Equal work for unequal pay: the gender reimbursement gap for healthcare providers in the United States

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ABSTRACT

Introduction Gender disparities in income continue to exist, and many studies have quantified the gap between male and female workers. These studies paint an incomplete picture of gender income disparity because of their reliance on notoriously inaccurate or incomplete surveys. We quantified gender reimbursement disparity between female and male healthcare providers using objective, non-self-reported data and attempted to adjust the disparity against commonly held beliefs as to why it exists.

Methods We analysed over three million publicly available Medicare reimbursement claims for calendar year 2012 and compared the reimbursements received by male and female healthcare providers in 13 medical specialties. We adjusted these reimbursement totals against how hard providers worked, how productive each provider was, and their level of experience. We calculated a reimbursement differential between male and female providers by primary medical specialty.

Results The overall adjusted reimbursement differential against female providers was −US$18 677.23 (95% CI −US$19 301.94 to −US$18 052.53). All 13 specialties displayed a negative reimbursement differential against female providers. Only two specialties had reimbursement differentials that were not statistically significant.

Conclusions After adjustment for how hard a physician works, his/her years of experience and his/her productivity, female healthcare providers are still reimbursed less than male providers. Using objective, non-survey data will provide a more accurate understanding of this reimbursement inequity and perhaps lead the medical profession (as a whole) towards a solution that can reverse this decades-old injustice.

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INTRODUCTION

For decades studies have shown inequities in pay between women and men. Some of the earliest analyses of pay inequity were conducted in the 1970s, and, since that time, reports indicate that women consistently earn less than their male contemporaries.[1 2] Indeed one would be hard pressed to identify a single calendar year in which female workers achieved earnings parity with their male counterparts.

Many studies have theorised that pay disparities result from women (1) undervaluing the services they provide, (2) working fewer hours and/or (3) being less productive.[3–10] Unfortunately, these theories are based on analyses of data that are susceptible to bias and/or not adjusted for confounding variables.[11 12] A large proportion of these studies rely on self-reported income and many do not adjust for factors that could influence gender pay.[13 14] With such limitations, we believe that the medical community could improve upon its understanding of gender pay inequality. We quantified gender reimbursement disparity between female and male healthcare providers using objective, non-self-reported data and attempted to adjust the disparity against commonly held beliefs as to why it exists.

METHODS

We obtained healthcare provider reimbursement data for various medical specialties using the 2014 Medicare Fee-for-Service Provider Utilisation and Payment Data Physician and Other Supplier Public Use File (PUF) (http://www.cms.gov/apps/ama/license.asp?file=http://download.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Downloads/Medicare_Provider_Util_Payment_PUF_CY2012_update.zip). This freely available dataset contains the practice locations, primary medical specialty, sex, reimbursements paid, services provided, and beneficiaries seen of, to and by healthcare providers participating in the Centers for Medicare and Medicaid Services (CMS) Part B fee-for-service programme in the USA for calendar year 2012.[15] The CMS Office of Information Products and Data Analytics used data from the National Claims History Standard Analytic Files to create the Medicare PUF. The data in the PUF are not self-reported by individual healthcare providers.[15]

Unlike survey data used by previous investigators, the 2014 Medicare PUF did not include: hours worked, non-clinical earnings, bonus/incentive/performance monies, medical school type/location/graduation date, or years in clinical practice. The PUF included the National Provider Identifier (NPI), which we used to estimate the years in clinical practice for each provider. The National Plan and Provider Enumeration System (NPPES) generates a unique NPI for each healthcare provider.[16 17] Each provider receives an NPI from NPPES once and uses that NPI to submit reimbursement claims to CMS during the entirety of their active clinical practice. We cross-referenced the NPI listed in the 2014 Medicare PUF with the NPPES Data Dissemination File (http://download.cms.gov/nppes/NPI_Files.html) and calculated the time between

the year a provider's NPI was generated (enumeration year) and the year 2012. We used this value as a surrogate for years of clinical experience.

We calculated reimbursement differentials between reimbursements paid to female and male providers. Subsequently, we performed multivariate analyses of reimbursement differential against a number of confounding variables. Based on the work of Weeks *et al*,[3] Baker[5] and Seabury *et al*,[18] we included the following confounders in our model: primary medical specialty, years of clinical experience, hours worked and productivity. The first confounder was included in the 2014 PUF. Using the NPI enumeration year, we calculated a surrogate value for the number of years of clinical experience. We used the number of Medicare beneficiaries seen as a surrogate for the total number of hours worked delivering care to patients. Based on data presented in The Physicians Foundation Annual Report and The Washington Post, we assumed that providers who delivered care to more beneficiaries were likely to have worked more hours than those who delivered care to fewer beneficiaries.[19 20] Similarly, we assumed that the number of services provided would be an appropriate surrogate for productivity: the greater the number of services provided, the greater the productivity.[19 20]

We restricted our analyses to providers who self-identified as practicing internal medicine, family practice, or a medical specialty, such as cardiology, endocrinology, nephrology, rheumatology, haematology, medical oncology, haematology and oncology, pulmonary, critical care, infectious disease or gastroenterology.

We used Microsoft Excel and JMP to perform multiple linear regression analyses and calculated an adjusted reimbursement differential between women and men. Our statistical threshold for significance was $p<0.05$. Wherever possible, we followed the STROBE and SAMPL guidelines for conducting observational research and reporting results, respectively.[21 22] The institutional review boards of the Department of Veterans Affairs (Salisbury, North Carolina, USA) and East Carolina University—Brody School of Medicine (Greenville, North Carolina, USA) approved this study.

RESULTS

The Medicare PUF for calendar year 2012 contained 9 153 273 records for 882 125 providers. We included the records of providers in 13 medical specialties, resulting in 3 549 862 records for 246 995 providers. We were either missing or unable to download and/or analyse records for 1344 providers (0.5%). Of the remaining providers in our dataset (245 651), nearly 70% were generalists in either internal medicine (91 336; 37%) or family practice (77 452; 32%). The greatest number of specialists was in cardiology (22 150; 9%) and the fewest in haematology (682; 0.3%).

The dataset with which we worked had a 70:30 ratio of male to female providers. Cardiology had the lowest percentage of female providers (10.7%). No specialty had an equal percentage of male/female providers; endocrinology came close to parity with a male/female ratio of 57:43. Tables 1 and 2 summarise our baseline data.

In the unadjusted analysis, female providers were reimbursed US$34 125.68 (95% CI −US$34 991.61 to −US$33 259.76) less. Six specialties had a female reimbursement differential greater than the overall differential (cardiology, haematology/oncology, haematology, nephrology, medical oncology and rheumatology); all differentials were statistically significant. The narrowest reimbursement differentials were in family practice (−US$15 029.77 (95% CI −US$15 627.83 to −US$14 431.70)) and infectious disease (−US$19 176.82 (95% CI −US$23 177.82 to −US$15 175.83)), but female providers had a statistically significant gap in reimbursement compared with male providers in every specialty. Table 3 summarises the unadjusted analysis.

In the adjusted analysis, we used surrogate observations to account for three confounders purported to affect the disparity in gender reimbursement: years of experience (surrogate: years since NPI enumerated), productivity (surrogate: number of services provided) and hours worked (surrogate: number of beneficiaries seen). The overall adjusted reimbursement differential was −US$18 677.23 (95% CI −US$19 301.94 to −US$18 052.53). Nephrology displayed the largest statistically significant gender differential of −US$16 688.96 (95% CI −US$21 437.04 to −US$11 940.88). Of the 13 specialties, only haematology and medical oncology had differentials that were not statistically significant. Table 3 and figure 1 summarise the adjusted analyses.

DISCUSSION

After adjustment for hours worked, productivity and level of experience, female healthcare providers received lower reimbursements than their male counterparts. Investigators have often cited at least one of these explanations for the disparity in physician pay.[3 5–9 23] Despite these adjustments, female providers received statistically lower reimbursements in 11 of 13 medical specialities.

Weeks and Wallace have extensively analysed the income disparities for physicians.[3 6–9] Their work has revealed widespread inequality in an overwhelming number of specialties and has led them to conclude that three variables are likely to affect this inequality: physician effort, physician experience and practice characteristics. In the present investigation, we adjusted for physician effort and experience using objective, non-self-reported surrogate observations. We were unable to adjust for practice characteristics because the Medicare PUF did not contain such information.

Baker[5] and Sasser[23] expounded on the theories of Weeks and Wallace by suggesting that type of specialty affects physician income. Female physicians are more likely to work in less lucrative specialties, so their incomes will be lower than their male counterparts who more commonly work in highly lucrative fields. Baker's work also shed light on the factors that did not affect income, namely biological age, ethnic group and type/geography of medical school.[5] Therefore, we adjusted our analysis for 13 medical specialties. We found that in 11 of these specialties, female providers received statistically less reimbursement than male providers irrespective of the amount worked, level of productivity or years of experience.

In 2009, Cron and Gilly reintroduced 'inherent value' to the discussion of gender pay inequality.[24] Female workers receive less money because they price their services lower than male counterparts. This idea may hold true in traditional industries. In healthcare, insurance companies set the price for most services, with a heavy reliance on the pricing trends established by Medicare. Differences in prices are more likely to be due to geographic considerations or concomitant services provided than the negotiating prowess of individual providers.[25] As a result, individual providers are less likely to undervalue themselves because they are unlikely to broadly affect prices for healthcare services.

Seabury *et al*[18] have provided one of the most comprehensive analyses of gender income inequality in healthcare. After analysing self-reported data in the March Current Population Survey

Table 1 Specialty-specific baseline data

Specialty	Records (n)	Total Medicare payment (US$)	Portion of total Medicare payment (%)	Total beneficiaries seen (n)	Portion of beneficiaries seen (%)	Providers (n)	Male (%)	Female (%)
All	3 549 862	28 263 199 739.28	100.0	274 669 868	100.0	245 651	69.8	30.2
Cardiology	535 359	4 965 536 980.20	17.6	55 308 660	20.1	22 150	89.4	10.6
Endocrinology	52 126	387 291 151.12	1.4	5 244 848	1.9	4786	56.9	43.1
Critical care	19 196	208 382 904.46	0.7	1 235 739	0.4	2163	79.4	20.6
Family practice	970 873	4 372 944 047.90	15.5	63 021 587	22.9	77 452	64.9	35.1
Gastroenterology	172 708	1 344 335 879.10	4.8	10 876 759	4.0	11 991	86.6	13.4
Haematology/ oncology	182 034	2 703 879 368.90	9.6	11 607 555	4.2	7348	72.0	28.0
Infectious disease	36 701	523 363 211.33	1.9	3 132 146	1.1	4762	64.1	35.9
Internal medicine	1 197 465	8 736 311 072.30	30.9	95 001 597	34.6	91 336	66.0	34.0
Nephrology	107 806	1 685 606 837.30	6.0	8 094 556	2.9	7483	77.2	22.8
Haematology	9631	127 615 053.23	0.5	542 408	0.2	682	70.3	29.7
Medical oncology	55 014	806 637 769.54	2.9	3 445 250	1.3	2598	71.9	28.1
Rheumatology	69 402	1 044 462 027.40	3.7	5 670 752	2.1	4065	62.3	37.7
Pulmonary	141 547	1 356 833 436.50	4.8	11 488 011	4.2	8835	83.8	16.2

and adjusting for race, age, sex, hours worked and practice location, they revealed a US$33 840.00–US$56 019.00 income range differential between female and male providers. This differential straddles the US$34 125.68 unadjusted differential (95% CI –US$34 991.61 to –US$33 259.76) that we report, but is double the US$18 677.23 adjusted differential in our analysis. The discrepancies between these investigations may be due to different sample sizes (38 115 vs 245 651), the manner in which data were collected (self-reported in the Seabury study), and/or the inability to adjust for specialty or procedural volume using the March Current Population Survey dataset.[14 18]

We recognise that the work of these investigators has provided the foundation on which contemporary analyses, such as our own, have been performed. Unfortunately, these antecedent studies relied on survey data from various sources, including the American Medical Association, Survey of Young Physicians, US Census Bureau, Bureau of Labor Statistics, and/or March Current Population Survey.[3 5–9 18 23 24] Despite our belief in the methodologies of these surveys, there are unavoidable biases that percolate through them which can negatively impact their analysis.[13 26] Our investigation used reimbursement claims information—data that are not self-reported. In so far as these data are not self-reported, analysis of the Medicare PUF should not be plagued by low survey response rates or measurement/sampling biases.[10–12 27]

STRENGTHS AND LIMITATIONS

The size and type of data analysed help strengthen our analyses and conclusions. The Medicare PUF contains observational data for all providers that billed Medicare Part B for services in calendar year 2012. We analysed data from over 245 000 providers. Our study is one of the largest to address gender pay inequity in recent years, including the recently released Doximity survey of 35 000 providers.[28] Equally important is the fact that the data for these providers are objective. Consequently, the PUF is less susceptible to poor response rates or self-reporting biases that can exist when survey data are used.[3 5–9 18 23 24]

Table 2 Gender-specific baseline data

	Providers (n)		Total beneficiaries seen (n)		Total services provided (n)		Total years experience (n)	
Specialty	Male	Female	Male	Female	Male	Female	Male	Female
All	171 541	74 110	223 225 015	50 770 959	677 000 816	148 801 021	1 183 715	489 934
Cardiology	19 802	2348	51 313 193	3 993 546	83 771 357	5 856 627	140 606	16 046
Endocrinology	2725	2061	3 796 148	1 448 700	7 234 704	2 601 555	18 947	13 763
Critical care	1718	445	1 076 601	159 138	2 214 813	282 652	11 700	2942
Family practice	50 254	27 198	47 637 820	14 720 729	92 736 700	28 404 125	348 093	181 219
Gastroenterology	10 386	1605	10 008 152	868 388	13 656 191	1 167 344	73 568	10 859
Haematology/oncology	5292	2056	9 341 629	2 265 926	160 103 650	33 169 364	37 152	13 958
Infectious disease	3051	1711	2 256 342	875 804	28 310 374	10 642 175	21 094	11 376
Internal medicine	60 260	31 076	73 265 663	21 727 372	155 764 716	41 058 123	405 634	201 965
Nephrology	5775	1708	6 722 827	1 371 676	31 868 322	5 609 422	40 584	11 508
Haematology	479	203	409 451	132 957	6 710 182	1 340 539	3319	1376
Medical oncology	1867	731	2 752 351	692 899	46 202 567	8 716 131	13 116	4973
Rheumatology	2534	1531	4 361 989	1 308 763	29 587 851	7 918 219	17 882	10 268
Pulmonary	7407	1428	10 282 849	1 205 061	18 839 389	2 034 745	52 020	9681

Table 3 Adjusted and unadjusted gender reimbursement differentials for 13 medical specialties

Specialty	Unadjusted differential (US$)	95% CI lower (US$)	95% CI upper (US$)	Adjusted differential (US$)	95% CI lower (US$)	95% CI upper (US$)
All	−34 125.68	−34 991.61	−33 259.76	−18 677.23	−19 301.94	−18 052.53
Cardiology	−49 532.75	−54 955.76	−44 109.75	−8700.69	−12 216.92	−5184.46
Endocrinology	−21 583.72	−24 379.99	−18 787.44	−5680.17	−7081.80	−4278.54
Critical care	−21 161.13	−28 712.74	−13 609.52	−4360.05	−8184.85	−535.24
Family practice	−15 029.77	−15 627.83	−14 431.70	−8152.83	−8609.44	−7696.21
Gastroenterology	−26 556.29	−28 968.12	−24 144.45	−4636.67	−5761.80	−3511.55
Haematology/oncology	−94 350.55	−109 996.00	−78 705.13	−7377.09	−13 381.58	−1372.59
Infectious disease	−19 176.82	−23 177.82	−15 175.83	−6527.46	−9275.38	−3779.55
Internal medicine	−24 158.97	−25 003.32	−23 314.62	−10 850.34	−11 443.72	−10 256.97
Nephrology	−41 776.96	−47 751.56	−35 802.36	−16 688.96	−21 437.04	−11 940.88
Haematology	−52 257.03	−86 317.14	−18 196.91	−10 115.08*	−21 616.48	1386.32
Medical oncology	−81 433.39	−106 482.80	−56 383.97	−3970.50*	−13 903.06	5962.05
Rheumatology	−85 356.80	−98 925.86	−71 787.74	−15 405.54	−21 832.93	−8978.15
Pulmonary	−32 543.52	−36 514.82	−28 572.21	−11 017.79	−13 442.74	−8592.84

*Values did not meet the threshold for statistical significance.

Another strength is our ability to adjust for variables that have been proposed to be the reasons for gender pay inequality.[29 30] After adjusting for physician work hours, productivity and years of experience, we found a statistically significant gender reimbursement differential in 85% of specialties analysed.

As with all investigations, ours has limitations worthy of mention. First, we used surrogate markers to estimate physician work hours, productivity and years of experience. Prior investigations have directly measured these variables through the use of surveys.[3 5–9 18 23 24 28] We knowingly used surrogate variables in our analyses to avoid the uncertainties of working with survey data.[11] Second, we analysed reimbursements from Medicare Part B only. While Medicare is the largest insurer of patients in the USA, we ignored reimbursements from other agencies/companies, including other federal programmes (eg, Federal Employees Health Benefits, Tricare) and the Medicare Advantage plan.[15 29 31] Could there be more female providers receiving higher reimbursements from other agencies than male providers? The data needed to answer this and other questions were not available to us. Had it been available, our analyses would have provided an even more complete picture of reimbursement differentials. Third, our analysis does not address quality of care. Because the Medicare PUF does not contain such information, we do not know if quality of care affects provider reimbursement.[15] Lastly, and perhaps most regrettably, we still do not have an answer as to why female providers are reimbursed less than their male counterparts.

CONCLUSIONS

Reimbursement differentials between male and female providers continue to exist in a large proportion of medical specialties. Our findings suggest that the commonly held theories of why monetary disparities exist need to be revisited.[32 33] After adjustment for work hours, years of experience and productivity, female healthcare providers are still reimbursed less than male providers. Despite using Medicare Part B data to ascertain specialty-specific reimbursement differentials, we have no reason to believe that such differentials exist only in this dataset. If there is a disparity in gender reimbursement that is independent of the health insurance company that is billed, then future research should be performed to uncover this pattern. Only then can the medical community have the most accurate understanding of the reimbursement inequity and perhaps be guided towards a solution that can reverse this decades-old injustice.[34–36]

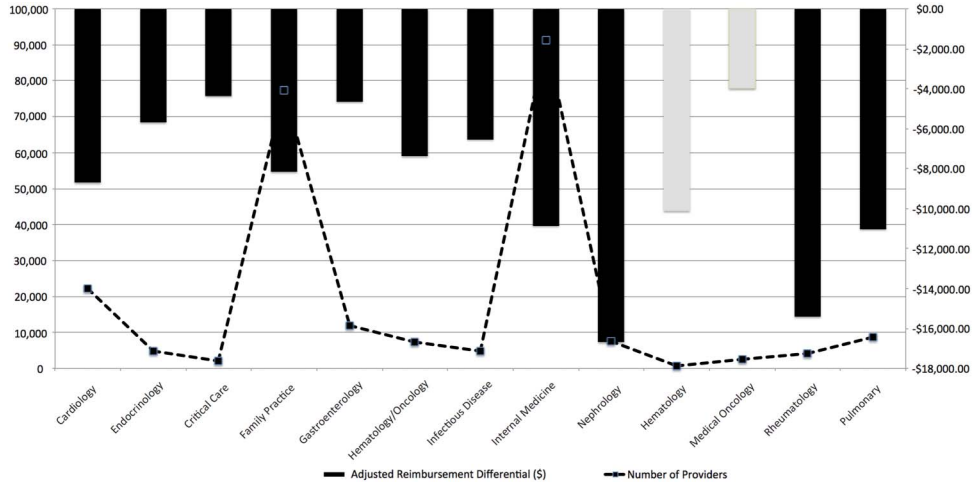

Figure 1 Adjusted specialty-specific reimbursement differentials (bars) against number of providers (dotted line). Black bars: p<0.05.

Main messages

- Female healthcare providers are reimbursed less than their male contemporaries.
- The Medicare Public Use File is one of the largest publicly accessible databases to contain reimbursement data.
- After adjustment for productivity, amount of work and years of experience, female providers are reimbursed less than their male counterparts.

Current research questions

- Is the reimbursement disparity limited to Medicare, or is it seen with other insurance companies?
- Can we quantify hours worked and productivity in a more direct manner than using surrogates or survey data?
- How can the medical profession resolve the gender disparity in reimbursement?

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Contributors TD: designed the experiment, performed data analyses and drafted manuscript. SA: designed the experiment. XF: performed data analyses. WT, PJ, TV: designed the experiment.

Competing interests None declared.

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