

## Special Article

## SEX DIFFERENCES IN THE USE OF HEALTH CARE SERVICES

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**ABSTRACT**

**Background** Sex differences in the use of health care services can be substantial at several stages of life. However, the extent to which differences in reproductive biology and mortality affect the use of health care services is unclear.

**Methods** We studied age- and sex-specific per capita use of health care resources for a one-year period during 1994 and 1995 in the Canadian province of Manitoba, where there is universal insurance for a comprehensive range of health care services. Using information obtained from administrative records of physicians' services and acute hospital care, we tabulated the use of health care resources by male and female subjects in three categories: care for conditions specific to sex, care provided to persons who died during the study year, and care provided for all other conditions.

**Results** The crude annual per capita use of health care resources (in Canadian dollars) was greater for female subjects (\$1,164) than for male subjects (\$918). Approximately 22 percent of health care expenditures for female subjects was associated with conditions specific to sex, including pregnancy and childbirth, as compared with 3 percent of expenditures for male subjects. An estimated 14 percent of health care expenditures for male subjects was consumed by persons who died during the study period, as compared with 10 percent of expenditures for female subjects. After adjustment for the use of health care associated with sex-specific conditions and differences in mortality, the female:male ratio in health care expenditures was reduced from 1.3 to 1.0.

**Conclusions** Expenditures for health care are similar for male and female subjects after differences in reproductive biology and higher age-specific mortality rates among men have been accounted for. (N Engl J Med 1998;338:1678-83.)

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**D**ESCRPTIVE studies of the use of health care services typically document higher per capita use by women during the adult reproductive period, followed by a crossover in later years, with higher per capita use among elderly men.<sup>1-5</sup> The explanations for these differences include sex differences in health status,<sup>6</sup> differences between men and women in seeking health care, and biases in the provision of care to male and fe-

male patients.<sup>7</sup> In addition, because a substantial fraction of lifetime use of health care services is consumed in the last year of life,<sup>8-13</sup> higher age-specific mortality rates among men also contribute to sex differences in the use of health care services at the end of life.

The purpose of this study was to describe the contribution of differences between the sexes in reproductive biology and mortality to male-female differences in the use of health care services. We describe the total dollar value of insured inpatient and outpatient care provided by physicians and acute care inpatient services used by male and female subjects of all ages in a population universally insured for a comprehensive range of health care services.

**METHODS****Study Design and Population**

We studied the use of physicians' services and acute care hospital services by all 1,140,200 persons registered with the single-payer insurance agency in the Canadian province of Manitoba (Manitoba Health Services Insurance Plan) from April 1, 1994, to March 31, 1995. The total health care expenditures in Manitoba during this period were estimated to be \$2.9 billion (Canadian dollars), or \$2,570 per capita.<sup>14</sup> Of this total, 74.6 percent was financed from public sources.

Under the Manitoba Health Services Insurance Plan, all Canadian residents of Manitoba are fully insured for a comprehensive range of health care services. The services include physicians' services and acute hospital care (without fees, premiums, or co-payment charges) and long-term nursing home care, supportive home care services, prescription-drug benefits, and public health services (financed in whole or part by the plan). This report is confined to a description of the use of physicians' services and acute care hospital services funded from public sources.<sup>15</sup>

**Sources of Data**

The Manitoba Health Services Insurance Plan maintains electronic records of all physicians' services rendered and all hospital admissions. These records contain unique patient identifiers that can be used to build individual histories of health care use. Previous work has estimated the reliability, concurrent validity, and predictive validity of these data,<sup>16-18</sup> which have been used in a

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range of studies investigating the process and outcome of health care.<sup>19-22</sup> Three sources of data were used for this study.

#### Registry File

The registry file contains a record for every person registered to receive insured services, including date of birth, sex, and dates of enrollment and cancellation. When cancellation is due to death, the cause of death is incorporated from computerized vital-statistics records. The registry file was the source of information for population denominators.

#### Physician-Claim File

All physicians' claims for reimbursement of medical care provided under a fee-for-service arrangement are submitted to the Manitoba Health Services Insurance Plan. All the claims are accompanied by a single diagnosis of the patient's condition most responsible for the encounter, recorded according to the system of the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM).<sup>23</sup> The fee paid to the physician is also recorded. Physicians' services enumerated in this data base include ambulatory and hospital care and diagnostic imaging and laboratory tests provided by private facilities. Use of drug benefits is not reported. As demonstrated in a number of comparative studies, the structure and organization of physicians' fee schedules in Canada are broadly similar to those in the United States.<sup>24,25</sup>

#### Hospital-Separation Abstract File

Abstracts of each hospital admission are completed after discharge. The information contained in these abstracts includes the patients' demographic characteristics, ICD-9-CM diagnostic codes, procedural codes, and admission and discharge dates.

#### Measures

##### Expenditures for Physicians' Services

The value of all physicians' services reimbursed by the Manitoba Health Services Insurance Plan was enumerated in units of reimbursed Canadian dollars for each registrant for the period from April 1, 1994, to March 31, 1995. These expenditures were then tabulated for population groups classified according to sex and in five-year age groups, and age- and sex-specific per capita expenditures were calculated. During the study period, the study subjects received approximately 13,600,000 physicians' services valued at \$271,465,000 (Table 1).<sup>15</sup>

##### Acute Care Hospital Expenditures

Hospital discharge records were tabulated by a method similar to that used for physicians' services. Because hospital care is funded from a global facility budget rather than on a per case basis,

we used a method to translate hospital discharges into estimates of resource expenditure. This method was based on an adaptation of the refined diagnosis-related-group method.<sup>26,27</sup> During the study period, there were approximately 164,000 discharges, and expenditures were \$917,373,000 (Table 1).

##### Use of Health Care for Sex-Specific Conditions

Various attempts have been made to estimate the contribution of sex-specific conditions to male-female differences in the use of health care. The more selective definitions restrict sex-specific use to the services used by women that are related to reproduction,<sup>28-30</sup> and the more comprehensive definitions include the treatment of conditions associated with sex differences in anatomy and biology throughout life, including genitourinary and breast conditions.<sup>4,31,32</sup> We used a comprehensive definition of sex-specific conditions, establishing four categories of sex-specific diagnoses on the basis of a published conceptual framework<sup>4</sup> in order to estimate expenditures according to sex: normal female reproduction, which includes normal pregnancy and childbirth as well as screening for cervical and breast cancer; abnormal reproduction, which encompasses complications of pregnancy, childbirth, and the puerperium; diseases of the genitourinary system, which include tumors, anomalies, and acute infections of the genitourinary system; and diseases of the breast, among which cancers of the breast are the main diagnoses. The first two categories are exclusive to women.

##### Mortality

Persons who died during the study period were identified from the registry file.

##### Use of Health Care in the Last Year of Life

Expenditures in the last year of life for the year April 1, 1994, to March 31, 1995, were estimated by determining resource use in the 365 days before death for all persons who died in that interval. Although this method counts expenditures in the previous year, for the purpose of this study the expenditures were assumed to have occurred during the study year. Expenditures during the last year of life and total expenditures were calculated for each sex and age group. Expenditures for persons who were alive at the end of the study year were calculated for each sex and age group after the last-year-of-life expenditures for those who died during the year were subtracted from total health care expenditures.

## RESULTS

The total expenditure for physicians' services and acute hospital care during the study period was \$1,189,000,000, of which \$673 million (57 percent)

TABLE 1. HEALTH CARE EXPENDITURES IN MANITOBA, 1994-1995.\*

POPULATION AND TYPES OF EXPENDITURE	MALE SUBJECTS	FEMALE SUBJECTS	TOTAL
Size of population — no. (%)	562,000 (49)	578,200 (51)	1,140,200
Physicians' services			
Services — no. (%)	5,352,500 (39)	8,258,100 (61)	13,610,600
Expenditures — \$ (%)	111,078,000 (41)	160,387,000 (59)	271,465,000
Acute hospital care			
Hospital discharges — no. (%)	67,300 (41)	96,500 (59)	163,800
Hospital days — no. (%)	649,500 (43)	851,200 (57)	1,500,700
Expenditures — \$ (%)	404,648,000 (44)	512,725,000 (56)	917,373,000

\*Data are from Manitoba Health.<sup>15</sup> Expenditures are shown in Canadian dollars. To convert values to U.S. dollars, multiply by 0.73.

**TABLE 2. SEX DIFFERENCES IN HEALTH CARE EXPENDITURES IN MANITOBA, 1994–1995.\***

VARIABLE	PHYSICIANS' SERVICES			ACUTE HOSPITAL CARE			TOTAL		
	MALE	FEMALE	FEMALE:	MALE	FEMALE	FEMALE:	MALE	FEMALE	FEMALE:
	SUBJECTS	SUBJECTS	MALE	SUBJECTS	SUBJECTS	MALE	SUBJECTS	SUBJECTS	MALE
	dollars			dollars			dollars		
			RATIO			RATIO			RATIO
All conditions	198	277	1.4	720	887	1.2	918	1,164	1.3
Sex-specific conditions	6	44	7.3	22	212	9.6	28	256	9.1
All other conditions	192	231	1.2	698	675	1.0	890	906	1.0
Mortality status									
Subjects dying during year	11	10	0.9	120	104	0.9	131	114	0.9
Subjects alive at year end	186	268	1.4	600	783	1.3	786	1,051	1.3
Sex-specific conditions and mortality status									
Treatment for sex-specific conditions or in the last year of life	17	56	3.3	139	313	2.2	156	369	2.4
Treatment for all other conditions	181	222	1.2	581	574	1.0	762	796	1.0

\*Mean per capita expenditures are shown in Canadian dollars. To convert values to U.S. dollars, multiply by 0.73. Because of rounding, columns may not add up to the totals.

was used by female subjects (51 percent of the study population) (Table 1). The per capita expenditure for physicians' services for female subjects was \$277, as compared with \$198 for male subjects (female:male ratio, 1.4) (Table 2). The per capita expenditure for hospital services for female subjects was \$887, as compared with \$720 for male subjects (female:male ratio, 1.2). Despite the higher overall expenditure for female subjects, the per capita expenditure for physicians' services and hospital care for male subjects exceeded that for female subjects for persons under 10 or over 59 years of age (Fig. 1).

Approximately 22 percent of the total dollar value of physicians' services and hospital care used by female subjects of all ages was provided for care associated with conditions specific to women (Table 2). In contrast, only 3 percent of the total value of physicians' services and hospital care provided to male subjects was associated with conditions specific to men.

For male subjects, 6 percent of the expenditure for physicians' services and 17 percent of that for hospital care were used by persons who died during the study year (Table 2). For female subjects, the respective proportions were 4 percent and 12 percent. Of total health care expenditures, 14 percent and 10 percent, respectively, were spent on male and female subjects who died during the study year.

Thirty-two percent of the expenditure for female subjects and 17 percent of the expenditure for male subjects were attributed to care associated with sex-specific conditions and care provided in the last year of life (Table 2). When these two components were excluded, the per capita expenditure for health care for all other conditions differed only marginally between female and male subjects: \$796 and \$762, respectively (female:male ratio, 1.0). The effect of these exclusions was to reduce the female:male ratios

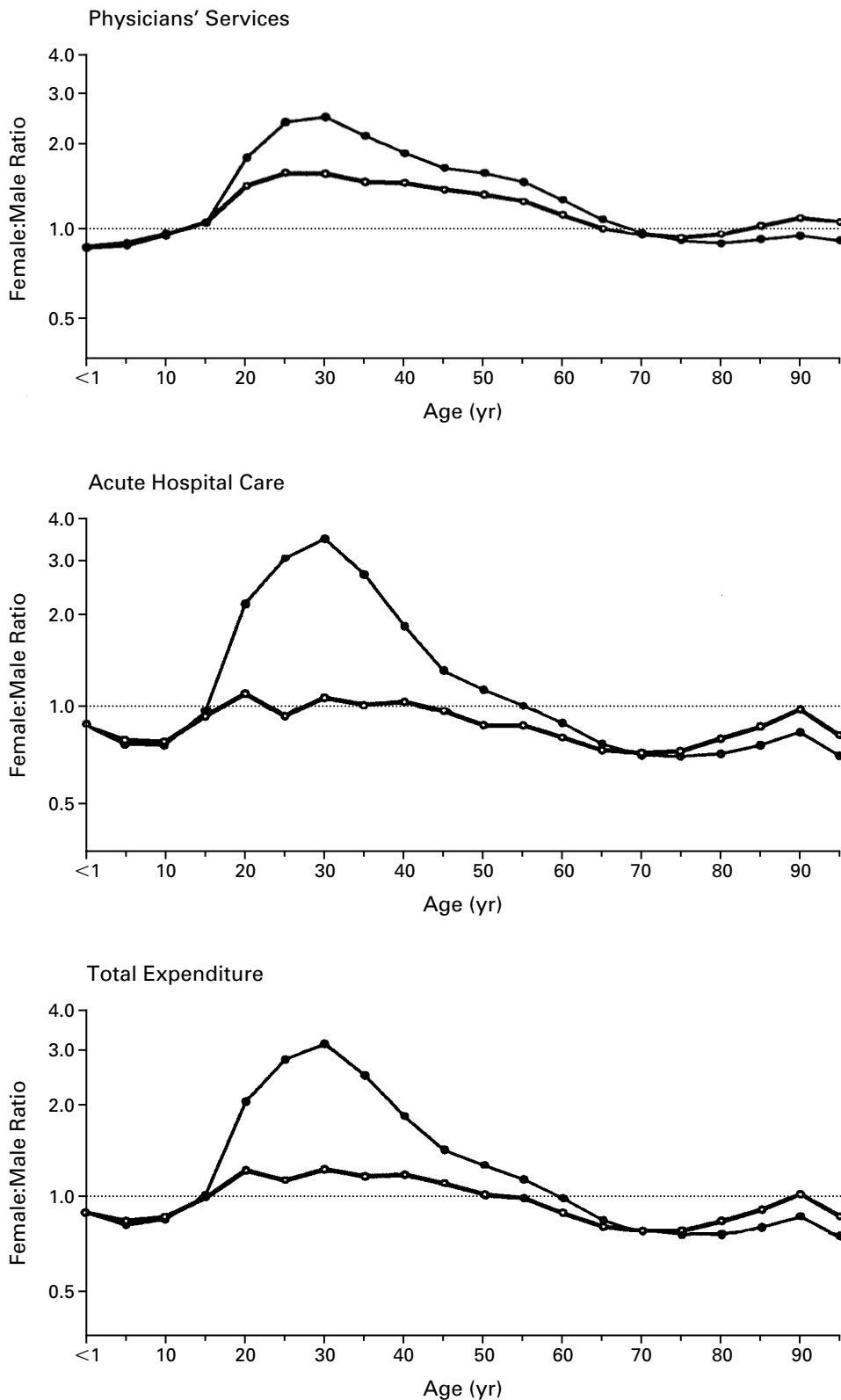
of expenditures from 1.4 to 1.2 for physicians' services and from 1.2 to 1.0 for acute hospital care.

The age-specific effects of the exclusion of care associated with sex-specific conditions and mortality are shown in Figure 1. The exclusion of these components reduced, but did not eliminate, the relatively higher expenditures for physicians' services for women during their childbearing years. Although male-female differences in per capita expenditures for hospital services during the childbearing period were largely eliminated by these exclusions, the higher per capita expenditures for elderly men persisted. These patterns were similar when expenditures for physicians' services and hospital care were combined.

The mean dollar values of the expenditures during the last year of life for male and female subjects are shown in Table 3 according to cause of death. The expenditure for the 4796 male subjects who died in the observation period was \$73.8 million during the 365 days before death, with a mean expenditure of \$15,388 per subject. The expenditure for the 4413 female subjects who died was \$65.6 million, representing a mean expenditure of \$14,873 per subject. Although the expenditures for persons during the last year of life varied substantially with the cause of death (as classified according to ICD-9-CM major categories), there was no strong evidence of sex differences within groups of subjects with specific causes of death.

## DISCUSSION

The results of this study are consistent with findings from a range of health care systems describing higher expenditures for physicians' services and hospital care for women than for men.<sup>33-35</sup> This study has extended these observations by reporting rela-



**Figure 1.** Sex Ratios for Per Capita Health Care Expenditures in Manitoba, 1994–1995. Solid circles represent per capita use for all conditions, and open circles represent per capita use for all conditions except sex-specific conditions and treatment in the last year of life. A value of 1.0 represents equivalence between the sexes.

**TABLE 3.** HEALTH CARE EXPENDITURES IN THE LAST YEAR OF LIFE, ACCORDING TO SEX AND CAUSE OF DEATH, IN MANITOBA, 1994–1995.\*

CAUSE OF DEATH	MALE SUBJECTS		FEMALE SUBJECTS	
	NO. OF DEATHS	EXPENDITURE	NO. OF DEATHS	EXPENDITURE
		dollars		dollars
Circulatory disorders	1855	12,917	1864	12,610
Tumors	1304	20,993	1121	19,757
Respiratory disorders	450	13,602	400	12,049
Injury or poison	391	5,378	156	10,106
Digestive disorders	160	16,883	184	16,064
Endocrine disorders	141	19,762	146	18,883
Nervous disorders	97	11,163	110	10,254
Mental disorders	87	5,694	117	6,497
Genitourinary disorders	97	22,156	106	17,967
Ill-defined disorders	74	7,870	75	5,404
Other†	56	28,147	68	15,530
Infectious disorders	50	19,928	29	20,917
Perinatal disorders	23	80,653	22	88,397
No information	11	1,756	15	4,601
Total	4796	15,388	4413	14,873

\*Causes of death are classified according to the *International Classification of Diseases, 9th Revision, Clinical Modification*.<sup>23</sup> Mean expenditures are shown in Canadian dollars. To convert values to U.S. dollars, multiply by 0.73.

†This category includes deaths attributed to disorders of the blood, skin, and musculoskeletal system and to congenital anomalies.

tively little difference between male and female subjects in a population with universal health insurance in the use of health care resources, after differences in reproductive biology and higher age-specific mortality rates among men have been accounted for. The male–female differences in expenditure were largely accounted for by greater expenditure for women than for men during the childbearing years and, to a lesser extent, by greater expenditure for older men than for older women because of the higher age-specific mortality of older men.

A considerable body of research on sex differences in the use of health care services has focused on differences in the way men and women seek care and, to a lesser extent, on the degree to which the diagnostic and therapeutic steps taken by physicians may vary according to the sex of the patient.<sup>36–39</sup> Although we did not directly measure the behavior of patients in seeking care or the sex-specific aspects of physicians' approaches to treatment, the information reported in Table 3 does not support the hypothesis that there are strong differences in physicians' services and hospital care provided to female and male patients in the last year of life.

At the same time, important age-specific sex differences in the use of, and expenditure for, health services remain after adjustment for the provision of

care associated with sex-specific conditions and care in the last year of life. The higher residual use and expenditure for women during their childbearing years and the higher residual use and expenditure for elderly men may be artifacts of measurement. For example, in the elderly age group, the use of an arbitrary period of 365 days to determine health care use and expenditure in the treatment of terminal illness may lead to underestimation.<sup>12</sup>

Alternatively, the observed residual differences may in part be related to sex differences in the prevalence of illness, in care-seeking behavior, or in social roles. For example, because women continue to have a dominant role in caring for children, arranging for the health care needs of children may bring women into contact with physicians more often than men, leading to increased opportunities for the use of health care services.

These data provide insight into the proportion of health care services consumed in the final year of life.<sup>8–13</sup> The health care expenditures for male and female subjects who survived the study year averaged \$786 and \$1,051, respectively. On the basis of average life expectancies of 75 and 81 years, respectively, this represents a lifetime expenditure of \$58,950 for men and \$85,131 for women up to one year before the day of death. We estimated the expenditures in the last year of life to be \$15,400, or 21 percent of total lifetime expenditures, for male subjects, and \$14,900, or 15 percent of total lifetime expenditures, for female subjects. Adding components of both public and private health care expenditures that have not been included in this study would increase these estimates and might modify our principal finding of equivalence in the use of health care resources by male and female subjects after adjustment for sex differences in mortality and the treatment of sex-specific conditions.

We did not directly measure sex differences in the prevalence of conditions for which medical care is indicated.<sup>2,30,32</sup> Accordingly, the observed relative equality between male and female subjects in health care use and expenditures cannot be assumed to indicate that health care resources are appropriately distributed between men and women, or that the proportion of unmet needs is equivalent.<sup>37,38,40</sup> Our results provide an empirical context for the ongoing investigation of equity in the distribution of health care resources between men and women.

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