

Differences in Costs of Treatment for Foot Problems Between Podiatrists and Orthopedic Surgeons

Robin B. Harris, PhD; John M. Harris Jr., MD, MBA; Jon Hultman, DPM; and Scott Weingarten, MD, MPH

Abstract

We examined charge data for health insurance claims paid in 1992 for persons under age 65 covered by a large California managed care plan. Charge and utilization comparisons between podiatrists and orthopedic surgeons were made for all foot care and for two specific foot problems, acquired toe deformities and bunions. Podiatrists provided over 59% of foot care services for this commercial population of 576,000 people. Podiatrists charged 12% less per individual service than orthopedists. However, podiatrists performed substantially more procedures per episode of care and treated patients for longer time periods, resulting in 43% higher total charges per episode. Hospitalization was infrequent for all providers, although podiatrists had the lowest rates. In a managed care setting in which all providers must adhere to a preestablished fee schedule, regardless of specialty, the higher utilization by podiatrists should lead to higher overall costs. In some cases, strong utilization controls could offset this effect. We do not know if the utilization difference is due to actual treatment or billing differences. Further, we were unable to determine from the claims data if one specialty had better outcomes than the other.

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Most managed care organizations (MCOs) seek the services of the most cost-efficient health care providers. It is not known, however, if different specialties have systematically disparate

charges for similar care. Available studies often emphasize charges for similar, individual services rather than charges associated with full episodes of care.

Foot surgery, offered by orthopedists and podiatrists, provides a unique opportunity to evaluate the economic effects of practices and billing patterns of different classes of providers. Both specialists perform foot and ankle surgery, although they are trained differently and belong to different specialty societies. We are aware of only one study comparing the treatment and billing patterns of orthopedists and podiatrists.¹ In this study, researchers evaluated insurance claims from the year 1982 for members of the Federal Employees Health Benefits Program (FEHBP). The authors of this study examined 60-day episodes of care and found that orthopedists performed fewer procedures per episode than podiatrists. However, the average orthopedist's procedure charge was 17% higher than the average podiatrist's comparable procedure charge, and orthopedists were more likely to perform procedures on an inpatient basis. The average charge by podiatrists for an entire foot surgery treatment episode was 30% lower than the average charge by orthopedists.

While the FEHBP study had important implications for MCOs seeking to reduce costs, there have been dramatic changes in the health care delivery landscape since 1982. MCOs now have preestablished fee schedules for all providers regardless of specialty, and they have drastically reduced hospital services. With such level reimbursements, an MCO may prefer one specialist over another based on other factors, such as utilization of procedures, ancillary care, and/or hospital care. Systematic utilization differences between specialists providing similar care can equate with significant cost differences and may also influence medical outcomes.

We sought to evaluate potential charge and utilization discrepancies associated with the surgical management of foot and ankle problems by podiatrists and orthopedists.

From the Arizona Prevention Center, University of Arizona College of Medicine, Tucson, AZ (R.H.), Medical Directions, Inc., Tucson, AZ (J.H.), Medical Business Advisors, Beverly Hills, CA (J.H.), and Department of Health Services Research and Medicine, Cedars-Sinai Medical Center, University of California at Los Angeles School of Medicine, Los Angeles, CA (S.W.)

At the time this study was conducted, Dr. Harris was an officer of Blue Cross of California, Woodland Hills, CA

Address correspondence to: Robin B. Harris, PhD, Arizona Prevention Center, 2501 Lee Street, Tucson, AZ 85716.

E-mail: rharris@azcc.arizona.edu

... METHODS ...

Insurance Claims Data

We analyzed charges from health insurance claims paid out during calendar year 1992 for members of Blue Cross of California's Prudent Buyer Plans who were less than 65 years old. The Prudent Buyer Plans network providers were paid directly by Blue Cross based on a maximum allowable fee schedule. Providers did not have risk-sharing arrangements, nor were they required to refer to in-network providers during 1992. Members were free to self-refer to any provider, but coverage was reduced when they used out-of-network providers.

During the study period, Blue Cross was attempting to enlist 75% of practicing physicians and podiatrists in California in its Prudent Buyer network. Blue Cross divided the Prudent Buyer membership population into two market segments. One segment included individual members and members from smaller employer groups, and these members usually had higher deductible and copayment levels. The other segment, which included members from large corporate or group accounts, had no or low deductibles. Estimated 1992 membership in the group market segment was 576,000 for members less than 65 years of age. We used this group as our primary data set for this analysis.

Definition of Disease and Episode of Care

We analyzed all professional claims for procedures or visits that could be related to foot and ankle problems, excluding trauma-induced fractures. Table 1 shows International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)² and Current Procedural Terminology (CPT-4)³ codes that we used. We excluded nail diseases, since claims data did not allow us to distinguish between fingernail or toenail problems.

The claims data system recorded the charges for each procedure or service per claim and the total sum paid for the claim. The claims data included physician or podiatrist services but did not include institutional charges. We used these charges to measure services performed and reimbursement expectations. As expected, provider reimbursements did not necessarily equal these individual charges.

We calculated episodes of care from linked individual claims records for each insured person. Procedures and services linked to an individual and performed within 60 days of the first event were considered as part of one episode. We used 60 days as our criteria to allow

comparison with results of the 1982 FEHBP study. Actual duration of the episode was calculated and sub-analyses were performed for episodes of varying duration (<2 days, 2-30 days, 31-60 days). When more than one procedure or service was performed during an episode, we could not determine from the claims records which procedure was primary or secondary. Whenever at least one inpatient professional service was performed within the 60-day window, this was considered an inpatient care episode.

Providers

The individual claims records identified the type of practitioner providing each service according to the tax identification number. The insurance company had previously assigned specialty codes to the tax identification numbers used by its providers. We grouped provider codes as follows: podiatrists, orthopedic surgeons, general medicine specialties, other subspecialty physicians, physical therapists, and other service providers.

When more than one provider was involved in one episode, the data did not identify the primary provider of care. As a result, we characterized providers as the first or final provider of care during an episode, and we used the first provider as the primary provider. In the vast majority of cases, the first and final provider was the same provider; the percent agreement between the first and last provider of care for a 60-day episode was 95.9%.

Analyses

We removed duplicate claims and excluded claims in which the provider specialty was unknown ($n = 1,670$), no charge was reported ($n = 22$), or the primary diagnosis was unknown ($n = 245$). After this adjustment, our database included 94,457 individual transactions for 33,072 claims.

We estimated the incidence of foot care services for males and females by age, based on 1992 enrollment in the Prudent Buyer group insurance plan. Age- and gender-adjusted incidence rates were calculated using direct adjustment with the combined population as the standard. We then summed total charges billed by the providers for both individual service items and episodes of care. We estimated the mean charge per procedure or service for various member classifications and provider groups. The unadjusted mean charge per episode and mean number of service items per episode were also calculated. Age- and gender-adjusted mean values were estimated using least square regression methods. We used multiple *t*-tests for between-group comparisons of the mean, with

Table 1. CPT-4 and ICD-9 Codes Used to Define Foot Care Problems

ICD-9 Codes of Interest	Diagnosis
355, 35500, 3555, 35550, 3556, 35560, 3557, 35570, 3558, 35580	mononeuritis of lower limb
680.7	carbuncle or boil of foot
6811, 68110-68190	cellulitis abscess, onychia, or paronychia of toe
6827, 68270, 6829	other abscess or cellulitis of foot
7071, 707, 70700	ulcer of lower limb
71117, 71127, 71137, 71147, 71157, 71167, 71177, 71187, 71197	arthropathy with infections, foot
71217, 71227, 71237, 71247, 71257, 71267, 71277, 71287, 71297	crystal arthropathy, foot
71517, 71527, 71537, 71547, 71557, 71567, 71577, 71587, 71597	osteoarthritis & allied disorders, foot
71617, 71627, 71637, 71647, 71657, 71667, 71677, 71687, 71697	other & unspecified arthropathies, foot
71817, 71827, 71837, 71847, 71857, 71867, 71877, 71887, 71897	other derangement of joints, foot
7267, 72670-72679, 72690	peripheral enthesopathies of ankle and tarsus
72706	tenosynovitis of foot and ankle
7271	bunion
72767	rupture - Achilles tendon
72768	rupture - other tendon of foot or ankle
7287	plantar fascial fibromatosis
73007, 73017, 73027, 73037, 73077, 73087, 73097	osteomyelitis, foot
7325	juvenile osteochondrosis of foot
73344	aseptic necrosis of bone - talus
734	flatfoot
735, 73500, 7351, 73510, 7352, 73520, 7353, 7350, 7354, 73540,	acquired deformities of toe
7355, 7358, 73580, 7359	"" ""
7367, 73670, 73671, 73672, 73673, 73674, 73676, 73679	other acquired deformities of ankle or foot
7545, 75450, 75453, 7546, 75460-75462, 7547, 75470, 75471	congenital deformities of feet
7556, 75502-75567	anomalies of toes & foot
CPT-4 Foot Codes of Interest	
28001-28035	Incision
28043-28175	Excision
28190-28193	Introduction/removal
28200-28360	Repair/revision/reconstruction
28705-28760	Arthrodesis
28800-28825	Amputation
28899	Miscellaneous

Scheffe's adjustment for multiple comparisons. Due to skewed distribution of the outcome variables (charges and number of procedures), we also performed analyses using log normal transformation; however, this did not change the results. Therefore, the

nontransformed results are presented. Data management and statistical analyses were performed using PC-SAS systems (SAS Institute, Inc., Cary, NC).

We also sought to compare the charges submitted by podiatrists and orthopedists for the management of

two specific, primary diagnoses. These diagnoses included bunions (ICD-9-CM=727.1) and acquired deformities of the toes (ICD-9-CM=735.x). We conservatively estimated the use of hospital services by assuming that all professional services indicating inpatient care were associated with a hospitalization.

... RESULTS ...

Types of Claims

In this insured population, 13,934 members under 65 years of age had at least one episode of foot care during 1992. A total of \$10,018,926 was billed for these services.

Table 2 shows the frequency of foot care services in this population during 1992. The age- and sex-adjusted annual incidence of foot care services (excluding nail care) was 25.9 per 1,000 members. Women were more likely to use foot care services than men for all age groups except for men less than 20 years old. The use of care (and presumably foot problems) generally increased with age, with the exception of men less than 20 years old (Table 2).

Table 3 shows the mean charge per episode, the mean number of procedures or service items billed per episode, and the mean charge per procedure or service by gender. Age-specific analyses showed little variation in charges by age for either sex. The mean values were then age-adjusted for each gender. However, care provided to women cost more per procedure/service and more per episode. Sixty-one percent of these episodes of care were provided to women, and the mean charge per episode was \$647 for women, as compared with \$423 for men ($P < 0.0001$).

Table 2. Use of Foot Care Services Within an Insured Population in 1992, by Age and Gender of Members

	# Members With at Least 1 Foot Care Service	Incidence Per 1,000 Members (95% Confidence Limit)
Women		
<20 years	936	13.2 (12.29-14.09)
20-29	530	13.8 (12.67-15.05)
30-39	1,440	28.9 (27.45-30.41)
40-49	2,397	39.3 (37.79-40.89)
50-59	2,033	50.1 (47.97-52.23)
60-64	950	68.6 (64.48-72.98)
All	8,286	30.2 (29.56-30.84)
Men		
<20 years	1,523	20.2 (19.22-21.25)
20-29	369	10.4 (9.37-11.51)
30-39	789	19.5 (18.17-20.89)
40-49	1,295	24.9 (23.52-26.23)
50-59	1,117	28.0 (26.26-29.61)
60-64	554	36.9 (33.98-40.08)
All	5,647	21.9 (21.30-22.43)

Charges by Specialty

Over 59% of all services were provided by podiatrists and 57% of the episodes were attributed to podiatrists. Approximately 16% of all services claimed were from physical therapists or other non-physician or nonpodiatrist providers.

Table 4 illustrates the relationship between foot care charges and specialist. The overall relationship between care and provider type was similar for both genders, despite the increased utilization among women. The mean values were adjusted for age and gender. Podiatrists had a 12% lower mean charge per procedure or service than did orthopedists or specialty physicians. The average procedure charge, adjusted for age and gender, was \$113 for podiatrists and \$129 for orthopedists ($P < 0.0001$).

However, as Table 4 illustrates, the mean charge per episode of care was significantly greater for podiatrists than orthopedists (\$665 vs. \$466, respectively; $P < 0.0001$). Podiatrists performed substantially more procedures per

Table 3. Mean Professional Charges and Volume of Foot Care Services for Men and Women in an Insured Population in 1992

	Total Procedures	Total Episodes*	Mean Charge Per Procedure+	Mean Charge Per Episode†	Mean Procedures Per Episode
Men	33,698	6,968	\$87 (1.09)	\$423 (12.25)	4.81 (.08)
Women	60,759	10,911	\$116 (1.05)	\$647 (15.44)	5.57 (.08)

*Episodes consist of all services provided for a foot problem within 60 days of an initial visit.

†Mean (standard error) estimated by multivariate linear regression model, adjusted for age of members. All male-female comparisons significant at $P < 0.0001$.

episode of care than did any physician group, and an episode of care for podiatrists was associated with a mean of 5.9 procedures compared with 3.9 procedures per episode for orthopedists ($P < 0.0001$). General practice physicians had the lowest procedure charges and episode charges. This difference in patterns of care may be due to differences in type of patients and their presenting problems.

Podiatrists tended to provide care for longer durations than orthopedists. More than 32% of episodes attributed to podiatrists were between 31 days and 60 days long, as compared with 16% of the orthopedists' episodes.

Sixty percent of all episodes were less than 2 days long, and only 18% were between 31 days and 60 days. A subanalysis of these shorter episodes revealed that, while podiatrists performed significantly more procedures per episode, total charges for the short episodes were statistically comparable between provider groups (Table 4).

Over 23% of all services claimed by podiatrists and 22% of orthopedists' services were for foot surgeries or foot x-rays. Podiatrists performed substantially more casting or strapping procedures or muscle testing procedures than orthopedists (14.9% vs. 3.97%, respectively).

Location of the Service and Provider Specialty

When we examined the location of service, we found that most services were provided in the office

setting (91% for podiatrists and 89% for orthopedists). All providers seldomly used inpatient services, although podiatrists were less likely to perform individual services in the inpatient setting than orthopedists (1.25% vs. 4.46% of services were performed on an inpatient basis by podiatrists and orthopedists, respectively; $P < 0.0001$).

In this insured population, we identified 638 episodes with at least one inpatient service. Approximately 2.8% of all podiatrists' episodes were so defined as inpatient compared with 4.8% of orthopedists' episodes. The mean professional charges for episodes of care containing at least one hospital service, adjusted for age and gender of member, were similar for orthopedists and podiatrists (\$3,468 and \$3,195, respectively; $P < 0.05$).

We attempted to match hospital charge data with professional charge data, but less than 46% of the episodes could be matched. For matched episodes, episodes with a podiatrist identified as the primary provider were associated with lower, but not statistically significant, institutional charges than services from other provider groups. The adjusted institutional charges were \$9,788 for podiatrists versus \$11,994 for orthopedists ($P = 0.43$). The average adjusted lengths of stay were also similar between specialty groups (2.5 days for podiatrists and 2.7 days for orthopedists; $P = 0.80$).

Table 4. Comparison of Professional Charges and Volume of Foot Care Services by Provider Specialty

Provider Specialty*†	Total Procedures	Mean Charge Per Procedure*	Total Episodes†	Mean Charge Per Episode**	Mean Procedures Per Episode**
All episodes					
Podiatry	55,364	\$113 (1.13) [§]	9,497	\$665 (15.38) [§]	5.91 (.08) [§]
Orthopedics	9,082	\$129 (2.66)	2,501	\$466 (29.06)	3.88 (.14)
General medicine	7,399	\$69 (2.94)	2,604	\$245 (28.41)	3.14 (.14)
Other specialty MD	7,844	\$127 (2.88)	1,999	\$528 (32.71)	4.23 (.16)
Episodes <2 days duration					
Podiatry			5,129	\$253 (8.48)	2.74 (.03) [§]
Orthopedics			1,661	\$237 (14.52)	2.05 (0.6)
General medicine			1,964	\$105 (13.31)	1.84 (0.5)
Other specialty MD			1,443	\$279 (15.70)	2.28 (0.6)

*Mean (standard error) estimated by multivariate linear regression model, adjusted for age and gender of members.

†Episodes defined as all procedures and services that occurred within 60 days of the initial service date.

**Provider is classified as the specialty of the first physician or podiatrist performing a service during the episode. Count for total procedures attributed to provider actually performing the service. During episode, count attributed to primary provider.

[§] $P < 0.001$ comparing podiatrists versus other provider, adjusting for multiple comparisons.

^{||} $P < 0.001$ comparing general medicine versus other provider groups.

Comparison of Charges for Specific Problems

We performed separate analyses for two categories of specific, common foot problems that can result in surgical treatments: acquired toe deformities and bunions. We identified 3,835 episodes of acquired toe deformities treated by podiatrists or physicians and 1,053 episodes of bunions. Table 5 shows the mean professional charges per treatment episode and the mean number of procedures performed during the episode for both types of foot problems and for each provider group.

Approximately 65% of the episodes relating to acquired toe deformity problems were single-day episodes. While the mean professional charges for the 1-day episodes were relatively similar for both provider types, the mean adjusted charges for all episodes were higher for podiatrists when compared with orthopedists. During 60-day episodes of care for acquired toe deformities, podiatrists performed 41% more procedures than orthopedists ($P < 0.01$). Fewer episodes attributed to podiatrists required hospital services (4.4% of podiatrists' episodes versus 8.5% for orthopedists, $P < 0.0001$).

Service charges for bunion care are also shown in Table 5. A substantial portion of bunion care was provided in single-day episodes; at least 63% of bunion episodes were 1-day episodes. Podiatrists had greater charges than orthopedists at all episode lengths and claimed more services per episode than did orthopedists. As with acquired toe deformities, most services were performed in the ambulatory setting, with 5.7% of bunion episodes by podiatrists requiring hospital services as compared with 12.4% by orthopedists ($P < 0.0001$).

... DISCUSSION ...

Provider practice patterns can profoundly influence MCO network costs. Providers who receive less money per unit of service may not be less costly to the MCO if they utilize more services. Studies designed to determine the true cost-effectiveness of MCO network management strategies often reveal conflicting results. One study demonstrated that chiropractic care has a beneficial effect on back pain cost outcomes,^{4,5} whereas a more recent study demonstrated no difference in back pain outcomes between provider groups, with primary care physicians providing the least expensive care.⁶

Despite the fact that 10% of Americans and 25% of the elderly report problems with their feet, foot care has received relatively little attention in the health policy debate.^{7,8} We examined the utilization of foot care by a commercially insured population and attempted to clarify differences in treatment patterns between podiatrists and orthopedists.

Podiatrists provided the majority of foot care for the population we studied, and this agrees with national surveys.^{7,9} We found that podiatrists charged less per procedure or service than orthopedists. However, podiatrists charged more per episode of foot care because they saw their patients more frequently than orthopedists. This held true when we analyzed two specific surgical conditions: bunions and acquired toe deformities.

This study confirms findings from the 1982 FEHBP study, in that orthopedists charged more per procedure for foot care and podiatrists provided more units of care per 60-day treatment episode. Both studies also found that orthopedists tended to use hospital services more often, although our study

Table 5. Comparison of Professional Charges for Episodes of Foot Care for Specific Foot Problems

Provider Specialty	Total Episodes	Mean Charge Per Episode*	Mean Procedures Per Episode*
Acquired Toe Deformities (ICD-9-CM=735)			
All Episodes			
Podiatry	2,825	\$867 (42) [†]	5.58 (.16) [‡]
Orthopedics	268	\$552 (117)	3.62 (.45)
Episodes <2 days, duration			
Podiatry	1,729	\$273 (24)	2.64 (.08)
Orthopedics	172	\$303 (66)	2.13 (.23)
Bunions (ICD-9-CM=727.1)			
All Episodes			
Podiatry	517	\$1,021 (90)	5.86 (.31) [‡]
Orthopedics	132	\$488 (155) [†]	3.12 (.53)
Episodes <2 days, duration			
Podiatry	282	\$327 (60)	2.89 (.19)
Orthopedics	81	\$223 (103)	2.13 (.33)

*Mean (standard error) estimated by multivariate linear regression model, adjusted for age and gender of members. Overall model also adjusted for length of episode.

[†] $P < 0.01$ comparing podiatrists versus orthopedists.

[‡] $P < 0.001$ comparing podiatrists versus orthopedists.

showed a considerable decrease in the use of hospital resources by all providers. According to the FEHBP study, in 1982, orthopedists hospitalized 93% of their patients who were surgically treated for bunions and podiatrists hospitalized 38% of these patients. In our study, podiatrists used hospital services for 5.7% of bunion episodes and orthopedists used hospital services for 12.4% of these episodes. The fact that orthopedic services were still less expensive despite this 6.7% higher use of hospital services suggests that savings are not likely to result from further reductions in institutional use when treating these two common foot problems.

This study also confirms that women over 20 years of age use more foot care services than men. This finding was briefly noted in the FEHBP study. The increased use of foot care services among women in this population was associated with higher costs. It may be possible that women have more foot problems or more complex problems due to shoe type. Alternately, women may be more willing to undergo therapeutic procedures. It is important to consider that utilization of health care services can vary according to gender and age, and different providers may be more likely to attract different patient populations.

This claims-based study was limited in that we could not assess qualitative factors such as case-mix, clinical outcomes, and patient satisfaction. Further analysis of clinical records or patient-reported outcomes data could help us determine if higher utilization of procedures and services by podiatrists (or differences among podiatrists) is associated with different types of patients and/or outcomes. This would help characterize the service pattern that is associated with good outcomes and efficient service utilization.

While this study would seem to show that podiatrists are generally more expensive providers in the care of patients with foot problems, this effect could

be attenuated with strong utilization controls that reduce podiatry referrals or by capitation arrangements that are independent of actual utilization. Overall, this study underscores the need to examine practice patterns of different specialists who perform similar procedures when making decisions about the cost-effectiveness of care.

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