Results of the 2016 National Resident Matching Program®: 1986–2016: A Comparison of Family Medicine, E-ROADs, and Other Select Specialties

Stanley M. Kozakowski, MD; Alexandra Travis; Ashley Bentley, MBA; Gerald Fetter Jr, MSHA

BACKGROUND AND OBJECTIVES: This article is a continuation in a series of national studies conducted by the American Academy of Family Physicians that reports the performance of family medicine and other primary care specialties in the National Residency Matching Program® (NRMP) Main Residency Match, hereafter called the Match. Match data from 1986–2016 were analyzed to compare the numbers of positions offered and filled in family medicine, other primary care specialties, emergency medicine, diagnostic radiology, ophthalmology, anesthesiology, and dermatology (E-ROAD), and other select specialties. Of the 10 largest specialties defined by the greatest number of positions offered in the 2016 Match, all but one (general surgery) have experienced growth since 1986. Overall, the total number of positions offered in the Match grew by an average of 226 positions per year. At the same time, primary care specialties grew 19 positions per year, and E-ROAD specialties grew by 72 positions per year. The disproportionate growth of subspecialties overall, notably the E-ROAD subspecialties, relative to the modest growth of primary care specialties makes the goal of better health care harder to achieve. The GME portion of physician workforce pipeline is mismatched to the health needs of the nation, and this mismatch is worsening.

This article is a continuation in a series of national studies conducted by the American Academy of Family Physicians (AAFP) that reports the performance of family medicine and other primary care specialties in the National Residency Matching Program® (NRMP) Main Residency Match, hereafter called the Match. The Match represents a snapshot of the specialty mix of the future physician workforce. Positions offered reflect the priorities of the sponsoring institutions, and the US senior fill rates by specialty serve as a proxy for the relative attractiveness of any single specialty among US graduates.

This article is a departure from the more recent studies in this series that focused on year-to-year changes in Match rates, comparing family medicine with other specialties. The authors have expanded this Match analysis to capture historical changes in family medicine, other primary care and select non-primary care specialties, including those that may have higher levels of average income and be perceived as having more controllable lifestyles. Studies have highlighted the relationship between growth in specialty popularity, as reflected in the number of residency positions offered and filled by US seniors, and specialty income.1,2 Additionally, since the 1980s, the literature has demonstrated a growing popularity of career choice of specialties with perceived controllable lifestyles. A 2003 study showed that lifestyle explained 55% of the changing trends in specialty choice of US allopathic medical students after controlling for income, work hours, and duration of graduate medical education (GME).3,4 Five specialties perceived to offer controllable lifestyles (emergency medicine, radiology, ophthalmology, anesthesiology, and dermatology) are known by the term E-ROAD specialties. These specialties also command some of the highest median salaries among physician specialties. The authors hypothesize that the E-ROAD specialties and other specialties leading to subspecialization grew disproportionately during the period of study.

This article may be particularly useful as a barometer for advocates,
policymakers, and other stakeholders who recognize the need for a robust primary care workforce. To achieve these aims it is critical to have an adequate supply, both in number and quality, of family physicians and other primary care specialists.

**Methods**

The authors used publicly available online data from the NRMP to obtain information about postgraduate year 1 (PGY-1) match rates for all participating specialties from 1986 through the 2016 Match. Primarily has been defined by the National Academy of Medicine as a function of care and not as a discipline or specialty. For the purpose of this study, primary care specialties are defined as family medicine, general internal medicine, general pediatrics, and medicine-pediatrics because graduates from these residency programs are most likely to deliver care that is integrated, accessible, and addresses a large majority of personal health care needs through sustained partnerships with patients and practice in the context of family and community. Categorical internal medicine and pediatrics are not included because a low percentage of graduates of those programs go on to practice primary care. A US senior is defined by the NRMP as “a fourth-year medical student in a Liaison Committee on Medical Education (LCME)-accredited US school of medicine. A student with a graduation date after July 1 in the year before the Match is considered a US senior.” The NRMP has six other categories of Match applicants: previous graduates of US MD-granting medical schools, students/graduates of Canadian medical schools, students/graduates of DO-granting medical schools, students/graduates of fifth-pathway programs, US citizen graduates of international medical schools, and non-US citizen graduates of international medical schools. The authors have defined the 10 largest specialties as those specialties with the greatest number of positions offered in the Match in 2016. The list includes internal medicine (categorical), family medicine (categorical), pediatrics (categorical), medicine-preliminary (PGY-1 only), emergency medicine, psychiatry (categorical), surgery-preliminary (PGY-1 only), obstetrics-gynecology, surgery (categorical), and anesthesiology. Although not a specialty outright, preliminary medicine is included in this analysis as one of the top 10 Match options students pursue. These transitional first-year GME positions are required by some specialties, including diagnostic radiology, anesthesiology, dermatology, neurology, and ophthalmology, and represent a career choice to enter into those specialties and subspecialties and not into primary care specialties.

Five specialties have been perceived by students to offer the best controllable lifestyles for practicing physicians and are also associated with higher-than-average incomes compared with other specialties. The acronym E-ROAD has been used as a term for the collective of emergency medicine, diagnostic radiology, anesthesiology, ophthalmology, and dermatology.

The AAFP conducts an annual online census of all residents in Accreditation Council on Graduate Medical Education (ACGME)-accredited family medicine residency programs. Among the data collected is a list of all first-year residents and their medical school, including the month and year of graduation. Residency programs that failed to respond to the initial survey were contacted by email or telephone to ensure a successful response rate to the online survey. The residency census was granted an exemption by the AAFP Institutional Review Board.

**Analysis**

Descriptive analysis and Ordinary Least Squares (OLS) regression were utilized to assess the relationship between the year (independent variable) and number of positions offered in the Match by specialty or groups of specialties (dependent variable). Significance was defined at the .05 level, and analyses were conducted using IBM SPSS Statistics 22.0 (IBM, New York, NY).

**Results**

All but one of the ACGME-accredited family medicine residency programs completed the annual AAFP online census to achieve a 99.8% response rate. The total number of PGY-1 positions in the Match has far exceeded the total number of US senior applicants, and likewise the number of US seniors matched, each year between 1986 and 2016, with the gap widening. In 1986 there were 4,033 more PGY-1 positions offered than US seniors participating in the Match. By 2016 that number had risen to an excess of 9,673 (see Figure A at http://www.stfm.org/FamilyMedicine/Vol48Issue10/Kozakowski763). The overall fill rate for US seniors participating was the same in the 2016 Match as it was in 1986 at 93%. There is also a widening gap between total positions offered in all specialties participating in the NRMP Match and the total number of primary care positions offered in the Match (see Figure B at http://www.stfm.org/FamilyMedicine/Vol48Issue10/Kozakowski763). The percentage of PGY-1 positions in primary care specialties offered in the Match has declined from a high of 22.0% in 1997 to 14.5% in 2016. After a period of initial growth from the founding of the specialty in 1969 until the mid 1990s, the number of family medicine PGY-1 positions offered in the Match has followed a sinusoidal pattern (see Figure C at http://www.stfm.org/FamilyMedicine/Vol48Issue10/Kozakowski763). Over the last 30 years, the number of positions offered in family medicine has grown from 2,390 to 3,238, though the peak occurred in 1998 (3,293). The total number of family medicine positions filled in the 2016 Match (3,105) is at its highest level since the start of the Match. However, the number of US seniors matching into family medicine has not kept...
pace. US seniors matched to family medicine PGY-1 residency positions peaked in 1997 at 2,340 but then dropped off through 2009. Despite a 37% increase in the number of US seniors matching into family medicine between 2009 and 2016, the current number remains 213 fewer than in 1986 and 873 fewer than the peak in 1997. The percentage of family medicine positions filled by US seniors has declined from 72% in 1986 to 45% in 2016 (Figure 1). Since 1986 the current 10 largest specialties have had wide-ranging growth rates in the number of positions offered, ranging from emergency medicine and anesthesiology growing 602% and 242%, respectively, to surgery-categorical with a 6% decline. Family medicine positions increased 35% (Figure 2). Since 1986, family medicine’s contribution to the total number of primary care positions offered in the Match has ranged between 73% and 85%.

The E-ROAD specialties in aggregate grew substantially from 1986 to 2016 relative to primary care specialties. The number of primary care positions offered in the PGY-1 Match grew the least since 1986 at an annual average of 19 positions per year ($P=0.038$), E-ROAD specialties at an average of 72 positions per year ($P<0.001$), and the total number of positions offered in the Match at an average of 226 per year ($P<0.001$) (Figure 3). While emergency medicine and anesthesiology grew several fold, PGY-1 positions offered in diagnostic radiology nearly doubled from 1986 to 1995, then abruptly decreased in 1997 to a steady level since. Ophthalmology discontinued offering PGY-1 positions in the NRMP Match in 2009. It should be noted that the number of PGY-1 positions offered in the Match presents an incomplete picture of the growth of the E-ROAD specialties. Since the late 1990s, the number of diagnostic radiology and dermatology positions offered in the NRMP PGY-2 Match have grown considerably.

Figure 4 shows the percentages of US MD and DO students, international medical graduates (IMG) who are US citizens, and IMGs who are not US citizens, who entered ACGME-accredited family medicine residency programs from 2000 to 2016. The proportion of US MD graduates entering family medicine residencies has been relatively flat for the last 6 years while the proportion of IMG non-citizens has decreased. There was rapid growth in the total number of residents in all years of family medicine residency training during the early 1990s and the sinusoidal pattern since 1997. The number of ACGME-accredited family medicine residency programs has followed a similar sinusoidal pattern during the same time interval (see Figure C at http://www.stfm.org/FamilyMedicine/Vol48Issue10/Kozakowski763).
Discussion

The purpose of medicine as a profession is to meet the health needs of people and communities. Previous reports have demonstrated that the current US physician workforce does not have the optimal composition and distribution necessary to achieve the Triple Aim of better health care experience, improved health of populations, and reduced per capita costs of health care. As a leading indicator of the future composition of the US physician workforce, the authors chose to compare NRMP Match data from 1986 through 2016 to provide a historical context and examine trends between family medicine, primary care, those specialties that offered the largest number of positions in the 2016 Match and the E-ROAD specialties that are perceived to have controllable lifestyles. Some have argued that the number of GME positions should be expanded in response to a growing number of unmatched US seniors as well as the fact that there has been a cap in the number of Medicare-funded positions since 1996 despite a growing and aging population. In fact, the number of GME positions has grown 35% since 1996 despite the cap, from 20,563 to 27,860. The number of offered positions continues to far exceed the number of US seniors who seek graduate medical education (GME) positions through the Match. The gap between the number of US MD and DO graduates and the number of available GME positions is expected to decrease from 21.7% in 2014–2015 to 13.5% in 2023–2024, resulting in greater competition for GME positions, particularly for US-citizen and non-US-citizen IMGs. This study demonstrates that the majority of the growth in the number of positions offered is in non-primary care specialties. Of the 10 largest specialties defined as those with the greatest number of positions offered in the 2016 Match, all but one (general surgery) have experienced growth since 1986. Categorical internal medicine has experienced the largest growth of all of the Match specialties. Because only 10%–20% of internal medicine graduates remain in primary care, increased internal medicine positions represent channels for subspecialty programs that often generate higher levels of revenue for their sponsoring institutions. There has been disproportionate growth among the subspecialties, most notably the E-ROAD specialties, relative to the modest growth of primary care specialties, general surgery, obstetrics and gynecology, and psychiatry. The factors that influence the decisions of those sponsoring institutions are complex. All residents and fellows can generate clinical revenues directly or indirectly for their sponsoring institutions. Residents and fellows in subspecialties may generate more admissions and/or procedures than primary care residents yielding higher hospital revenue in the current...
fee-for-service payment system. This increased revenue, coupled with the increased cost of infrastructure for ambulatory primary care training may explain these trends. Since 1997, the number of family medicine positions grew by 123 (3.9%) while total primary care positions decreased by 151 (-0.6%). During that time, the number of family medicine programs has followed a sinusoidal pattern. The overall number of positions offered in family medicine between 1986 and 2016 has grown to a record high, following a pattern that mirrors the changes in primary care income relative to subspecialty income. Only 14.5% of PGY-1 positions offered in the 2016 Match were for primary care positions. Declines in US medical student choice of careers in primary care hinder the realization of the promise of primary care to improve health outcomes, reduce health disparities, and control costs. Even though more than 95% of primary care positions fill in the Match, there is not a sufficient number of graduates of these programs to fulfill current and projected workforce needs. Alternative pathways to primary care residency programs through the American Osteopathic Association (AOA) Intern/Resident Registration Program contribute to the workforce but do not come close to making up the difference, with 995 positions offered and 594 students matching into family medicine in 2016 through the AOA.

This study has several limitations. The NRMP Match represents the largest, but not the only, pathway to residency education and therefore does not provide a complete picture of input into residencies. However, the number of students entering the GME system via other matching processes is relatively small in comparison to the Match. Introduction of the Supplemental Offer and Acceptance Policy (SOAP) and the All-In Policy by the NRMP may account for some of the growth in the number of positions that have been offered in the Match over the last several years, as options for offering positions outside of the Match have been mostly eliminated. Primary care specialties were limited to family medicine, medicine-primary care, pediatrics-primary care, and medicine-pediatrics because the majority of the care rendered by these graduates deliver the function of primary care as defined by the National Academy of Medicine. The authors acknowledge that some residents graduating from categorical internal medicine and pediatrics residencies meet this definition.

This article captures the changing collective priorities of institutions that offer GME positions in the Match over 30 years. These priorities do not align with the Council on Graduate Medical Education recommendation to increase the percentage of primary care physicians among all physicians to at least 40%, a threshold necessary to improve the health of the US population. The National Academy of Medicine calls for the GME community to be
accountable to align physician supply with the nation’s health care needs. Growth of GME positions above the cap is predominantly in the more-lucrative specialties and subspecialties. As noted in a study by the RAND Corporation, commissioned by the Medicare Payment Advisory Commission (MEDPAC), Medicare’s GME-related payments should be more differentiated to take into account the differences in financial impact of various specialty programs and public funds shifted to support primary care training. Future studies should address the factors used at a local level by sponsoring institutions to determine the addition of new GME positions and the types of positions that are funded over the Medicare cap, how these positions align with the health needs of the communities served by the sponsoring institutions, where those additional physicians practice after graduation, and how availability of GME positions impacts the choice of specialty by medical students.

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CORRESPONDING AUTHOR: Address correspondence to Dr Kozakowski, American Academy of Family Physicians, Medical Education Division, 11400 Tomahawk Creek Parkway. 800-274-2237, ext: 6700, Fax: 913-906-6289. skozakowski@aafp.org.

References


