SPECIAL
ARTICLE

Entry of US Medical School Graduates Into Family Medicine Residencies: 2011–2012

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BACKGROUND: This study reports on the number of graduates entering family medicine residencies in 2011 from allopathic, osteopathic, and international medical schools. Allopathic graduate data come from medical school registrars or the American Medical Association Masterfile. The 2012 family medicine residency program director census, with a response rate of 100%, verified residents who entered training July 2011 from all medical schools. Approximately 8.4% allopathic medical school's graduates of the 17,478 graduates (July 2010 to June 2011) were first-year family medicine residents in 2011, compared with 8.0% in 2010 and 7.5% in 2009. The percent of medical school graduates entering family medicine from each of the allopathic schools was calculated and averaged over 3 years to diminish 1-year fluctuations. Allopathic medical schools' 3-year average percentage of graduates who entered family medicine residency programs in 2011 ranged from 0.6% to 21.4%. Compared to 2010, osteopathic graduates in Accreditation Council for Graduate Medical Education-accredited family medicine residencies (21.5%) increased 2.8% from 2010, whereas international medical graduates (32.1%) decreased 3.4%. An increasing trend is seen in the number of allopathic graduates entering family medicine residencies. Osteopathic and international graduates' entry to residency appears inversely related. As medical schools emphasize social accountability to improve the health of communities, higher family medicine graduation rates may occur. Initiatives in medical school admissions may increase the number of medical students more likely to select family medicine careers.

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This is the 31st national study conducted by the American Academy of Family Physicians (AAFP) to determine the percentage of graduates from each medical school entering family medicine residency programs. Although the 2011 National Resident Matching Program (NRMP) results demonstrated the highest number of US seniors choosing family medicine since 2002, the results substantiated medical students' overall preference for subspecialties.[1] Health care costs and outcomes are strongly linked to the availability of primary care physicians.[2] Whereas the majority of internal medicine residents become hospitalists or enter subspecialty training and practice,[3] almost all family physicians are generalists and provide first-access, comprehensive, continuity medical care. Family physicians, therefore, will be relied upon to provide the bulk of primary care, especially for adults, in the future.[4] In addition, for older adults, family physicians distribute themselves more evenly across populations than general internists,[5] addressing the maldistribution of physicians favoring urban/suburban over rural areas and are key access points for medical care in rural areas.[6]

According to the 20th Council on Graduate Medical Education (COGME) report "Advancing Primary Care,"[3] a substantial shortage of primary care physicians exists in the United States due to insufficient production and suggests that a number of factors, such as compensation, practice environment, and medical school experiences, contribute to the lower entry rate of medical students into primary care. Data here demonstrate differences in family medicine residency entry rate by region and medical school organizational structure. Promotion of family medicine to US medical students is crucial for the future of the US health care system.

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Methods

This is the 31st national study conducted by the AAFP that reports retrospectively the percentage of graduates from allopathic and osteopathic medical schools who enter Accreditation Council for Graduate Medical Education (ACGME)-accredited family medicine residency programs. Since June 1972, the AAFP has annually performed a census of all residents in family medicine residency programs. Program directors listed all first-year residents and their medical schools, including the month and year of graduation. The residency program directors also verified the status of second- and third-year residents and the graduates originally reported in previous years. For the last 9 years, this census has been performed through an online survey. After all census forms were returned by program directors in June 2011, the medical school information was coded and keyed. A 100% response rate has always been achieved in this study.

To obtain percentages of graduates entering family medicine residency programs from each medical school, the AAFP contacted medical school registrars or used American Medical Association (AMA) masterfile data that reports graduates from each allopathic medical school based on a July 1, 2010, to June 30, 2011, graduation date.[7] The percentages are reported as 3-year rolling averages. The AAFP also uses data from this reference to determine the type of medical school, public or private. For 15 years, the study has included graduates of colleges of osteopathic medicine and used the same methods outlined above. After the data were returned by the family medicine residency program directors, the registrars of colleges of osteopathic medicine were contacted to verify the graduation month and year of osteopathic physicians who were first-year residents in ACGME accredited family medicine residency programs. The American Association of Colleges of Osteopathic Medicine provided estimates of the number of graduates from each college of osteopathic medicine.[8]

Results

Of the 3,435 first-year residents in 2011, 1,470 (42.8%) were identified as having graduated from US Liaison Committee on Medical Education (LCME)-accredited medical schools between July 2010 and June 2011 (Table 1). In addition, there were 125 first-year residents (3.6%) who graduated from US LCME-accredited medical schools outside the reporting period. Therefore, 46.4% (1,595/3,435) of all first-year family medicine residents in October 2011 graduated from US LCME-accredited medical schools, compared with 45.8% (1,520/3,319) in 2010.

Approximately one in five graduates of the University of Oregon Health and Sciences University (23.6%), University of North Dakota (21.8%), and East Carolina University (20.3%) was in a family medicine residency program as a first-year resident in 2011 (see complete list of "Number and Percentage of Medical School Graduates Who Were Family Medicine Residents, by US Medical School, 2011" at www.stfm.org/fammed_match.cfm). The University of Washington graduated the highest number of medical school graduates who chose family medicine residency programs (34), followed by Indiana University (30) and the University of Iowa (27). Of the 17,478 graduates of LCME accredited medical schools between July 2010 and June 2011, 8.4% were family medicine residents in 2011.

The Mountain and the West North Central regions had the highest percentage of medical school graduates who were first-year family medicine residents in October 2011 (12.6% and 11.9%, respectively) (Table 2). (Also, see "Number and Percentage of Medical School Graduates Who Were Family Medicine Residents in 2011, by Census Region and State of Medical School" at www.stfm.org/fammed_match.cfm). The New England (5.7%) and Middle Atlantic (5.4%) census regions reported the lowest percentages. Texas (101), California (90), New York (88), Illinois (77), Pennsylvania (77) and Ohio (75) produced the highest number of medical school graduates who entered family medicine residency programs.

A total of 739 graduates of American Osteopathic Association (AOA)-approved colleges of osteopathic medicine were first-year residents in ACGME-accredited family medicine residency programs (21.5%) in October 2011 (Table 1); however, not all of them completed their medical education in the previous year. Of the 4,159 graduates of colleges of osteopathic medicine between July 2010 and June 2011, 680 (19.8%) were in ACGME-accredited family medicine residency programs in October 2011 (see complete list of "Number and Percentage of Graduates

Table 1: Number of First-year Family Medicine Residents in July 2011, by Type of Medical School

	Number	Percent
US medical school graduate, 7/10–6/11*	1,470	42.8
US medical school graduate, outside 7/10–6/11	125	3.6
Osteopathic school graduate, 7/10–6/11	680	19.8
Osteopathic school graduate, outside 7/10–6/11	59	1.7
International medical school graduate	1,101	32.1
TOTAL	3,435	100

* Tables 2–4 relate to 1,470 residents who graduated within the time period.
Source: American Academy of Family Physicians

Table 2: Number and Percentage of LCME-Accredited Medical School Graduates Who Were Family Medicine Residents in 2011 by Census Region of Medical School

Census Region	Number of Graduates July 2010 to June 2011	First-year Family Medicine Residents (#)	First-year Family Medicine Residents (%)
East North Central	3,331	285	8.6
East South Central	986	89	9.0
Middle Atlantic	3,262	177	5.4
Mountain	522	66	12.6
New England	1,047	60	5.7
Pacific	1,423	155	10.9
South Atlantic	3,100	262	8.5
West North Central	1,434	171	11.9
West South Central	2,091	195	9.3
Puerto Rico	282	10	3.5
Total	17,478	1,470	8.4

of Colleges of Osteopathic Medicine Who Were Residents in ACGME-Accredited Family Medicine Residencies in 2011, by Osteopathic Medical College at www.stfm.org/fammed_match.cfm). A total of 1,101 first-year family medicine residents (32.1%) in October 2011 were international medical graduates (Table 1), compared with 1,179 (35.5%) in 2010.

Approximately two in five of the US medical school graduates who entered a family medicine residency program in October 2011 stayed in the same state for their residency as their medical school (45.9%) (Table 3). Large proportions of graduates of the medical schools in South Dakota (87.5%), Mississippi (72.7%), Texas (72.6%) and California (72.5%) who entered a family medicine residency remained in the same state.

Medical school funding and structure may influence medical student choice of specialty. Graduates from the 78 publicly funded US allopathic medical schools were more likely to be family medicine residents than were graduates from the 48 privately funded medical schools (9.9% versus 6.0%) (Table 4). Medical schools with family medicine departments produce graduates who are more likely to enter family medicine residency programs than medical schools with other or no administrative structure in family medicine. All medical schools were ranked in descending order based on the average percentage of their graduates who entered family medicine residency programs in the prior 3 years (Table 5) (also see complete list of "Ranked Order of LCME-Accredited Medical Schools Based on the Last 3 Years' Average Percentage of Graduates Who Were Family Medicine Residents in 2011, by Type of Administrative Structure, 2011" at www.stfm.org/fammed_match.cfm.) In October 2011, 8.8% of all graduates of medical schools with departments or divisions of family medicine were family medicine residents (Table 6), compared to approximately 2.4% of graduates from the nine medical schools without departments or divisions of family medicine. The medical school with a center of family medicine (Columbia University) increased its graduates entering family medicine by tenfold, from 0.6% in 2010 to 6.7% (one graduate in 2010, nine in 2011).

Discussion

Increasing the supply of family physicians is the key to containing health care costs and improving access to health care for future generations of patients. In 2005–2006, the Association of American Medical Colleges (AAMC) and the Council on Graduate Medical Education (COGME) predicted physician shortages.[9,10] Since then, we have witnessed simultaneous and dramatic increases in class size of existing allopathic and osteopathic medical schools and the creation of new schools. In June 2012, there were 18 new medical schools listed by Liaison Committee on Medical Education (LCME) as applicant (three), candidate (three), preliminary (seven) or provisional (five) status.[11] The number of osteopathic medical schools increased from 19 in 2000 to 26 in 2011, with three more approved in 2012. Including branch campuses and remote teaching sites, osteopathic

Table 3: Percent of 2010–2011 Medical School Graduates by State or Territory Who Entered a Family Medicine Residency Program in the Same State in 2011

State of Medical School	% Entering Family Medicine Residency in the Same State	State of Medical School	% Entering Family Medicine Residency in the Same State
Alabama	50.0	Montana*	NA
Alaska*	NA	Nebraska	52.0
Arizona	36.8	Nevada	26.3
Arkansas	57.9	New Hampshire	0.0
California	72.5	New Jersey	45.5
Colorado	44.4	New Mexico	33.3
Connecticut	0.0	New York	43.0
Delaware	NA	North Carolina	47.9
District of Columbia	0.0	North Dakota	58.3
Florida	40.8	Ohio	47.8
Georgia	34.4	Oklahoma	56.1
Hawaii	33.3	Oregon	36.0
Idaho*	NA	Pennsylvania	53.7
Illinois	43.0	Puerto Rico	10.0
Indiana	67.7	Rhode Island	44.4
Iowa	37.3	South Carolina	55.2
Kansas	34.8	South Dakota	87.5
Kentucky	35.9	Tennessee	26.4
Louisiana	55.4	Texas	72.6
Maine	32.3	Utah	47.1
Maryland	2.8	Vermont	0.0
Massachusetts	35.1	Virginia	28.2
Michigan	54.2	Washington	51.4
Minnesota	69.0	West Virginia	33.3
Mississippi	72.7	Wisconsin	40.8
Missouri	26.2	Wyoming*	NA
		OVERALL	45.9

*Alaska, Idaho, Montana, and Wyoming have no in-state medical school. Students from these states enter the University of Washington under the WWAMI agreement and are listed here as Not Applicable (NA).

undergraduate medical education occurs in at least 34 locations. Historically, osteopathic schools have graduated a higher percentage of students entering family medicine than allopathic medical schools. One in five residents in ACGME-accredited family medicine residencies graduated from osteopathic medical schools (21.5%). Three new osteopathic schools graduated their first class in 2011. Their graduates entered ACGME-accredited family medicine residencies in rates similar to allopathic graduates and demonstrated the same geographic discrepancy: western schools graduated a higher percentage of students bound for family medicine than the eastern schools (A.T. Still University in Mesa, AZ—19.8%, Lincoln Memorial University Debusk College of Osteopathic Medicine in Tennessee—15.6% and Touro College of Osteopathic Medicine in New York—7.5%). The percentage of allopathic students from the Mountain and West North Central regions entering family medicine was twofold greater than that of the New England and Middle Atlantic regions (12.6% and 11.9% versus 5.7% and 5.4%). One potential explanation is western

Table 4: Number and Percentage of Medical School Graduates Who Were Family Medicine Residents in 2011, by Type of Medical School

Programs*	Number of Graduates July 2010 to June 2011*	First-year Family Medicine Residents #**	First-year Family Medicine Residents %
Public (78)	10,938	1,079	9.9
Private (48)	6,540	391	6.0
TOTAL (126)	17,478	1,470	8.4

* American Medical Association. Medical Schools in the United States. JAMA 2011;306:1007-14.
** American Academy of Family Physicians. Annual Survey of Medical Schools.

Table 5: Top 20 Medical Schools Based on the Last 3 Years' Average Percentage of Graduates Who Were Family Medicine Residents in 2011, by Type of Administrative Structure

Medical School	%	Administrative Structure
East Carolina University	21.4	Department
Oregon Health & Sciences University	18.4	Department
North Dakota, University of	18.1	Department
Uniformed Services University	17.2	Department
Marshall University	16.8	Department
New Mexico, University of	16.2	Department
Iowa, University of	15.9	Department
Kansas, University of	15.4	Department
Washington, University of	15.3	Department
South Dakota, University of	15.2	Department
Arkansas, University of	15.1	Department
California, Davis, University of	14.3	Department
Utah, University of	14.3	Department
Nebraska, University of	14.2	Department
Texas A&M University	14.2	Department
Missouri, Columbia, University of	13.8	Department
Massachusetts, University of	13.7	Department
Minnesota, University of	13.5	Department
Meharry Medical College	13.1	Department
Arizona, University of	12.8	Department

medical schools may admit more students from rural backgrounds, and rural students are more likely to consider family medicine; however, many other factors may also influence this primary care production gap.[12]

Medical schools are increasingly being called upon to demontrate "social responsibility," defined as "the obligation of [medical schools] to direct their education, research, and service activities toward addressing the priority health concerns of the community, region, and/or nation they have the mandate to serve."[13] Medical schools should demonstrate how their graduates contribute to the quality, equity, relevance, and cost-effectiveness of health services.[14] Some form of external measurement is necessary to validate a school's social accountability claims.[15] For example, one ranking on "social mission" evaluated medical schools' ability to train physicians to care for the population as a whole, taking

Table 6: Number and Percentage of Medical School Graduates Who Were Family Medicine Residents in 2011, by Family Medicine Administrative Structure

Administrative Structure	Number of Graduates July 2010 to June 2011*	First-year Family Medicine Residents (#**)	First-year Family Medicine Residents (%)
Department or Division of FM (116)	16,214	1,434	8.8%
None (9)	1,130	27	2.4%
Center (1)	134	9	6.7%
TOTAL (126)	17,478	1,470	8.4%

* American Medical Association. Medical Schools in the United States. JAMA 2011;306:1007-14.
** American Academy of Family Physicians. Annual Survey of Medical Schools.

into account the school's graduation rate of physicians who practice primary care, work in underserved areas, and represent the diversity of the population.[16] The Medical Education Futures Study selected six medical schools that have demonstrated innovative approaches to teaching, modeling, and promoting their social mission. The synopsis of this research, the "Beyond Flexner Report," identified eight modalities medical schools may use to carry out effective social mission education: school mission, pipeline cultivation, school admissions, curriculum structure and content, location of clinical experience, debt management, mentoring/role-modeling, and postgraduate engagement.[17]

A medical school's explicit commitment to educate physicians who will pursue careers compatible with community needs appears to affect the career choices of its graduates,[13] and establishing specific measurable outcomes related to career choice, both in primary care and subspecialty care, is a part of providing the right mix of providers to the community.

Creating more medical schools and increasing the number of matriculants without addressing family medicine graduate production, however, will not fulfill communities' needs for family physicians. Our data show that in 2011, all medical schools without a department or division of family medicine fell in the lowest quartile of family medicine graduates. In 2012, Mt. Sinai School of Medicine announced it will open a department of family medicine. It is hopeful this new department will help increase Mt. Sinai's family medicine graduating percentage higher than 2011's (2.5%). Our current data demonstrate that public medical schools graduate a higher percentage of future family physicians than private schools. All medical schools that receive public funding should be accountable to their stated mission, especially if it is to meet the health care access needs of their state. Our future surveys will substantiate if these new public medical schools follow through on their commitment to their social mission by graduating more family physicians.

Family medicine residencies have the capacity to accept an increased percentage of US allopathic and osteopathic graduates (at the cost of decreasing international medical graduates' entry into residencies). Medical schools, however, need to admit students who have a greater likelihood of committing to family medicine. Medical school admission policies should favor students more likely to enter primary care, such as the desire to serve the underserved, demonstrate altruism, and commit to social responsibility.[12] The LCME states "The institution should establish focused, significant, and sustained programs to recruit and retain suitably diverse students."[19] Students of racial/ethnic underrepresented minorities, women, older, or from a rural background are more likely to enter family medicine.[12] Pre-baccalaureate programs aiding more students with these characteristics would likely increase a school's family medicine graduates.

As a means to assist in increasing diversity in medical schools, the Association of American Medical Colleges (AAMC) is championing the Holistic Review Project, encouraging the evaluation of medical school applicants in a wider context than using just a single or few factors. The AAMC has developed recommended protocols to help medical schools initiate holistic review practices and provided resources and tools for medical schools to implement these processes.[19] The AAMC is also updating the Medical College Admissions Test (MCAT). The MCAT 2015 will add sections on psychological and social foundations of behavior, critical analysis, and reasoning skills.[20] Pre-medical students with interests in topics important for community-based medicine and patient communication, such as psychology and sociology, may benefit from these changes. Ultimately, we hope the MCAT changes in addition to holistic review will re-emphasize the need for a broad-based undergraduate education, and also open the way for more underrepresented minority students, which may lead to a larger pool of medical students interested in entering family medicine.[12]

Reporting graduates entering family medicine residencies is the only reliable measure of future physicians who will provide comprehensive, first-contact medical care. Medical schools often announce the number of graduates matching into pediatrics, internal medicine, and family medicine as their primary care production. Match Day and graduation statistics and percentages overestimate the number of physicians who will practice primary care because they do not accurately account for medical schools' graduates' future medical practice. Sixty percent of pediatric residents and more than 80% of internal medicine residents subspecialize; whereas, more than 90% of family medicine residents practice primary care.[3] Measuring primary care production 2 years after the completion of the initial residency (5 years after graduation for those entering internal medicine, pediatrics, and family medicine residencies) is a more accurate indicator of practicing primary care physicians and does not inflate or mislead the stakeholders of undergraduate medical education: the communities, the state governments, and the patients.[21]

Conclusions

The family medicine residency survey conducted annually by the AAFP offers an important look into the composition of the first-year family medicine residents' class and the number of US medical students entering family medicine residencies. The percentage of US allopathic and osteopathic medical school graduates in family medicine residencies increased slightly in 2011; however, the percentage of US seniors choosing primary care careers still remains well below the nation's needs. Some medical schools are embracing their commitment to their social mission,[17] and, as the public expects more accountability to their social mission, more medical schools will adopt changes in admission processes and curricula to promote their social mission. Health care policy, graduate medical education financing, and payment reform need to incentivize institutions to change their infrastructure that is currently contributing to the inbalance of specialists to generalists and the rural-urban maldistribution of physicians.[22] The AAFP believes that the nation is best served by an appropriately diverse and well-distributed physician workforce that resembles the diversity and distribution of the nation's communities. A sufficient family medicine workforce will be essential to provide effective, efficient, and equitable care for the nation.[4]

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