

Orthopedic Problems in Family Practice: Incidence, Distribution, and Curricular Implications

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The spectrum of orthopedic problems encountered by family physicians in everyday practice has received little study in the past. This paper presents and analyzes the incidence and distribution of orthopedic problems in general/family practice based on four sources of secondary data. These sources include the National Ambulatory Medical Care Survey, a Family Practice Service in a large military teaching hospital, a statewide study in Virginia, and two community-based family practice settings in Washington State.

Orthopedic problems constitute about ten percent of all office visits in family practice. Over one half of these involve chronic, nontraumatic musculoskeletal problems. Major differences are noted in the distribution of sprains, strains, and fractures in adults and children. Fractures of the hand, foot, forearm, lower leg, and clavicle comprise between 50 and 80 percent of fractures seen in the settings under study. This kind of information should be helpful in better defining goals and methods for graduate training of family practice residents in orthopedics.

There is a broad consensus among experienced family physicians that orthopedic problems, particularly "office orthopedics," constitute a substantial and challenging portion of family practice in any setting. There is a further consensus, also largely anecdotal, among many recent graduates of family practice residencies that residency training in the care of orthopedic problems has not fully prepared them for the needs of their practices.

Despite this apparent problem, there have been almost no studies of the scope and specific content

of orthopedics in general/family practice in the United States, and only a few such studies elsewhere in the world. Among these rare studies, a survey was recently completed of 302 family physicians in North Carolina. One half of the respondents felt that their training in orthopedics was inadequate.¹

The present approach to orthopedic training in family practice residencies usually involves one or two months on an orthopedics rotation. This rotation is frequently a mix between inpatient, largely operative orthopedics (of lesser relevance to the family physician), and ambulatory orthopedics as encountered in the Emergency Room or office practice of orthopedists. In the absence of studies of the actual incidence and distribution of or-

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Table 1. Comparison of Data Collection Methods and Demographic Characteristics of Providers and Patients in Four Studies of Orthopedic Problems in Family Practice

| Data Source | Data Collection Method | Coding Scheme | Provider Type | Patient Population |
|-------------|-------------------------------------|---------------|---|---|
| Madigan | Clinic record no billing | ICHPPC | Family practice residents | Military (including active duty, retired, dependents) |
| NAMCS | Special protocol apart from billing | ICDA-8 | General practitioners and family physicians | Probability sample representative of US population |
| Washington | Computer billing service | ICDA-8 | Family physicians | Private urban and rural practices |
| Virginia | Special protocol apart from billing | RCGP | General practitioners, family physicians, and family practice residents | Urban, suburban, and rural Virginia practices |

Table 2. Overall Distribution of Orthopedic Problems

| | Madigan (%) | NAMCS (%) | Washington (%) | Virginia (%) |
|----------------------------------|-------------|-----------|----------------|--------------|
| Chronic Musculoskeletal Problems | 57 | 57 | 56 | 54 |
| Sprains and Strains | 24 | 32 | 27 | 28 |
| Fractures | 6 | 10 | 14 | 14 |
| Other | 13 | 1 | 3 | 4 |
| Totals | 100 | 100 | 100 | 100 |

thopedic problems in family practice, it has not yet been possible to develop detailed and specific curricular objectives and methods for teaching in this important area.

The purpose of this paper is twofold: (1) to analyze the incidence and distribution of orthopedic problems in general/family practice from available data on three levels—national, regional, and individual practices in the community; and (2) to collate and discuss these data in terms of their curricular implications, particularly for graduate training in family practice.

Methods

Secondary data were examined from four sources: (1) the National Ambulatory Medical Care Survey (NAMCS) of general/family practice;

(2) the Family Practice Service at Madigan Army Medical Center, Tacoma, Washington; (3) a state-wide study of family practice in Virginia; and (4) two family practices in the Pacific Northwest served by the Computer Medical Corporation of Seattle, Washington.

The NAMCS data involve a probability sample of approximately 15,000 patient problems seen by general/family physicians during 1976. The Madigan data involve a total of approximately 5,000 patient visits for musculoskeletal problems over a 16-month period from September 1, 1975 to December 31, 1976. The Family Practice service of Madigan Army Medical Center is staffed by 23 family practice residents under the supervision of the program's eight faculty. The residents and faculty provide comprehensive care for a known

Table 3. Distribution of Sprains and Strains (Madigan, NAMCS, and Washington)

| Location of Sprains and Strains | Madigan | | NAMCS | | Washington | |
|---------------------------------|---------|--------|-------|--------|------------|-------|
| | % | cum % | % | cum % | % | cum % |
| Vertebral Column Below Neck | 20 | 20 | <69* | 69 | 40 | 40 |
| Ankle | 16 | 36 | < 8* | 77 | 17 | 57 |
| Wrist, Hand, Finger | 15 | 51 | 7 | 84 | 9 | 66 |
| Knee, Lower Leg | 14 | 65 | 5 | 89 | 11 | 77 |
| Neck | 10 | 75 | ** | | 5 | 82 |
| Foot, Toe | 10 | 85 | ** | | 8 | 90 |
| Shoulder, Elbow, Upper Arm | 9 | 94 | 4 | 93 | 4 | 94 |
| All Other | 7 | 101*** | 8 | 103*** | 6 | 100 |

*These percents are artificially inflated due to inconsistencies in the ICHPPC and ICDA coding systems.
 **These percents are included in the percents reported in "Vertebral Column Below Neck" and "Ankle."
 ***These percents are greater than 100 percent due to cumulative rounding errors.

population comparable in age and sex composition to civilian communities. The Virginia data involve analysis of over 500,000 patient problems presenting to 118 family physicians in rural, suburban, and urban settings in Virginia over a two-year period.² The individual practice data include all visits for musculoskeletal problems in two selected family practices in Davenport (population 1,471) and Spokane, Washington (population 174,500) for 12-month periods during 1977-1978.

Table 1 displays the varieties of data collection methods, coding schemes, types of provider, and patient populations surveyed in the four data sources examined. There were two purposes for comparing such heterogeneous sets of data. First, each of the studies provided greater detail in some dimensions than in others, and secondly and most importantly, the authors wished to identify the major components of orthopedic practice in family medicine in a way which is generalizable across study methods and demographic characteristics of providers and patients.

Results

The most detailed analysis of available data was directed to the first two sources of secondary data—the National Ambulatory Medical Care Survey (NAMCS) and the Madigan study. The

coding methods used in these two studies permitted useful comparisons for the overall incidence and distribution of orthopedic problems, as well as for the distribution of sprains, strains, and fractures. The latter two sources—the Virginia study and the Washington practices—provided results which were useful in rank-order comparisons of problems and procedures.

Overall Incidence of Orthopedic Problems

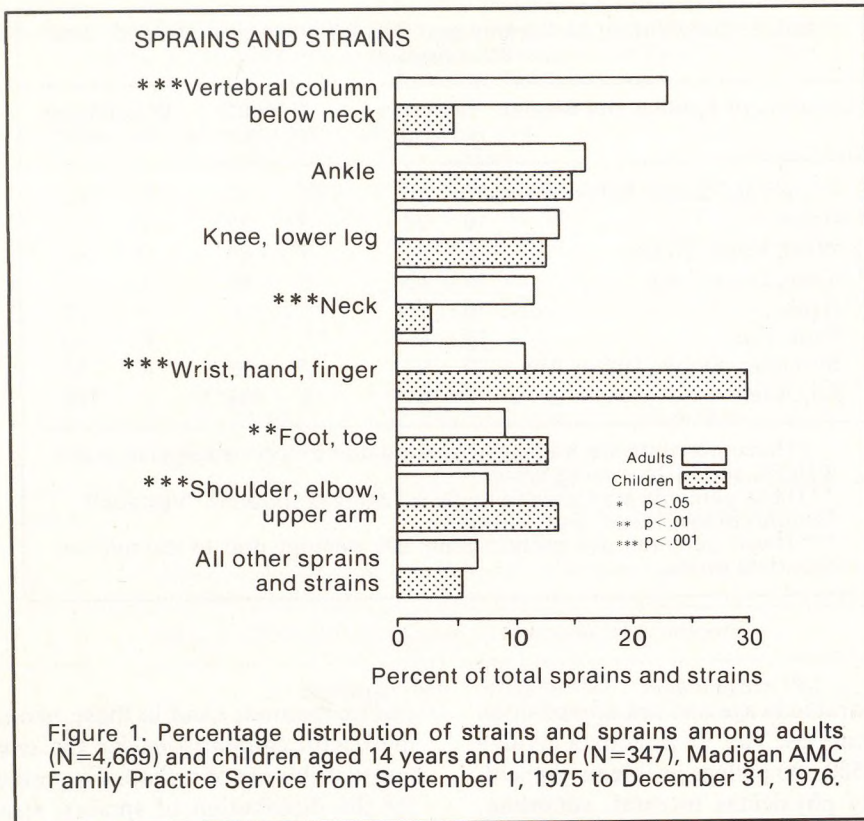
The overall incidence of orthopedic problems comprised about 10 percent of all office visits in the NAMCS and Madigan studies and 8.6 percent in the Virginia Study.

Overall Distribution of Orthopedic Problems

The NAMCS, Madigan, and Washington studies revealed the following breakdown for chronic musculoskeletal problems, sprains and strains, and fractures (Table 2).

Distribution of Sprains and Strains

The overall distribution of sprains and strains in the NAMCS, Madigan, and Washington studies is shown in Table 3. The data were not sufficiently detailed to include analyses of the Virginia study.



The distribution of sprains and strains in the Madigan study for adults and children (ages 0-14 years) reveals some interesting comparisons. These differences are shown in Figure 1. Several major differences in the incidence of sprains and strains are evident in adults and children:

| | Adults (n) | Children (n) |
|-----------------------------------|-------------|--------------|
| Wrist, hand, fingers | 11% (514) | 30% (104) |
| Shoulder, elbow, upper arm | 8% (374) | 14% (49) |
| Neck and rest of vertebral column | 35% (1,634) | 8% (25) |

Distribution of Fractures

In the four studies, fractures accounted for 6 to 14 percent of orthopedic practice. The overall distributions of fractures in these studies are shown in Table 4. Disparities may be attributable to the

classification schemes. The two studies with relatively few fractures in the *other* category (Madigan and NAMCS) are quite comparable to each other, but different in their distributions from the two studies having a significantly greater number of entries in the *other* category.

Again, the Madigan data reveal interesting differences in the distribution of fractures in adults and children. These differences are shown in Figure 2.

The major differences in incidence in types of fractures in adults and children are as follows:

| | Adults | Children (Ages 0-14 years) |
|--------------|-----------|----------------------------|
| Radius, Ulna | 4% | 23% |
| Ribs | 8% | 0.9% |
| Humerus | *Uncommon | 8% |

*Included in the "All others—9%"

Table 4. Distribution of Fractures

| Fracture Location | Madigan | | NAMCS | | Washington | | Virginia | |
|--|---------|-------|-------|-------|------------|-------|----------|-------|
| | % | cum % | % | cum % | % | cum % | % | cum % |
| Carpal, Metacarpal, Tarsal, Metatarsal Bone(s) | 27 | 27 | 23 | 23 | 19 | 19 | 18 | 18 |
| Phalanges of Foot or Hand | 26 | 52 | 19 | 42 | 14 | 33 | 15 | 33 |
| Radius, Ulna | 12 | 64 | 14 | 56 | 16 | 49 | — | — |
| Tibia, Fibula | 9 | 73 | 7 | 63 | 7 | 56 | 10 | 43 |
| Clavicle | 8 | 81 | 6 | 69 | 4 | 60 | 6 | 49 |
| Ribs | 5 | 86 | 12 | 81 | 8 | 68 | 8 | 57 |
| Skull and Facial Bone | 4 | 90 | 7 | 88 | 5 | 73 | 1 | 58 |
| Humerus | 4 | 94 | 6 | 94 | 5 | 78 | 4 | 62 |
| All Others, Specified and Ill-Defined | 7 | 101* | 8 | 102* | 22 | 100 | 38 | 100 |

*These percents are greater than 100 percent due to cumulative rounding errors.

Comparative Rank Order by Frequency of Orthopedic Problems

All four available secondary sources of data provide interesting comparisons of the rank order by frequency of specific fractures (Table 5) and nontraumatic orthopedic problems (Table 6).

The seven locations of fractures shown in Table 5 accounted for about 90 percent or more of all fractures in each of the four studies, and show a high level of agreement in terms of comparative frequency of the most common kinds of fractures.

Table 6 shows the comparative rank order of frequency among the four available studies for specific nontraumatic musculoskeletal problems, and again, a high level of comparability is evident. A notable exception is the reversal in ranks between low back pain and bursitis, tenosynovitis and synovitis. Together these six specific problems accounted for well over 50 percent of nontraumatic musculoskeletal problems in each of the four studies.

Curricular Implications

It is quite apparent from all of these studies that the great majority of orthopedic problems encountered in general/family practice fall under the category of "office orthopedics" involving a relatively small constellation of common sprains,

strains, fractures, and chronic musculoskeletal problems. Nontraumatic musculoskeletal problems account for over one half of all orthopedic visits seen in everyday practice. Fractures comprise about ten percent of all orthopedic problems and about one half of all fractures involve the carpal, metacarpal, tarsal, and metatarsal bones, and the phalanges of the foot and hand.

The patterns of traumatic orthopedic problems are quite different for adults and children. Adults, for example, sustain a higher incidence of rib fractures, and sprains and strains of the vertebral column, whereas children are more subject to fractures of the radius-ulna and upper extremity sprains and strains. Fractures in children often involve incomplete, greenstick ("torus") fractures and epiphyseal injuries, so that the potential risk of growth disturbance must be kept in mind and avoided. A prospective study in an urban hospital in Canada of 410 fractures seen in 398 children over a one-year period revealed an incidence of 13.9 percent for epiphyseal injuries and 16.3 percent for torus fractures.³

These observations point to the clear-cut need for graduate training in family practice to directly address these content areas with respect to common orthopedic problems of a traumatic and nontraumatic nature. Family practice residency programs must assure that their residents are actively

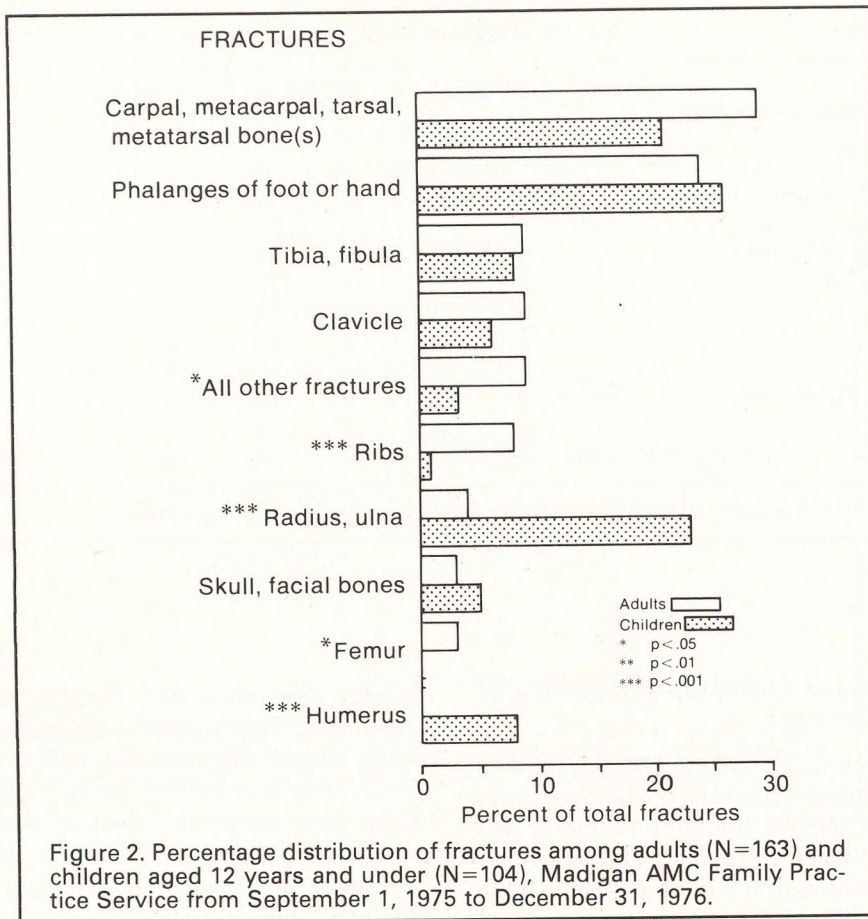


Figure 2. Percentage distribution of fractures among adults (N=163) and children aged 12 years and under (N=104), Madigan AMC Family Practice Service from September 1, 1975 to December 31, 1976.

involved in the care of these problems under appropriate supervision. Graduates of family practice residencies need to acquire the necessary knowledge and procedural skills to recognize and manage many of these problems, and at the same time be familiar with the potential complications of "simple" fractures. They must also be able to recognize and provide initial care in more complicated and less common orthopedic problems. The paper by Medley, Shirley, and Brilliant in this issue of *The Journal* presents general guidelines for consultation and referral for a wide variety of specific fractures in adults and children.⁴

The composite experience and training received by family practice residents in the Family Practice Center, in the Emergency Room, during orthopedics rotations (preferably both inpatient and

ambulatory), and/or in the offices of orthopedic surgeons should be planned and monitored so that graduates are well prepared to competently care for the majority of orthopedic problems encountered in daily practice. Orthopedic teaching rotations which excessively involve the family practice resident in supportive roles in the care of major and complex orthopedic problems run counter to the educational needs of the future family physician.

Comment

The studies which have been discussed represent a wide range of patient populations in different parts of the country. Although the commonalities of these studies are striking, there may be considerable variation in the spectrum of or-

Table 5. Comparative Rank Order of Fractures

| | Madigan | NAMCS | Washington | Virginia |
|--|---------|-------|------------|----------|
| Carpal, Metacarpal, Tarsal, and Metatarsal Bones | 1 | 1 | 1 | 1 |
| Phalanges of Foot or Hand | 2 | 2 | 3 | 2 |
| Radius, Ulna | 3 | 3 | 2 | 5 |
| Tibia, Fibula | 4 | 5 | 5 | 3 |
| Clavicle | 5 | 6 | 7 | 6 |
| Ribs | 6 | 4 | 4 | 4 |
| Humerus | 7 | 6 | 6 | — |

Table 6. Comparative Rank of Non-Traumatic Musculoskeletal Problems

| | Madigan | NAMCS | Washington | Virginia |
|-------------------------------------|---------|-------|------------|----------|
| Low Back Pain | 1 | 1 | 3 | 1 |
| Osteoarthritis | 2 | 2 | 2 | 2 |
| Pain in Joint (Arthralgia) | 3 | 5 | 5 | 5 |
| Bursitis, Tenosynovitis, Synovitis | 4 | 3 | 1 | 3 |
| Syndromes related to cervical spine | 5 | — | — | 6 |
| Rheumatoid Arthritis | 6 | 4 | 4 | 4 |

thopedic problems seen and managed by individual family physicians in different practice settings. A family physician in a rural community in the western United States, for example, may be required to provide definitive care for a wider range of fractures than the family physician practicing in an urban area with ready access to orthopedic consultation.

Family physicians can make essential contributions to the care of patients with orthopedic problems as long as three conditions are met:

1. The curricula of family practice residencies include orthopedic training that effectively addresses the future practice needs of program graduates;

2. Family physicians are aware of their limitations in the care of orthopedic problems; and

3. Family physicians maintain close working relationships with consultants in orthopedic surgery for the purpose of consultation (both formal and informal), referral, and continuing medical education.

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