

Gender Distribution of General Surgery Residents at the University of Puerto Rico

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Objective: To determine whether the number of women accepted to the University of Puerto Rico (UPR) general surgery residency program has increased in recent years.

Methods: We examined the gender distribution of residents accepted in their first postgraduate year (PGY-1) by the UPR Surgery Department from 1958 to 2014. This information was obtained from the database of graduate residents, which collects information on gender, medical school from which they graduated, the years in which they were in the residency program, and, their specialty. We evaluated all the residents admitted to PGY-1 positions in surgery (1958–2014) and of those admitted to PGY-1 categorical general surgery positions (1983–2014). The study was IRB approved.

Results: Since 1958 the number of female residents admitted as PGY-1s to the UPR Surgery Department has augmented, starting with 2% in the 1960s and rising to 36% in 2014. The percentage of categorical female residents was 11% in the 1983 to 1990 period, 14% in the 1991 to 2000 period, 18% in the 2001 to 2010 period, and 35% in the 2011 to 2014 period.

Conclusion: We found an increase in the number of women admitted to the general surgery program over the last several years. However, despite this increase some degree of gender inequality remains in most surgery programs. Currently, 60% of undergraduate students and 50% of medical students are women, but only 36% of surgical residents are women. Future studies need to address the reasons for the small number of women in surgical programs. [*P R Health Sci J* 2016;35:35-39]

Key words: Gender, Surgery residents, Diversity

Increasing numbers of women who graduate from medical schools in the United States are being accepted into general surgery residency programs (1). Women represent roughly 50% of medical students and 33% of surgery residents (2–7). The Association of American Medical Colleges (AAMC) reported that 36% of general surgery residents in 2010 were female (8). However, some surgical specialties, orthopedic surgery (13%) and neurosurgery (14%), for example (8), continue to have very low percentages of females.

Women face a unique set of challenges while in residency. Though the training experiences of female residents have been little studied, what data are available suggest that these residents tend to have more negative experiences than their male counterparts do. Female residents consistently report gender bias that contributes to a negative work environment and serves as a barrier to their learning and advancement into leadership positions (9–10).

It is not known whether the trend towards greater participation of women in surgery training is similar at the University of Puerto Rico (UPR). Our goal, therefore, was to assess the gender distribution of surgical residents admitted to the UPR Surgery Department over the years.

General surgery residency programs historically used to admit residents for both general surgery training and for subspecialty surgery training (e.g., neurosurgery, orthopedics, urology, otolaryngology). The subspecialty residents would spend 1 or 2 years in general surgery and then continue on to their subspecialties. General surgery residency programs had a pyramidal process for residents, with many accepted to the first post-graduate (PGY-1) level knowing that they would not complete the 5 years of general surgery, since they assumed that they would go on to different subspecialties. The system was later changed to identify the residents who intended to complete full general surgery training. Those positions were called “categorical” and began to be recorded in our database of graduate residents starting in 1983. The “preliminary” positions were for residents who stayed for only 1 or 2 years prior to

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advancing to the subspecialty of their choice. For the purposes of our study, the gender distribution of the “categorical” surgery residents is being used to evaluate the number of women in general surgery.

Materials And Methods

We examined the gender distribution of all the students accepted as PGY-1 residents by the UPR Surgery Department from 1958 to 2014. The information was obtained from the database of graduate residents of the UPR Surgery Department. This database has collected a variety of information about all of the residents who have graduated from the UPR general surgery residency program, which information includes the gender of each resident, the medical school from which he or she graduated, the specific years in which he or she was enrolled in the residency program, and, finally, his or her specialty and current status. We reviewed the overall gender distribution of all surgery residents who were accepted to PGY-1 positions from 1958 to 2014, as well as those of categorical general surgery residents accepted to a PGY-1 position in the Surgery Department in the last 31 years (1983–2014). The residency programs have 2 categories of residents, as defined by the Accreditation Council for Graduate Medical Education (ACGME), namely, categorical and preliminary. A categorical position offers a resident full training in the specialty of his or her choice, which training is required for and is intended to lead to board certification in that specialty. By contrast, a preliminary position consists of 1 or 2 years of general training that is intended to prepare the resident for entry into an advanced specialty program. Though the general surgery residency program has been accredited since 1968 and these categories were applied to the residents at that time, the database started to collect this information in a reliable manner in 1983. Therefore, we have been able to evaluate the gender distribution of categorical surgery residents only from 1983 to the present. The general surgery program currently accepts a total of 15 residents at the PGY-1 level, of whom 5 hold categorical positions and are expected to complete the 5-year program and become general surgeons.

Statistical analyses for our study were performed with the software program SPSS version 22.0 (Chicago, Illinois). Categorical variables were presented as frequencies and percentages. For inferential analysis, the groups were compared using the chi-squared test. Differences between groups were considered to be statistically significant at $p < 0.05$.

This study was reviewed and approved by the Institutional Review Board (IRB) of the University of Puerto Rico Medical Sciences Campus.

Results

Our study found that the number of women entering general surgery residency in the UPR program has steadily increased through the years. Upon examining the overall

gender distribution of all surgery residents at the UPR program from 1958 to 2014 (Table 1), we see that the percentage of women in our residency program has risen from 2% in the 60s to 26% in more recent years. A greater increase in the participation of females is noted when the categorical residents are independently examined (Table 2). Women made up 35% of the categorical residents in the general surgery program from 2011 to 2014.

Table 1. Gender distribution of all surgery residents (PGY-1) admitted to the UPR general surgery program, 1958–2014 (categorical and preliminary).

Years	Females	Males	Total	P
1958–1959	0 (0%)	3 (100%)	3	<0.05
1960–1969	1 (2%)	40 (98%)	41	<0.05
1970–1979	12 (7%)	169 (93%)	181	<0.05
1980–1989	15 (10%)	129 (90%)	144	<0.05
1990–1999	21 (11%)	162 (89%)	183	<0.05
2000–2009	28 (22%)	102 (78%)	130	<0.05
2010–2014	18 (26%)	52 (74%)	70	<0.05

Chi-squared test used for P value.

Table 2. Gender distribution of categorical surgery residents admitted to the UPR general surgery program as PGY-1s over the past 21 years (1983–2014).

Years	Females	Males	Total	P
1983–1990	4 (11%)	34 (89%)	38	<0.05
1991–2000	6 (14%)	38 (86%)	44	<0.05
2001–2010	8 (18%)	37 (82%)	45	<0.05
2011–2014	7 (35%)	13 (65%)	20	<0.05

Chi-squared test used for P value.

When we separate the group that was admitted in July 2014, which is our most recent group, we find that of the 5 categorical residents, 3 are women (60%), as can be seen in Table 3. However, from the overall group of 15 residents admitted to the surgery program, only 5 (36%) are females.

Table 3. Gender distribution of categorical and preliminary surgery residents admitted in July 2014.

PGY-1 surgery residents, 2014	Females	Males	Total	P
Categorical surgery residents	3 (60%)	2 (40%)	5	>0.05
Preliminary surgery residents	1 (10%)	9 (90%)	10	<0.05
Total PGY-1 surgery residents	4 (36%)	11 (73%)	15	<0.05

Chi-squared test used for P value.

In general, our findings indicate that there has been a slow increase of about 4% per decade in the number of categorical general surgery positions occupied by women in the UPR program, with a statistically significant ($p < 0.05$) increase starting in 2011 (18% vs. 35%), as is indicated in Table 4.

Table 4. Percentage increase of females admitted as PGY-1s to the general surgery residency program.

	% of Female PGY-1s (initial range)	% of Female PGY-1s (subsequent range)	% Increase	P
1983–1990 and 1991–2000	11%	14%	3%	>0.05
1991–2000 and 2001–2010	14%	18%	4%	>0.05
2001–2010 and 2011–2014	18%	35%	17%	<0.05

Chi-squared test used for P value.

Discussion

The number of female residents accepted to general surgery residency training programs has increased in recent years (1). Our study indicated that a similar trend has occurred locally and that our percentage of female residents compares favorably with the percentage of ACGME general surgery residents who are female in the United States, which percentage is reported to be 36% (8).

According to census statistics, women constitute 52% of the population in Puerto Rico (11). Currently in Puerto Rico, 60% of undergraduate students and 50% of medical students are women, but only 36% of surgical residents are women (8,12,13). The AAMC statistics currently show a female-to-male ratio of 3:7 (in the United States and Canada), and the gap is wider in subspecialties such as orthopedic surgery, neurosurgery, and urology, as can be seen in the graph at the end of this manuscript, which graph shows the percentage of residents, by specialty, who are female (reproduced with permission from the 2012 Physician Specialty Data Book) (Figure 1).

Significant progress has been made over the years in terms of female participation in surgical training. In our program we have noted a slow improvement, consisting of an approximately 4% increase (per decade) in the number of women residents. In the period ranging from 2011 to 2014, a statistically significant increase in the percentage of female categorical surgery residents occurred, with the proportion of such residents jumping from 18% in the 2001 to 2010 period to the current 35%. If we evaluate only the current year (2014), the percentage of female categorical surgery residents has increased to 60%, which is only slightly disproportionate to our population's current gender distribution.

The surgical specialties have lagged behind in their ability to attract female residents. Several surgical specialties require their residents to begin training with 1 or 2 years of preliminary residency in general surgery. Since these groups have a lower number of females, this is reflected in the lower number of females in the combined group, with preliminary and categorical residents together at the PGY-1 level.

However, despite the greater number of women in surgical residency programs, the literature suggests that gender inequality has not been eliminated from all surgery programs. In fact, the perception that one's gender might prove to be a barrier to a career in academic surgery remains prevalent (2).

Though the same has not been found to be true for their male counterparts, women in surgical residency programs often anticipate or perceive gender-based discrimination. Such discrimination might take the form of being treated differently (from men), of experiencing derogatory comments about or because of their sex, or both. Whether overt or implicit (or, again, both), gender-based bias and negative attitudes inhibit the career aspirations of female surgeons, effectively constructing a barrier to their career development. The perception that there is a glass ceiling for women in academic surgery has been well studied (14). Three major factors contribute to the glass-ceiling phenomenon: traditional gender roles, manifestations of sexism in the medical environment, and the lack of effective mentors.

The increasing attention that administrators and instructors of residency training programs are giving to the issue of diversity, has led to there being more knowledge on how to attract female and minority students (and female minority students) (15). It seems likely that program diversity is an important factor that positively influences the program ranking decisions of women and minorities who are pursuing surgical training. The more women in the program, the more other women will be attracted to enter the program. This would explain our finding that within a couple of years of our program's having reached a critical percentage of females in the program; it also reached the accepted national level of female resident enrollment in 2014.

Data has indicated that role-modeling has a significant influence on an individual's decision to choose or not choose a specific career (16–18). Students often identify faculty members who had positive influences on their career choices. It has been reported that medical students are twice as likely to express interest in pursuing a career in surgery if they have been able to identify a positive surgical role model (17). However, it has been noted that there is significant reduction in that interest as the medical school training proceeds, going from 64% at the time of entering to 26% at the time of exiting (18). Role models are an important career influence, but work hours and lack of flexibility in surgery training programs continue to provide challenges in creating a diverse workforce.

The links between choosing a surgical career, being accepted to a general surgery residency program, and having the correct learning environment that allows for the formation of a competent surgeon are important for all involved. As increasing numbers of women decide to pursue careers in surgery, the current demographics of medical schools are undergoing changes. Ultimately, this increase in the proportion of females in this male-dominated environment can only strengthen the surgical workforce that is available to our population.

The limitation of this study is that it provides information only on gender distribution in the UPR general surgery residency program, while other residency programs have been available for a number of years in Puerto Rico.

Julie A. Freischlag, MD, former Halsted Professor, Surgeon-in-Chief, and Chair of Surgery at Johns Hopkins Medical Institutions, has an interesting perspective on diversity: “We need to recognize that diversity—managing and leading across differences—is not an initiative or a program; it should be a competency that anyone who manages people must learn if he or she is to be an effective leader” (5).

Resumen

Objetivo: Evaluar si el número de mujeres aceptadas al Programa de Residencia en Cirugía General de la Universidad de Puerto Rico (UPR) ha aumentado. **Método:** Examinamos la distribución por género de los residentes admitidos a su primer año postgraduado (PGY-1) por el Departamento de Cirugía General de la UPR del 1958 al 2014. La información se obtuvo de la Base de Datos de Residentes Graduados del Departamento de Cirugía. Esta base de datos recopila información sobre el género, escuela de medicina de procedencia, años de entrada y salida, actividad actual y especialidad. Evaluamos la distribución por género de todos los residentes PGY-1 de cirugía (1958-2014) y de los residentes PGY-1 categóricos de cirugía general (1983-2014). **Resultados:** Desde el 1958 el número de mujeres admitidas como PGY-1 ha aumentado en el Departamento de Cirugía de la UPR, comenzando con 2% en los años sesentas hasta 36% en el 2014. El porcentaje de residentes femeninas en posiciones categóricas de cirugía fue 11% en 1983-1990, 14% en 1991-2000, 18% en 2001-2010 y 35% en 2011-2014. **Conclusión:** Este estudio encontró un aumento en el número de mujeres admitidas al programa de residencia en cirugía durante los pasados años. A pesar del aumento en números, la literatura sugiere que la desigualdad entre los géneros persiste en cirugía. Actualmente, 60% de los estudiantes de bachillerato y 50% de los estudiantes de medicina son mujeres, pero solamente 36% de los residentes de cirugía son de género femenino. Estudios futuros deben evaluar las razones de esta desigualdad.

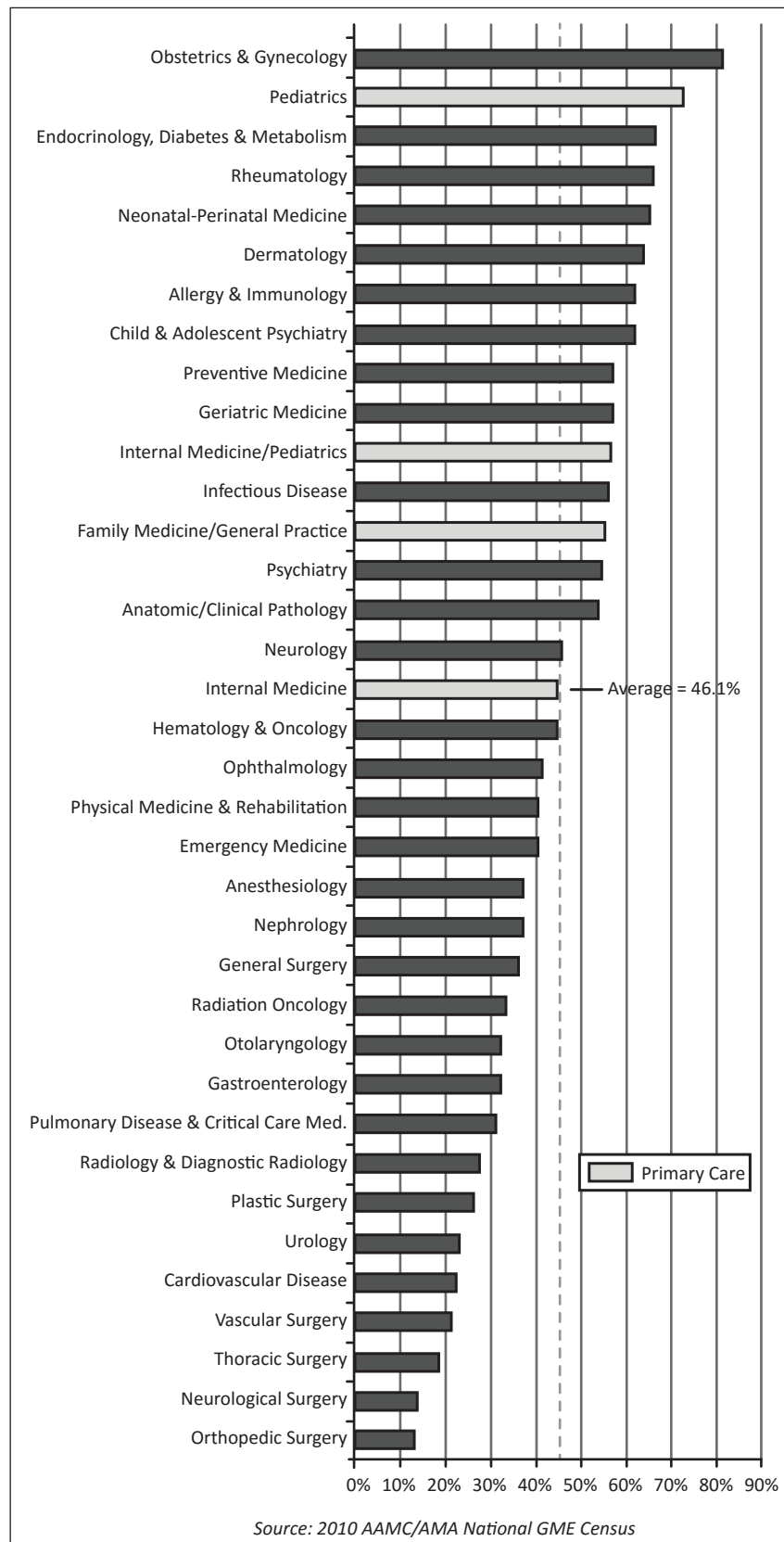


Figure 1. Percentage of ACME Residents/Fellows who are Female, by Specialty (reproduced from the 2012 Physician Specialty Data Book with the permission of the AAMC).

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