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MEDICAL EDUCATION

Variation among medical training programs

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ABSTRACT

Within the national discussion over graduate medical education (GME) and training reform, little has been written about the significant variation across medical and surgical specialties in residencies and fellowships. The differences between these training programs are important, as they can have a significant impact on the future of the physician workforce. This study identified all United States medical and surgical residency and fellowship programs included in the publicly accessible American Medical Association (AMA) database system, the Fellowship and Residency Electronic Interactive Database (FREIDA), and compared elements of each program. Though often considered relatively standardized, programs in the United States demonstrate a surprising range in their "tangible" factors. Demographic characteristics differ by program size and percent of female faculty, female trainees, graduates from osteopathic schools, and international graduates. Variation in employee benefits include salary, vacation days, health and disability insurance provisions, childcare offerings, subsidized housing, and assistance with moving expenses. Academic curricula vary among preparation for primary care careers, exposure to hospice and home care services, Spanish language training, education in health economics, debt management counseling, and physician impairment prevention.

INTRODUCTION

Differences between medical and surgical residency and fellowship training programs are a crucial consideration for health policy makers, educators, and patients since these differences can have a significant impact on the future of the physician workforce. Clinical practice patterns and skills taught during training are explicitly or implicitly conveyed as the proper way to practice medicine, regardless of specialty or location of practice. With an average of 47% of physicians remaining in the state in which they trained, significant differences between training environments have national implications, as trainees assume the role of attending physicians and in turn pass on expectations to a new generation of students (Association of American Medical Colleges, 2015; Seifer, Vranizan, & Grumbach, 1995). While differences between specialties are to be expected in certain areas of practice, all specialties should ensure a consistent approach to important curricular matters, such as healthcare economics and quality improvement, as well as matters pertaining to quality of life for residents. Medical students are frequently unaware of the conditions of their employment, the benefits available to them, or the curricular offerings of the programs to which they are applying, and they are thus unable to ensure the completeness of their education prior to the residency match. Ensuring consistency across training programs or at least transparency in program demographics, benefits, and curricular offerings is therefore crucial (Wilkey, 2011).

STUDY DATA AND METHODS

We searched the American Medical Association's (AMA) Fellowship and Residency Electronic Interactive Database (FREIDA) to identify aggregate program-level data (American Medical Association). No identifiable data were collected. Data preparation and graphical presentation were performed in Tableau v10.1.4. This study is exempt from Institutional Review Board (IRB) review. A data-use agreement with the American Medical Association did not permit the presentation of data that may permit identifying a particular program or hospital. In total, 9,816 programs were reviewed.

STUDY RESULTS

Demographic Characteristics

Residency programs differ by state and specialty in their training of U.S. medical graduates (USMGs) compared to international medical graduates (IMGs) (Table 1). While some fellowships and residency programs are predominantly focused on training U.S. allopathic medical graduates (MDs), other programs accept significant numbers of osteopathic graduates (DOs), as well as international medical graduates. Surgical specialties tend to emphasize USMGs, with adult surgical residencies composed of 86% USMGs and pediatric surgery fellowships averaging 87%. This is starkly higher than non-surgical specialties, in which 63% of adult residents and 62% of pediatric residents are USMGs. DO distribution also varies widely, with only 2% of pediatric surgery fellows, 3% of adult surgical residents, 11% of adult non-surgical residents, and 13% of pediatric non-surgical residents holding DO degrees.

Gender distributions across specialties are also notable, as shown in Figure 1. Adult and pediatric surgical specialties remain predominantly male. Trainees within adult surgical fellowships, adult surgical residencies, and pediatric surgical fellowships are 34%, 28%, and 37% female, respectively. In contrast, pediatric non-surgical residencies and fellowships have a significant majority of female residents (72% and 63%). Adult non-surgical residencies and fellowships have a fairly even distribution, at 48% and 40% female, respectively.

This pattern is further reflected by the percentages of female faculty in the various specialties, which remain higher in non-surgical pediatrics residencies and fellowships (51% and 50%). Surgical residencies and fellowships for adult patients are 19% and 22%, which are the lowest percentage of female faculty noted. Surgical pediatric fellowships have slightly higher numbers of female faculty (27%), as do adult non-surgical residencies and fellowships at 38% and 33%.

Employee Benefits

As indicated in Table 2, salaries are consistent across program types, starting at around $51,000 and increasing by approximately $1,000-$3,000 every year thereafter. On average, residents and fellows are given 18 days of vacation per year, though this ranges from 15 to 25 days depending on the program (data not shown). 70% of programs provide meal allowances, while 59% provide parking for their residents or fellows, and roughly 10% of all programs provide moving assistance.

34% of programs offer on-site childcare, with little variation between specialties, and 6% of programs offer subsidized childcare, ranging from 1.7% of pediatric surgical fellowships to 10% of pediatric non-surgical residencies offering subsidized childcare (Table 2). In some states, almost every program offers on-site childcare, while in others, no programs offer this benefit.

Nationally, 4% of programs offer shared or part time positions; between specialties, this benefit ranges from 0% of pediatric surgical fellowships offering this benefit to 11.3% of pediatric non-surgical

residencies. In some states, up to 25% of programs offer part time positions, while in other states, no programs offer part time options.

Academic Curricula

There is a wide menu of curricular inclusions beyond the standard clinical rotations, with programs offering primary care tracks, courses on complementary medicine, cultural awareness, Spanish language, and health economics, as well as fatigue awareness training, and continuous quality improvement training (Figure 2) Additionally, some programs offer off-campus electives, international electives, and outpatient experiences, while other programs offer none of these options to students. Nearly all programs offer quality improvement programs (80-97%); cultural competency training is offered by 95% of pediatric non-surgical residencies, but only 68% of adult surgical fellowships. There are also differences in health economics instruction, with this instruction being offered in 15% of pediatric surgical fellowships and in 45% pediatric non-surgical residencies.

As shown in Figure 3, the ratio of faculty members to trainees varies significantly across programs, with a national average of roughly 3.2:1. The ratio is the lowest (1.5:1) in adult surgical residency and is the highest in non-surgical pediatric residencies (8.4:1).

DISCUSSION

A complete discussion of employee benefits is crucial to an understanding of residency program compensation. Although salaries are fairly consistent across program types, a more complete listing of the various other financial perquisites paints a more dynamic picture. The addition of health insurance, vacation, childcare, meals, housing, parking and other benefits can add up to more than $100,000 over the course of a resident/fellow's training. Greater educational debt has been shown to be associated with trainee burnout and lower in-training examination scores (West, Shanafelt, & Kolars, 2011). Other factors, such as workplace demographics (specifically USMG/IMG ratio), and higher faculty-to-trainee ratios have been shown to be associated with higher board pass rates (Atsawarungruangkit, 2015a, 2015b). However, despite the importance of these factors, medical students are often unaware of the details of available benefits until long after match day, and residents are not able to negotiate to receive more favorable benefits (Wilkey, 2011). More generally, while these findings suggest important differences between programs, the precise nature of these differences is not captured within the FREIDA dataset.

Curricular Impact

While certain specialties differ by necessity in the programs offered, certain basic courses such as those in quality improvement, cultural competency, and health economics are applicable to all disciplines (ACGME, 2017). The lack of such offerings likely result in differences between physicians' readiness and ability to provide high value care to a diverse population. While some residents have access to hospice programs, primary care tracks, and women's health tracks, many residents do not.

Family Considerations During Training

Many residents who wish to start families or have additional children find themselves unable to do so, challenged by inhospitable or unwelcoming policies at host institutions or programs (Finch, 2003; Jagsi, Tarbell, & Weinstein, 2007; Willett et al., 2010). Additionally, on-site child care has been shown to improve board pass rates, suggesting that the presence or absence of on-site child care can lead to a substantial impact on medical knowledge acquisition by trainees across specialties and geography (Atsawarungruangkit, 2015a). The FREIDA database provides data regarding three items pertaining to

childcare and three items pertaining to the overall gender composition of the programs reviewed. While these six items are certainly not all-encompassing, they represent an important window into the challenges faced predominantly by trainees who wish to have children during their training. Given that the yearly cost of childcare is a significant expense for families, the financial pressures reported by medical trainees who are considering or undertaking child rearing during training are certainly understandable given the significant cost of childcare relative to trainee income.

Previous research has suggested that female trainees are more likely to join disciplines in which they have female role models and a balance between work and life (Abbett et al., 2011; Neumayer et al., 2002; Van der Horst, Siegrist, Orlow, & Giger, 2010). Extrapolating to other areas within medicine, female trainees may be more likely to remain in specific hospitals, states, or disciplines if these locations offer more opportunities for mentorship. The gender composition of program faculty is highly correlated with the percent of female trainees who matriculate into a particular program ($p < 0.0001$). Despite this previous research indicating the need for more female faculty, wide variation exists between specialties, states, and cities in the percentage of female trainees and faculty members.

Previous research has noted that it is residents who bear the financial burden of their training in so far as they are minimally compensated relative to the income they generate for the institution at which they work (Chandra, Khullar, & Wilensky, 2014). While most programs offer medical insurance to residents, the residents are frequently obliged to participate in cost sharing. Similarly, data in the FREIDA database suggest differences in the extent to which residency and fellowship programs cover ongoing treatment for occupationally contracted HIV, despite the fact that trainees are on the front line and are at risk to experience a needle stick at some point in their training (Lee & Botteman, 2005; O'Neill, Abbott, & Radecki, 1992).

Conclusions

These data reflect significant disparities across graduate medical training programs in their demographic characteristics, employee benefits provided, and curricular offerings. Young physicians may experience more financial demands than they had anticipated during their residency or fellowship training and may be exposed to dramatically different curricular offerings than other trainees in the same specialty and city. These disparities can have a significant impact on trainees who then transmit the results of their training to the next generation of physicians. Trainees should be encouraged to openly discuss their needs with programs during the course of the application process to ensure the best possible fit between training opportunities and the applicant. Similarly, the American Medical Association (through FREIDA) and individual training programs should be required to make program level data readily available to applicants during the course of their interview process in such a way that comparisons are easily possible.

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Author Contributions: Conception and design: Kahn; Analysis and interpretation of data: Kahn, Abbett, and Gardin; Drafting and critical revision of manuscript: Kahn, Abbett, and Gardin

Conflict of Interests: The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. No conflicts were noted.

Acknowledgements: The authors wish to thank Stephen Rosenthal for his assistance with this manuscript.

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TABLES

Table 1. Program Demographics by Specialty Category

	Adult Non-Surgical Fellowship	Adult Non-Surgical Residency	Adult Surgical Fellowship	Adult Surgical Residency	Pediatric Non-Surgical Fellowship	Pediatric Non-Surgical Residency	Pediatric Surgical Fellowship
Percent DO Trainee	8%	11%	7%	3%	9%	13%	2%
Percent Female Trainee	40%	48%	34%	28%	63%	72%	37%
Average Total Percent Female Faculty	33%	38%	22%	19%	50%	51%	27%
% USMG	53%	63%	76%	86%	61%	62%	87%
% IMG	38%	26%	14%	10%	29%	26%	11%

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Table 2. Program Benefits by Specialty Category

	Adult Non-Surgical Fellowship	Adult Non-Surgical Residency	Adult Surgical Fellowship	Adult Surgical Residency	Pediatric Non-Surgical Fellowship	Pediatric Non-Surgical Residency	Pediatric Surgical Fellowship
PGY 1 Salary		$51,234.52		$51,408.76	$51,289.00	$51,754.48	
PGY 2 Salary	$55,693.00	$53,336.25		$53,333.67	$51,321.82	$53,750.03	
PGY 3 Salary	$58,800.96	$55,563.21		$55,538.28	$55,425.52	$56,004.14	
PGY 4 Salary	$58,343.98	$58,044.24	$57,664.07	$57,779.13	$58,440.15	$58,770.91	
PGY 5 Salary	$60,895.62	$60,451.27	$60,334.95	$60,078.98	$60,677.68	$58,700.00	
PGY 6 Salary	$63,007.55	$62,685.71	$62,580.48	$62,713.30	$62,991.33	$59,281.33	$62,622.43
PGY 7 Salary	$65,499.35	$66,225.66	$65,003.49	$64,485.52	$66,017.77	$65,770.00	$65,395.82
PGY 8 Salary	$68,402.07		$70,989.36	$68,541.40	$70,043.40		$70,777.14
PGY 9 Salary	$68,078.00			$68,709.00			
PGY 10 Salary		$51,234.52		$51,408.76	$51,289.00	$51,754.48	
Programs Providing Meal Allowance	42.59%	82.87%	62.25%	87.57%	51.55%	93.33%	74.14%
Programs Providing Parking	53.73%	68.13%	53.82%	57.32%	49.02%	68.33%	65.52%
Programs Providing Moving Allowance	5.82%	17.67%	5.05%	9.35%	9.77%	18.33%	10.28%
Programs Providing Housing Stipends	4.14%	3.34%	9.91%	9.28%	4.15%	5.17%	8.75%
Program Provides On-Site Child Care	32.36%	32.39%	32.53%	34.20%	38.50%	36.67%	34.48%
Program Provides Subsidized Child Care	6.01%	7.77%	5.42%	5.78%	7.59%	10.00%	1.72%

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FIGURES

Figure 1. Average Percent of Female Trainees and Faculty, by Residency and Fellowship Type

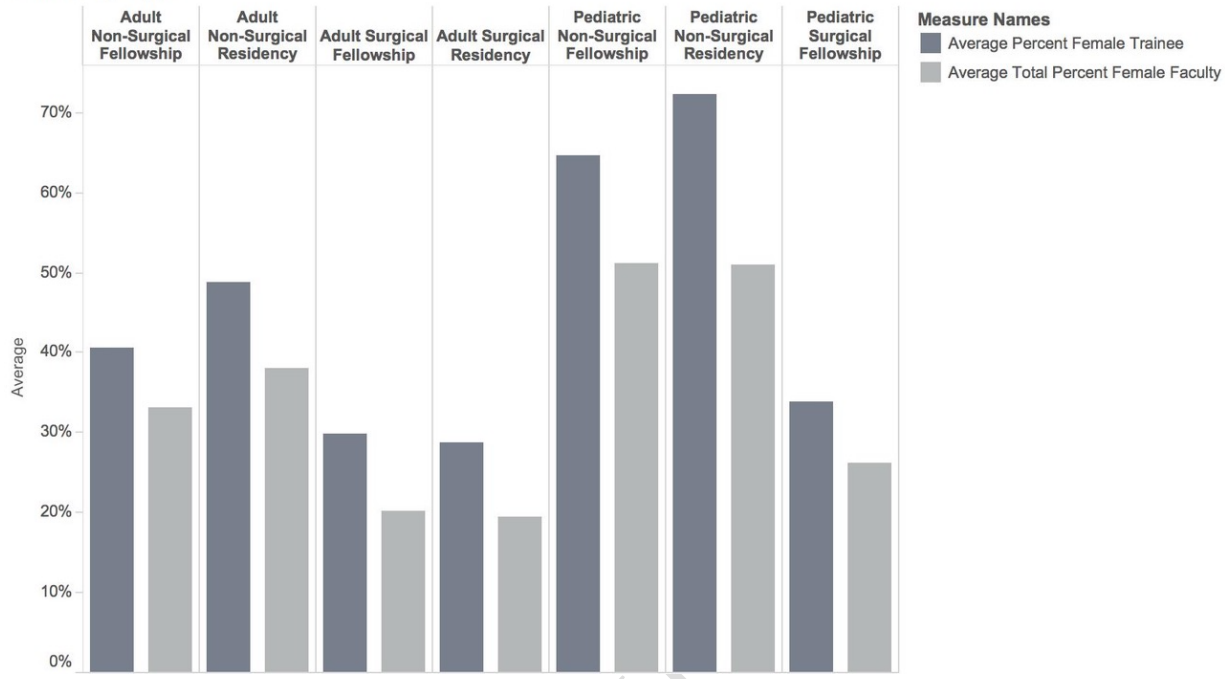

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Figure 2. Examples of Curricular Variation, by Residency and Fellowship Type

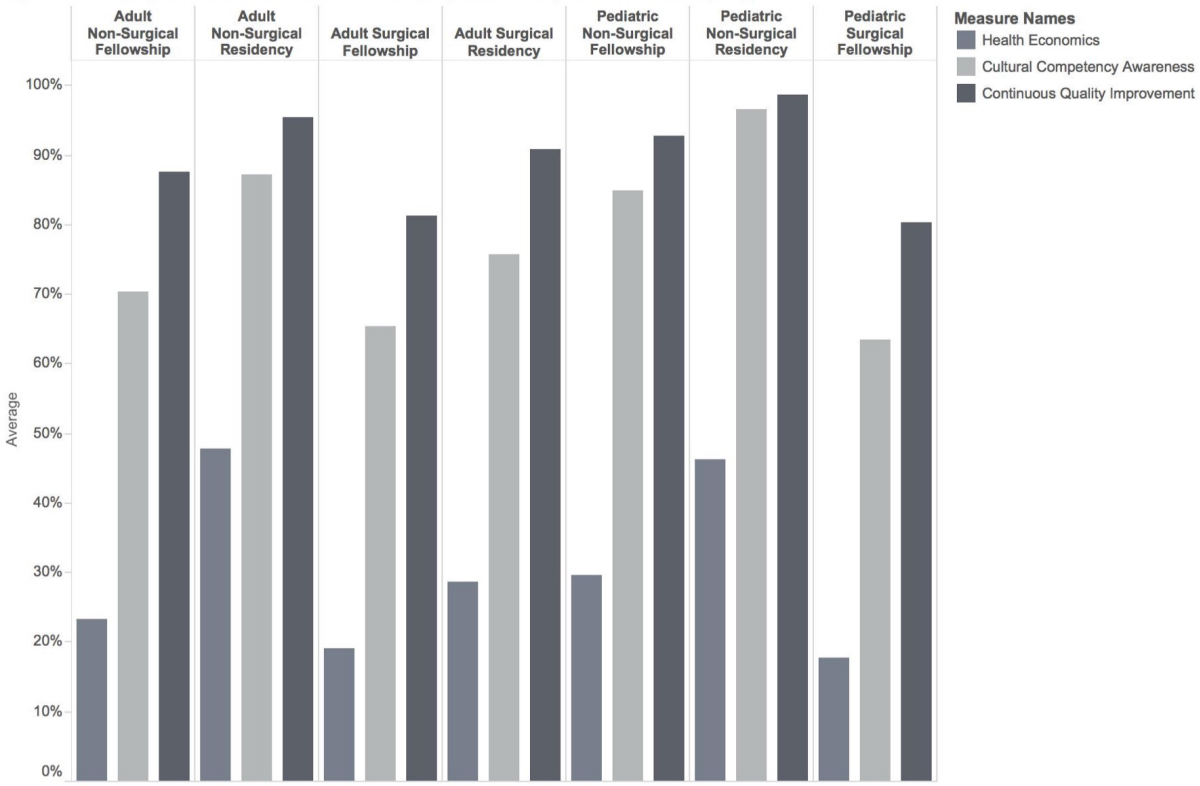

Figure 3. Average Ratio of Full Time Physician Faculty Members to Resident or Fellowship Positions, by Residency and Fellowship Type