The Diagnostic Content of Family Practice: 50 Most Common Diagnoses Recorded in the WAMI Community Practices

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Because there are several methodological deficiencies in previously published studies, a prospective study was carried out of the 50 most common diagnoses of community-based family practices in the Pacific Northwest. Age and sex of patients and reliability of data were controlled. The data reported show reasonable concordance with other published accounts for 10 most common diagnostic categories. For less frequent diagnoses, however, high variability in rank order is the rule, both within this study and by comparison with other studies. This suggests that the diagnostic content of family practice is far from universal and that diagnostic idiosyncrasies of physicians, regional differences in rates of disease, practice style, and as yet other unexplained factors may significantly influence the diagnostic content of family practice.

The description of the diagnostic content of ambulatory contacts in family practice could help improve curricula in both undergraduate and postgraduate training programs. As long ago as 1961, White et al[1] observed that while the bulk of illness occurs outside tertiary care centers and hospitals, the latter sites are where most medical training occurs. Thus, a thorough description of those diagnoses or problems that make up the bulk of ambulatory contacts would allow teachers of family medicine to devise teaching methods which provide the intellectual guidelines for treating these diseases. Additionally, a complete exposure to common ambulatory problems during training is essential. Without reliable guideposts, however, it is impossible to ensure that house officers and students are actually exposed to the clinical entities they will see in practice.

Previous reports of diagnostic content in family practice have serious limitations. The massive Virginia Study[2] may be geographically representative of only the middle Atlantic seaboard, and serious questions have arisen about its coding accuracy. Furthermore, the study did not differentiate between cases (prevalence) and workload and included data from hospital encounters. Since workload statistics may dramatically inflate the number of diagnoses made for an uncommon disease that requires frequent patient visits, and similarly, underrepresent common treatments that rarely require more than one visit, they are poten-

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tially capable of distorting ranked lists. Finally, the Virginia Study used a coding system developed for use in Great Britain (RCGP), which limits its comparability with commonly used codes for ambulatory care diagnoses in the United States (ICDA and its derivative, ICHPPC).

Another study by Stewart et al[3] reported data from six practices in Louisiana but truncated the coding rubric to 250 diagnoses and collected data for only two summer months. Only the 20 most common diseases were reported, further limiting the value of the data. Knopke et al[4] reported data on a sample of diagnostic contacts with 100 family physicians in Wisconsin during a one-month period. However, no rank by frequency was reported, and hospital and emergency room telephone contacts were included, making the study impossible to compare with other studies. Hollison et al[5] reported a series from an Army residency program showing major differences from the other US studies. Differences in coding methods and study population obscure the reasons for these differences. Finally, a study by two family physicians during their first year of practice in Appleton, Wisconsin,[6] duplicated the approach of the Virginia Study. Data were reported only from the initial year of the practice, and the authors reported no age-sex distribution. In addition, incidence (new cases only) was reported, limiting comparability with other studies reporting prevalence or workload.

Optimally, a curriculum for instruction in family practice should be devised from data that are accurate, comprehensive, and sensitive to the influences of geography and demographics. Program graduates should be well prepared in the treatment of the common diseases they will encounter. Reaching this goal depends in part on an accurate assessment of the diagnostic content of family practice. The previously cited studies all have significant flaws. Geographic limitations may have obscured important diagnostic entities. Young practices and rural-urban differences may have additionally biased reporting. An ideal study would include reliability testing, participating physicians' professional biographies, practice demography, and a sampling of practices from rural and urban settings. Finally, since important differences in practice style may be present on a regional basis, data from all sections of the country should be available for comparison purposes.

Methods

Six practices, all participating in the University of Washington Regional Medical Program (WAMI) (Washington, Alaska, Montana, Idaho) as community clinical training units for third- and fourth-year medical students in family practice, contributed data to the study. All physicians participating recorded diagnoses on patient encounter forms for a one-year period during the years 1977 to 1980. Diagnostic entries are for onsite ambulatory diagnosis only and do not include hospital encounters. The characteristics of these sites are presented in Table 1. Four practices are in small- to medium-sized (50,000 population) towns at least 1.5 hours from tertiary care centers. Two are located in urban areas with immediately available tertiary care. Two groups include primary care specialists (internists) other than family physicians.

Five sites used encounter forms with checklists to enter diagnosis data. One site used blanks for writing in diagnoses without a checklist. One group that did not use the ICHPPC-1[7] code substituted ICDA-8.[8] These diagnoses were translated into ICHPPC codes for analytic purposes. All sites in the contiguous states (excluding Alaska) were visited by the senior author prior to the commencement of coding in order to acquaint the providers and support staff with coding conventions and the purpose of the study. All physicians at all sites coded all diagnoses made for each encounter. Thus, at least one but potentially several diagnoses could have been entered. No attempt was made to differentiate between primary and secondary diagnoses. Data were entered as either new or old (previously unrecorded) or return visits for each patient encounter. All return visit diagnoses were excluded from this study. Thus the reported diagnoses represent practice prevalence (total patients with the diagnoses). Although precise data on total encounters were not tabulated, it is estimated that in excess of 110,000 patient encounters occurred at all sites during the data recording period.

Age-sex registers were maintained by two rural and one urban site concurrent with the collection of the diagnostic data. Additionally, two sites were selected to be audited for coding reliability. In these analyses a random sample of the years' diagnostic data entries were confirmed by actual

Table 1. Characteristic of Practice Sites Contributing Data

Site	Geographic Setting	Physician Group	Economic	Data Entry Method	Data Storage Method	Diagnostic Code
1. Anacortes	Small town, Washington	Multispecialty	Fee for service	Checklist	E-Book	ICHPPC I
2. Whidbey	Small town, Washington	Family practice	Fee for service	Write in	E-Book	ICHPPC I
3. Kalispell	Small town, Montana	Family practice	Fee for service	Checklist	Computer	ICHPPC I
4. Pocatello	Medium town, Idaho	Multispecialty	Fee for service	Checklist	Computer	ICHPPC I
5. Anchorage	Urban, Alaska	Multispecialty	Indian health	Checklist	Computer	ICDA-8
6. Spokane	Urban, Washington	Family practice	Fee for service	Checklist	E-Book	ICHPPC I

review of the charts. No attempt was made to document or quantitate underrecording errors. The reliability audit was done by independent investigators using prospectively established diagnostic criteria.

Results

Demographic

Age-sex profiles for practices 1, 2, and 6 are presented in aggregate in Figure 1. The male to female ratio was 45.9 to 54.1. Site 1 differed from sites 2 and 6 in that a higher proportion of patients were aged over 40 years. All groups showed a higher number of active patients below 20 years of age. Additionally, young women and the elderly are represented in greater numbers in the patient population than in the population at large.

50 Most Common Diseases

The rank order of aggregated diagnoses from all sites by frequency is presented in Table 2. The corresponding rank from the Virginia Study is shown for comparison. A dash in the Virginia Study column indicates no directly comparable code in the RCGP code system could be found. Diagnoses ranked in the 50 most common list by three or fewer of the six participating sites are noted. Diagnoses ranked at only one site are not included, although, as will be discussed below, several occurred. Large variability in rank order among sites was found for some codes, including hypertension, abdominal pain, hay fever, obstetrical care, and sinusitis. In addition, 19 codes ranking in the aggregate 50 most common list were absent from three or more sites.

The contribution of individual practices to the data variability is shown in Table 3. Approximately one half of the 50 most common diagnoses were held in common by the majority (four of six) of the sites. Three of the sites had diagnoses on their individual 50 most common list that they shared with fewer than one half of the other sites. The number of unique diagnoses (those present in the 50 most common list for only one site) showed even more variability when site-to-site comparisons were made. Indeed, the range of unique entries varied from 8 percent at site 1 to 36 percent at site 5. Thus a mean of 9.5 diagnoses (19 percent) were unique to each site.

Table 4 lists diagnoses unique to one site. Most unique diagnoses represented less common diagnoses. None were among the 10 most common reported by any site. However, limb pain, musculoskeletal other, letters and forms, injuries NEC (not elsewhere classified), and upper respiratory NEC were in the top 20 for the individual site list-

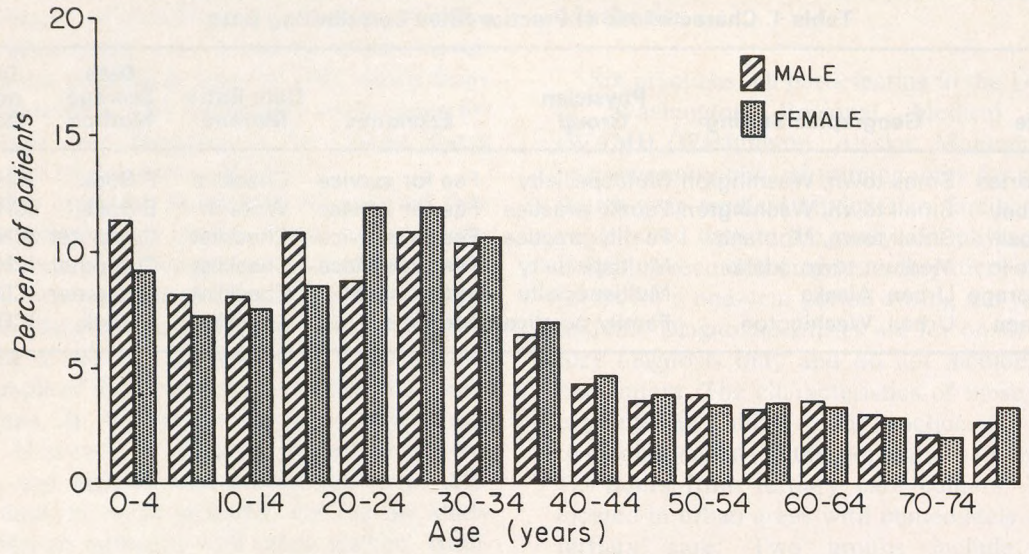

Figure 1. Age-sex profile of three practices contributing diagnostic data

ing them. Site 5 (Anchorage) is a US Public Health Service Indian health care facility, which reports a high incidence of infectious disease. Additionally, ICDA coding rubrics do create some incompatibilities with ICHPPC that are not reconcilable.

Reliability Testing

A 10 percent sample of diagnoses for the one-year period were selected and criteria developed for justifying the diagnosis on chart audit. Process criteria (eg, progress note, problem on problem list) were used, and no real attempt to judge the biomedical accuracy of the diagnoses was attempted. The purpose was thus to document whether the physician had left evidence in the chart to substantiate having made the diagnosis, not whether the diagnoses met external criteria for accuracy.

Sites 1 and 2 were selected for logistic reasons for an analysis of the reliability of diagnostic entries. For site 1, unsubstantiated errors (wrong diagnoses) accounted for 0.85 percent of diagnostic entries. For site 2, an error rate of 2.1 percent was reported. In addition, at site 2 an additional error in coding number (digit transposition) was found but judged insignificant. Thus a mean error rate for overrecording of problems for this subsample was 1.9 percent.

Discussion

The above data advance the quality of information available delineating the diagnostic content of family practice. Previous studies have had serious limitations in their "generalizability," including high error rates, inadequate seasonal control, reliance on data from recently established practices, and lack of basic demographic information about the patient populations. In addition, only limited data have been previously reported from the far western United States.

Table 2. 50 Most Common Diagnoses

Rank	Range of Ranks	Virginia Study Rank	Diagnosis (ICHPPC Code)
1	1-3	1	Medical examination (Y00)
2	1-4	8	Upper respiratory infection (460)
3	1-5	11	Otitis media (3810)
4	1-8	4	Pharyngitis (462)*
5	3-20	5	Bronchitis (466)
6	2-16	2	Hypertension (401)
7	7-14	38	Low back syndrome (7289)*
8	8-22	65/34	Immunizations (Y02)
9	6-31	18	Abdominal pain (7855)
10	11-18	93	Earwax (3781)*
11	7-24	17	Vaginitis (6221)
12	9-26	—**	Contusion (929)
13	8-27	7	Diabetes (250)
14	9-30	20	Cystitis (595)
15	6-31	3	Lacerations (889)
16	7-38	53	Conjunctivitis (360)*
17	4-39	6	Sprain/strain (848)
18	2-46	—	Tonsillitis (463)
19	13-41	—	Malaise (7809)
20	11-40	—	Serous otitis media (3811)
21	18-24	55	Warts (0791)
22	6-35	33	Hayfever (507)
23	5-22	10/48	Influenza (470)
24	15-28	12	Depression (3004)*
25	10-30	25	Pneumonia (486)
26	19-25	40	Contraception advice (V25)*
27	10-38	57	Bursitis (731)
28	11-34	—	Fracture (829)*
29	3-44	19	Congestive heart failure (412)*
30	22-28	—	Oligomenorrhea (6260)*
31	9-47	21	Sinusitis (461)
32	13-50	—	Boil (680)
33	8-42	14	Obstetric care (V220)
34	13-43	111	Gastroenteritis (092)*
35	12-48	35	Osteoarthritis (713)*
36	15-42	105	Menopausal symptoms (627)
37	17-40	—	Shoulder syndromes (7260)*
38	9-50	110	Fever (7888)*
39	10-50	28	Contact dermatitis (692)
40	15-50	27	Headache (7840)
41	12-49	—	Sterilization (V252)*
42	17-50	54	Rheumatoid arthritis (712)*
43	15-43	9	Obesity (277)
44	21-46	58	Dizzy (7804)*
45	31-33	15	Anxiety (3000)*
46	14-48	—	Eczema (691)
47	21-47	—	Increased menses (6262)
48	16-47	51	Stomach NEC (536)
49	16-47	46	Otitis externa (382)*
50	27-49	—	Chronic obstructive pulmonary disease (491)*

Note: Ordered by average rank for 6 practices
*Diagnosis in 50 most common list for three or fewer sites
**No comparable code
NEC: not elsewhere classified

Table 3. Site-by-Site Comparison of Diagnoses on the 50 Most Common Diagnoses List

Site	Diagnoses Common to Four or More Sites	Diagnoses Unique to One Site
1. Anacortes	26	4
2. Whidbey	23	12
3. Kalispell	23	6
4. Pocatello	25	6
5. Anchorage	18	18
6. Spokane	25	11

In this study, a sample of rural, urban, and institutional practices recorded data taken from patient encounter forms for a full year. The recording reliability of two subsets of the practices were found to be excellent and far surpassed expectations. All practices were established and ongoing, over 80 percent of the providers were board-certified family physicians, and all were providing primary care unrestricted by patient age, sex, or organ system. Additionally, all data report prevalence, not diagnostic workload.

There are some methodological caveats, however. First, underrecording errors were *not* measured. It could be argued that this minimally affects clinically "important" or primary diagnoses, since a requirement of the system is that at least one diagnosis per encounter be captured by the data collection system. Less important or secondary diagnoses, however, may well be underrepresented (eg, obesity, smoking).

This study cannot hope to control for or contrast the diagnostic differences between urban and rural practices. A much larger collaborative study is needed to examine these differences. Nevertheless, inspection of the diagnoses for individual sites showed that acute and infectious diseases are not underrepresented in the urban (sites 5 and 6) practices reported in this study. Indeed, one urban site (6) reported appendicitis among its 50 most common problems. Finally, since all practices in this study are in the Pacific Northwest or Alaska, these data do present a regional description of the content of family practice. Since it is possible that regional differences may be significant, any generalizations from these data to other sections of the country should be carried out with caution.

Although the reliability of the data with respect to overrecording is very high, suggesting that the rate of error due to physician or transcription errors is low, only a subset (sites 1 and 2) were audited. These sites were chosen for convenience, and it is possible that other sites might have had higher error rates.

Finally, data at one site were coded using ICDA-8 as a coding system. This is also the site with the highest variability both in terms of the 50 most common codes held in common with other sites and in codes unique to it. Although an attempt was made to translate ICDA-8 codes into ICHPPC-compatible rubrics, this may have arbitrarily forced diagnoses into categories other than those intended by the providers.

The diagnostic content of family practice is the intellectual hub of the specialty. Radiating from it are curricula, agendas for political action, and directions for research. Previous reports of diagnostic content have been exceedingly helpful in leading the discipline in its early evolution, and this study contributes to a more precise definition of the clinical content of the specialty. Yet precise definition, especially if such precision is more an illusion than reality, is not without drawbacks. Diagnoses per se are biomedical constructs, justified only by their utility and ability to explain known facts. They are not the disease itself, but a tool to aid in understanding and ultimately providing better health care. For many common ambulatory medical problems, research has not yet elucidated their natural history sufficiently to allow a precise definition or classification. For instance, using strict criteria, little scientific justification exists to lump or split acute bronchitis, upper respiratory tract infections, colds, or influenza, either epidemiologically, pathologically, or by treatment and outcome. Yet in these data, they were judged clinically distinct, and all ranked in the 50 most common diagnoses. Locking family practice into a definition of content on the basis of such uncertainty is probably a mistake.

Another illusion, dispelled by these data, is the previously expressed myth[3] that the diagnostic content of family practice is universal. This is clearly not true. Four of the 10 most common

Table 4. Diagnoses Ranking in 50 Most Common Diagnoses at Only One Site

Site	Diagnoses (ICHPPC Code)	Rank
1. Anacortes	Arthralgia 7873	40
	Tobacco abuse 3049	41
	Allergic medication 997	44
	Hypothyroid 244	48
2. Whidbey	Pain in limb 787	15
	Musculoskeletal other 739	18
	Catarrh 384	23
	Intrauterine device Y42	32
	Cervical spine symptoms 720	34
	Hemorrhoids 455	36
	Dysuria 7860	38
	Impetigo 684	39
	Vertebral strain 8478	42
	Abrasion 918	45
	Insect bite 910	46
	Adverse effects, chemical 989	48
3. Kalispell	Mononucleosis 075	36
	Myalgia 717.9	38
	Gout 274	42
	Finger wound 883	43
	Back strain 8478	44
	Gastritis 535	47
4. Pocatello	Virus NEC 0799	34
	Candidiasis 1121	36
	Nonspecific urethritis 597	37
	Laryngitis 464	39
	Skin NEC 216	41
	Esophagitis 530	42

diagnoses in this study were not represented in the 10 most common diagnoses listed in the Virginia data. Eight diagnoses on the 50 most common from this study were not represented at all in the Virginia report, including rheumatoid arthritis, menopausal symptoms, and gastroenteritis. Twelve additional diagnoses were not represented because of lack of corresponding codes comparing RCGP and ICHPPC. Internal variation among the sites in these data are just as large, with just under one half of the 50 most common diagnoses at individual sites not being shared with any other site. This variability remains unexplained; it may represent physician diagnostic idiosyncracy, inattention to the coding process, or lack of a commonly accepted biomedical explanatory model. Some diagnoses that a priori should have a fairly high degree of biomedical definition (eg, diabetes and pneumonia) indeed seem to have low site-to-site variability. Others with equally plausible diagnostic rigor (eg, cystitis, boils) do not. As has been recently suggested,[9] perhaps some of this ambiguity may be explained by the concept of "diagnoses clusters"—related diagnoses that may be used interchangeably by physicians to mean the same thing depending on the stage of the patient's workup (level of diagnostic certainty) or a perceived common pathophysiology, treatment, degree of seriousness, or outcome. Thus, some diagnostic idiosyncracy and variability may be due to the clinical interchangeability of related diagnoses.

So, although the definition of the specialty of family practice is enhanced by having a "clearer" idea of the diagnostic content of the specialty, much work needs to be done before a precise description is available. For now, common diseases,

Table 4. Diagnoses Ranking in 50 Most Common Diagnoses at Only One Site (Continued)

Site	Diagnoses (ICHPPC Code)	Rank
5. Anchorage	Letters and forms 900	12
	Injuries 9960	17
	Upper respiratory tract infection NEC 465	19
	Virus 0799	21
	Gonorrhea 0988	25
	Surgical care Y15	26
	Convulsions 7802	27
	Cellulitis 6819	29
	Leukorrhea 6295	33
	Infectious disease contact Y049	37
	Urticaria 7809	38
	Burns 9420	40
	Bacteria NEC 0399	43
	Herpes 054	41
	Chicken pox 052	44
	Rheumatic heart disease 389	48
6. Spokane	Lumbar NEC 725	39
	Irritable bowel 564	35
	Abortions 640	50
	Gastroenteritis 009	30
	Perinatal 778	47
	Strains/sprains arm 840	40
	Strains/sprains wrist 842	37
	Duodenal ulcer 532	45
	Appendicitis 540	36
	Breast NEC 611	44
	Cervicitis 620	39

NEC: not elsewhere classified

or perhaps clusters of common problems, represent an appropriate starting point for those interested in the education of family physicians.

References

1. White KL, Williams TF, Greenberg BG: The ecology of medical care. N Engl J Med 265:885, 1961
2. Marsland DW, Wood M, Mayo F: A data bank for patient care, curriculum, and research in family practice: 526,196 patient problems. J Fam Pract 3:25, 1976
3. Stewart LC, Gehringer GR, Byars VG Jr: Patient problems in the office practice of six family physicians in Louisiana. J Fam Pract 5:103, 1977
4. Knopke HJ, McDonald E, Sivertson SE: A study of family practice in Wisconsin. J Fam Pract 8:151, 1979
5. Hollison RV, Vazquez AM, Warner DH: A medical information system for ambulatory care, research, and curriculum in an Army family practice residency: 51,113 patient problems. J Fam Pract 7:787, 1978
6. Haight RO, McKee CA, Barkmeier JR: Morbidity in the first year of a family practice and its comparison to the Virginia Study. J Fam Pract 9:295, 1979
7. International Classification of Health Problems in Primary Care. Report of the Classification Committee of the World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians. Chicago, American Hospital Association, 1975
8. International Classification of Diseases, rev 8, adapted for use in the United States. National Center for Health Statistics, Rockville, Md. PHS publication No. 1693. Government Printing Office, 1968
9. Schneeweiss R, Rosenblatt RA, Kirkwood CR, et al: Diagnosis clusters: A new tool for analyzing the content of ambulatory medical data. Presented at the North American Primary Care Research Group Tenth Annual Meeting, Columbus, Ohio, May 20, 1982