model. We included the WWAMI program because it fulfilled our inclusion criteria and contend that its inclusion does not skew our results appreciably. Removing the WWAMI students from the 2009 RMC cohort decreases the percentage matching into family medicine by only 0.2%. Lack of more definitive information limits our ability to extrapolate our findings to the pro-

**Figure 2. Percent matched in family medicine, by regional medical campus, 2009.**

\* $p < 0.05$ , compared to the percentage of non-regional medical campus graduates matching into family medicine, 2009

jected impact of RMCs on the primary care workforce.

Furthermore, we included only graduates who matched through the National Residency Matching Program, so our data may be inaccurate if RMC and parent institution nonmatch rates are different. Graduates may have also ranked residencies in other specialties ahead of family medicine; therefore, match rates may not perfectly align with graduate preferences. Another limitation is that our outcome measure captures RMC graduates as they enter family medicine residency and does not provide a measure of the number of graduates ultimately practicing primary care. Based on our analyses of other specialties, the percentage of RMC graduates matching into internal medicine in 2009 was 14.8% compared with 19.2% of non-RMC graduates ( $P = .006$ ), suggesting that there may not be an overall increase in the number of medical students going in to primary care specialties but rather a shift from internal medicine to family medicine (the differences between the percentages of graduates for RMCs and non-RMCs going into medicine/pediatrics and pediatrics were not statistically different). Nevertheless, given reports indicating a decreasing percentage of internal medicine residents choosing careers in primary care, a shift in residents to family medicine may ultimately lead to an increased production of primary care physicians.<sup>29</sup>

Finally, due to limitations with our data source, we were unable to control for variables that also influence specialty choice such as rural birth, interest in primary care before matriculation, and exposure to Title VII funding. Admission protocols into RMCs from the parent institution vary widely, ranging from lottery systems to “first-come first-served,” although the selection mechanisms of the RMCs generally allow students to choose the RMC. Even the university that directly assigns students to a campus provides opportunities for them to subsequently trade slots. Thus, selection bias could also affect our findings if RMC cohorts consist of students already more likely to pursue primary care. This study was envisioned as an important first step in the assessment of RMC impact and one that begs for further understanding of variable factors across RMCs and their impact on social accountability outcomes.

The effects of the significant resources currently invested in RMC expansion require more detailed

analyses so that policymakers, planners, taxpayers, and deans can make informed decisions about allocating scarce resources to medical education and workforce growth. There is increasing capacity and interest in using “footprinting” techniques, and tools such as the Med School Mapper ([www.medschoolmapper.org](http://www.medschoolmapper.org)), to evaluate the impact of medical schools on their communities, states, and regions. The ability to differentiate the impact of RMCs from parent campuses should be improved to continue monitoring their effect. A better understanding and greater consensus among US medical educators as to appropriate measures of social accountability of medical schools are also needed.<sup>30</sup> Specific to the findings of our analysis, it will be important to analyze whether the percentage of graduates matching in family medicine differs across the RMCs and remains to be seen whether the RMCs that have recently developed in response to calls for expansion behave similarly to RMCs built in the 1970s. This would help to clarify the specific RMC characteristics that are particularly salient to primary care production and provide guidance for future RMCs. Finally, additional research is needed to determine whether graduates of these institutions are more likely to practice in shortage areas, rural areas, and community health centers.

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