

Seven chronic conditions: Their impact on US adults' activity levels and use of medical services

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Abstract

This paper analyzes the impact of seven chronic conditions (three nonfatal: arthritis, visual impairment, hearing impairment; four fatal: ischemic heart disease, chronic obstructive pulmonary disease, diabetes mellitus, malignant neoplasms) on US adults aged 18 and older. Impact refers to how readily a condition prompts activity limitations, physician visits, and hospital stays.

Data come from three national health surveys and vital statistics. For comparability, a single disease classification scheme was applied, and new rates were estimated. Frequency, impact, and prominence of the target conditions are studied via rates, ratios of rates, and ranks, respectively.

In young adulthood, the nonfatal conditions prompt limitations less readily than do the fatal ones, but by older ages, arthritis and visual impairment have a limiting impact equivalent to that of fatal conditions. Despite high prevalence and limitations, nonfatal conditions stand well below fatal conditions for health services use.

Although statistics on frequency, impact, and prominence all indicate conditions "importance," they give only weak clues about specific service needs of affected persons. The persistent finding that nonfatal conditions do not receive health services care commensurate with their prevalence and impact reflects long-standing imbalanced attention on fatal conditions in research and medical care.

Full Text

Introduction

Chronic conditions are long-term diseases, injuries with long sequelae, and enduring structural, sensory, and communication abnormalities. They are physical or mental (cognitive and emotional) in nature, and their onset time ranges from before birth to late in life. Their defining aspect is duration. Once they are past certain symptomatic or diagnostic thresholds, chronic conditions are essentially permanent features for the rest of life. Medical and personal regimens can sometimes control but can rarely cure them.

Chronic conditions have many possible outcomes: symptoms and botheration, physical and mental dysfunction, limitations in role performance (disability), visits to physicians and other health practitioners, therapeutic regimens and surgical procedures, dependency on equipment or other people, activity accommodations, sadness and fear, hospital stays, nursing home residence, and death.

Arthritis, visual impairment, hearing impairment, ischemic heart disease, chronic obstructive pulmonary disease, diabetes mellitus, and malignant neoplasms are seven chronic conditions that occur in mid-and late life. The first three are nonfatal and the other four are fatal. All seven can cause difficulty in performing roles and other valued activities, can motivate outpatient medical care, and can lead to hospitalization because of acute flare-up or need for surgery. How likely these outcomes are for persons with these conditions is our focus here.

This article analyzes the impact of these seven chronic conditions on adults aged 18 and over. Impact is the likelihood that people with a condition will face activity limitations, visits to physicians, and hospital services. We present other statistics about the frequency and prominence of these conditions to compare with impact, and we discuss how well the statistics presented indicate the importance of these conditions and affected persons' service needs.

The specific diseases included in the seven titles are as follows: Arthritis includes osteo, rheumatoid, and other rare forms; the great majority of cases in the population are osteoarthritis. Visual impairment is problems seeing (includes blindness in one or both eyes). Hearing impairment is problems hearing (includes deafness in one or both ears). Ischemic heart disease is the principal form of heart disease. Chronic obstructive pulmonary disease includes chronic bronchitis, asthma, and emphysema. Diabetes mellitus includes types I and II. For malignant neoplasms (cancer), most data sets are comprehensive and include all types and sites of cancer; the National Health Interview Survey, however, covers only selected types (gastrointestinal, lung and other respiratory, skin, female breast and genital, and prostate cancer).

Methods

The goal was to compare the impact, frequency, and prominence of the seven target conditions on various health measures: prevalence, activity limitations, visits to physicians, hospital stays, and death. Because the data come from diverse sources, ample effort was made to ensure that numerator events, population coverage, and time periods are as comparable as possible across all sources.

Data Series

Data are from the 1983-1985 National Health Interview Surveys (prevalence and activity limitation data for pooled years), the 1985 National Ambulatory Medical Care Survey

(physician diagnoses and patient complaints for ambulatory care visits), 1984 National Hospital Discharge Survey (discharge diagnoses from short-stay hospitals), and 1985 vital statistics. This is the most recent time period for which data are assembled in sufficient detail to permit the analyses herein. (An analysis of such series for 1978 to 1980 is in Verbrugge.(1)) Further descriptions of the surveys are in table footnotes.

Comparability was achieved as follows. First, detailed tabulations with national estimates were obtained for all conditions by age-gender groups for each data series. A crucial decision was which condition classification scheme to apply across all data series; the scheme used to generate prevalence rates from the National Health Interview Survey was chosen. Called Recode C,(A) it has 95 titles that encompass all chronic conditions in the International Classification of Diseases, 9th edition (ICD-9). (Mental conditions other than mental retardation were not queried in the National Health Interview Survey, so Recode C does not include ICD codes for them.) The detailed tabulations of prevalence, limitations, ambulatory care visits, and hospital discharges were aggregated to the Recode C level. Second, in each data series, Recode C estimates for age-specific groups were pooled to match the three desired age spans (18 to 44, 45 to 64, and 65 and over) as closely as possible. Finally, with the new sets of numerators in age-gender groups, rates were calculated using population denominators supplied with each series. Because rates were computed for all titles rather than for just the seven target conditions, it was possible to rank conditions within each series to indicate their prominence relative to all other conditions. The new rates for each data series were ranked to rank 15 or 20 in each age-gender group.(B)

The ICD-9 codes for the target conditions are as follows: arthritis 711.0,9, 712.8 and 712.9, 714 to 716, 720.0, 721; visual impairment X00 to X03; hearing impairment X05 to X09; ischemic heart disease 413, 414; chronic obstructive pulmonary disease 490 to 493; diabetes 250; cancer 140 to 208.(C) When feasible in a data set, visual and hearing impairments were coded as sensory impairments; when not feasible, selected chronic eye and ear diseases were used. How the titles and code spans were applied to each data series is described in table footnotes.

Statistics

The analyses use three statistics to indicate frequency, impact, and prominence of the target conditions. (1) Frequency is measured by overall rates of prevalence, limitation, physician visits, and hospital stays for the seven target conditions. Specifically, the rates are numbers of persons (or of limiting conditions, visits, or stays) for a condition per 1000 (or 10 000) population.(D) Note that frequency is expressed by rates rather than by population totals in this analysis. (2) Impact is measured by probabilities of limitation, physician visits, and hospital stays for the target conditions, or $P\{\text{Outcome:Condition}\}$. Such probabilities are estimated from epidemiological data by ratios of rates or by multivariate model effects (odds ratios, regression coefficients).(2-8) They are computed here by ratios of limitation (visits, stays) rates to prevalence rates. Multiplied by 100, the ratios are read as percentages of conditions that cause limitation, numbers of ambulatory care visits per 100 conditions, and numbers of hospital discharges per 100 conditions. (3) Prominence is measured by ranks of overall rates (prevalence, limitation, visits, stays) using all chronic condition titles.

Results

Frequency and Prominence of the Target Conditions

Tables 1 to 5 show overall rates for prevalence of chronic conditions, activity limitations owing to chronic conditions, ambulatory care visit diagnoses, ambulatory care visit complaints, and hospital discharge diagnoses. (Tables 1-5 omitted) The rates are organized in leading causes format within each age-gender group. The seven target conditions are indicated by an asterisk.

Rates of the target conditions and of associated limitations and health services use rise uniformly with age for the seven conditions. Ranks make unusual and interesting changes with age, so our discussion of Tables 1 through 5 will emphasize ranks.

Prevalence. Nonfatal conditions are more common than fatal ones at all ages (Table 1). As age increases, fatal conditions ascend in rank so they become more similar in prevalence to nonfatal conditions. Specific nonfatal titles shift a great deal across ages; sensory impairments and diseases become more prominent with age, while musculoskeletal impairments become less so. Most striking, arthritis rises to the top of the list; it is the preeminent chronic condition among older women.

The seven target conditions are seldom in the top 10 titles for young adults, but most of these conditions have reached these ranks by older ages. The exception is cancer; its low rank at all ages is probably due to the high and rapid case fatality of some forms, reducing prevalence rates at any given time compared with more enduring conditions.

Activity limitations. For young adults, musculoskeletal impairments are the most often cited causes of activity limitation (Table 2). Their importance falls sharply in middle and older ages when arthritis and fatal diseases, including ischemic heart disease, ascend to take the top ranks for limitation. By middle and late life, arthritis ranks first for limitations among both women and men.

Hearing and vision impairments rank higher for limitations at young and older ages than at middle ones. This occurs because chronic diseases ascend so swiftly in midlife that they temporarily displace sensory impairments for ranks. Cancer is not often cited as a cause of limitations at any age; as noted above, this may be because of cancer's high and often rapid case fatality. Chronic obstructive pulmonary disease and diabetes have no pattern of ranks by age.

Ambulatory care visit diagnoses. For young adults, the principal diagnoses are upper respiratory infections, mental health problems, injuries (especially among men), and reproductive system disorders (especially among women) (Table 3). This situation changes markedly in middle ages, when fatal diseases and hypertension take the lead. At older ages, these still hold sway but the roster of leading problems seen by physicians diversifies, with eye conditions (among both sexes) and arthritis (among women) taking more prominence.

Six of the target conditions enter the top 10 titles for office visits in middle ages and remain there at older ages. The exception is chronic ear conditions, represented by tinnitus, which receive little medical care at all ages.

Ambulatory care visit complaints. For young adults, the principal presenting complaints are throat, back and/or knee, and skin symptoms (Table 4). The situation changes sharply for middle-aged and older adults when various types of exams rise to become the leading reasons for visits to office-based physicians and specific symptoms fall in rank.

The coding scheme for complaints is ill suited to showing specific diseases. (A disease name is coded only if the patient states it directly; otherwise, symptoms are coded.) Therefore, fatal diseases and even arthritis rank low. But the scheme is well suited to visual and hearing problems (coded as symptoms): vision dysfunctions rise as prominent reasons for physician visits with age, whereas hearing dysfunctions do not prompt frequent care despite high prevalence.

Hospital stays. For young adults, hospitalization is infrequent; the most common discharge diagnoses are musculoskeletal conditions for men and reproductive disorders for women (Table 5). For middle-aged and older persons, the principal reason for hospitalization is cancer. Leading titles for middle-aged people are a mix of chronic and acute problems, but for older people chronic conditions are paramount. The hospital data show some leading titles not present in prior series (cerebrovascular disease, congestive heart failure, cardiac dysrhythmias); this reflects an emphasis on cardiovascular conditions in contemporary hospital care.

Ischemic heart disease is not as prominent in hospital stays as one might presume based on prevalence. Its highest rank occurs for middle-aged men, and then it drops sharply at older ages. Cataracts are a very common reason for hospitalization of older women, but not nearly so for older men. (Since the mid-1980s, cataract surgery has largely moved to outpatient settings.) Diabetes and chronic obstructive pulmonary disease are more common reasons for hospitalization at middle ages than at older ages (with respect to ranks). Arthritis and ear disorders prompt little hospitalization despite high prevalence.

Summary. The nonfatal and fatal conditions show strikingly different patterns. The former have a pattern of high prevalence and limitation but low health services attention. Arthritis is the most common chronic condition in middle and late life and is the most frequently cited cause of limitations, but it does not appear prominently in ambulatory and hospital care. Hearing impairment is also very common, but it causes little limitation and few health services.

This pattern reverses for the three fatal conditions. Despite low prevalence, cancer steadily ascends in prominence across limitation, visits, and hospital rates. It is the foremost cause of hospital stays in middle and late life, and it is the first-or second-rank cause of death at those ages.⁽⁹⁾ (A table with 1985 mortality rates and ranks for cancer, ischemic heart disease, diabetes, and chronic obstructive pulmonary disease is available from Dr Verbrugge.) Ischemic heart disease has high visibility in midlife disability and health services. For middle-aged men and women, its ranks for limitations, ambulatory care, and hospital stays exceed the prevalence rank. This is apparently the period of life when medicine makes its greatest effort to modify the disease process; ischemic heart disease is the leading cause of death for middle-aged men and the second-rank cause for women.⁽⁹⁾ For older men and women, it is a more typical chronic problem (its prevalence rank rises) and it is the first-rank cause of death, but it takes less prominence in disability and health care for older people than it does for those in midlife. Diabetes mellitus produces a similar picture of vigorous office-based treatment in middle and late life, contrasted with lower ranks for prevalence, limitation, and death.

The other two conditions have the opposite pattern than usual for nonfatal and fatal conditions. Visual impairment has moderate prevalence but generates substantial limitations and ambulatory care, and it is a high ranking cause of hospital stays for older women. Chronic obstructive pulmonary disease never attains the position in medical care that it has in daily life and even death; ranks for prevalence, limitation, and mortality are always higher than for ambulatory and hospital care.

Impact of the Target Conditions

To determine how readily these seven target conditions limit activity and prompt health services among affected persons, we measured impact by calculating ratios of limitation, physician visits, and hospital use to prevalence (Table 6).

Limitation impact. The likelihood of limitation from the seven conditions rises from young to middle adulthood and then increases only slightly more at older ages. (The exception here is for visual impairment.) Ischemic heart disease has its largest disability impact at ages 45 to 64 for both sexes and at ages 18 to 44 for men; this could reflect the high demands of productive activities at these ages, which persons with heart diseases have trouble fulfilling.

Women and men experience similar chances of social limitation from the conditions. An exception is much higher impact of ischemic heart disease for young men than women. Also, to a smaller extent, there is a higher impact of chronic obstructive pulmonary disease for men and a higher impact of visual impairment for women.

Nonfatal conditions have far lower chances of causing limitation in young adulthood than do fatal conditions. With increasing age, impacts of arthritis and visual impairment rise while those of fatal conditions stay steady or fall. By older ages, the fatal and nonfatal (except hearing) titles have roughly equal impact. This is a telling illustration of the importance of nonkillers in late life.

Visits impact. Visits impact tends to rise with age (despite some uneven patterns); thus, people with the seven conditions obtain more medical help as they age. A distinct exception is seen with ischemic heart disease for men, which has its largest visits impact at young ages, indicating therapeutic intensity for cases in early adulthood.

Medical contacts are generally similar for men and women with the same condition. Exceptions are more visits among young men with ischemic heart disease, and more medical care among women with vision problems at all ages. (Cancer also prompts visits more readily among young men, but this switches to women at middle ages. And middle-aged women seek more medical care for diabetes.)

Visits impact can be easily ranked across conditions. Hearing problems prompt least ambulatory care; next is arthritis and then chronic obstructive pulmonary disease. More vigorous medical attention is received for ischemic heart disease, visual problems (especially among women), diabetes, and cancer. These results appear consistently in all age-gender groups.

Hospital impact. For most conditions, hospital impact rises steadily with age. The sharpest rise occurs for visual impairment, reflecting rising cataract rates and efficacious surgical intervention. Ischemic heart disease is an exception, with highest hospital impact for young adults; therapeutic efforts are aimed strongly at young-adulthood cases. Diabetes also shows its highest hospital impact at ages 18 to 44 for both sexes.

Hospital impacts are similar for men and women for all conditions except ischemic heart disease, which shows greater hospitalization for young men than for young women. Are men's conditions at that age more severe than women's, or are men more likely to have aggressive treatment?⁽¹⁰⁻¹⁴⁾ At middle and older ages, hospital impact for ischemic heart disease shows no differences by gender.

Comparing conditions, results are similar to those noted for visits: hearing impairment is least likely to prompt hospital care, followed by arthritis (among young adults, it has lowest hospital impact) and then by chronic obstructive pulmonary disease. Ischemic heart disease and diabetes are far more likely to require hospital care, and cancer is most likely of all. Cancer's high impact reflects contemporary medicine's vigorous approach to the disease. (Visual impairment's position changes with age, with hospital impact low in young adulthood and very high at older ages.)

Summary. The likelihood that a condition prompts activity limitation and greater use of health services rises with age. The most distinctive exception is ischemic heart disease among young men, who incur notably more limitation, ambulatory care, and hospital services than older men with this condition. There are few differences in impact by gender; levels of disability and health services relative to prevalence are about the same for women and men. The exception again is ischemic heart disease, which prompts more limitation and health services use for young men than for young women. Three fatal conditions (ischemic heart disease, diabetes, cancer) are more limiting than the nonfatal ones for young and middle-aged adults, but their impacts become more equal for older adults. The fatal conditions also usually have more health services impact than the nonfatal ones; an exception is high hospital attention for visual impairment at older ages.

Discussion

What do the statistics indicate about the importance of these seven conditions and the health service needs of affected persons?

Importance

The three statistics (rates, ratios, ranks) measure a condition's importance in different ways: its population frequency (expressed by a rate), its individual-level impact, and its prominence compared with other conditions. Each target condition has a diverse rather than uniform picture of importance across the statistics. For example, arthritis is the foremost health problem for middle-aged and older women and its potential to cause disability rises with age, but it has low prominence in health services. Ischemic heart disease is likely to generate disability and vigorous medical care for young men, but this energy recedes at middle and older ages even though heart disease is the leading cause of death for men aged 45 and over.

This situation of a condition having high importance in some respects but low importance in others helps explain why so many diseases have strong advocacy in political and public health settings. Numerous conditions can claim high importance depending on the statistics used. Advocates cite whichever statistics point to the largest consequences.

Despite the plethora of statistics now available on prevalence, disability, and health services use for specific chronic conditions, mortality rates are still the most compelling statistics in policy discussions. Research funds have long been, and continue to be, amplest for fatal conditions, especially leading ones such as malignant neoplasms and cardiovascular diseases. Common nonfatal conditions such as arthritis, visual and hearing impairments, incontinence, bunions, and migraine headaches are less likely to secure research and program funds, a situation scarcely commensurate with their frequency and impact in daily life.

Service Needs

Need has various aspects⁽¹⁵⁾: felt needs (perceived desires for services by people with chronic conditions or disabilities), expressed needs (actual requests for services by people with

chronic conditions), met needs (provision of and use of services), unmet needs (needs not satisfied by current service provision, as stated by ill or disabled persons), normative needs (needs defined by professionals when assessing patients), and comparative needs (ill or disabled people who receive services compared with those who do not).

The statistics in our analysis speak to service needs as follows: Prevalence and limitation rates suggest felt needs although they do so in the most general manner (conveying no specific information about who to help or how). Ambulatory care visit and hospital stay rates indicate expressed needs. Yet actual use proves only a weak guide for policy decisions about altering research and health service concentrations.⁽¹⁶⁾ Impact ratios, also indicators of felt and expressed needs, are potentially stronger guides. They show how readily conditions prompt disability and medical care, thus giving a picture of individual-level consequences and pressures on services. Impact ratios have clear interpretations and foster comparisons across conditions. Ranks permit comparisons across outcomes, offering views of how commensurate health services are with prevalence and disability. Ranks provide distinctive insights into met and unmet needs, but they are not specific or strong enough on their own to guide policy decisions.^(E)

Conclusions

Statistics about frequency, impact, and prominence indicate a chronic condition's importance in direct and clear ways. The statistics provide rather weak suggestions about service needs for affected persons, suggestions that are often too indirect and insufficient on their own to guide policy and program decisions. In short, the data presented speak clearly to "what is" and less so to "what should be."

Public health and policy discussions often involve abundant statistics brought forth by advocates, but comparisons across conditions can still be difficult because the statistics are so various. Health survey analysts can make a valuable contribution to these discussions by producing a series of statistics that allow good comparisons across conditions. The effort needed to achieve comparability and comprehensiveness is always large. But it yields trim empirical results, interpretations that would not be otherwise perceived, and a more comfortable and conscious basis for decision making.

One general finding stands out in this analysis: the high prevalence of nonfatal conditions and their strong limiting impact in late life are not matched by health services use. Fatal conditions hold sway there, an enduring reflection of how a particular kind of importance (mortality) has nourished biomedical research and affected medical ethos. If research funds were shifted more in the direction of nonfatal disabling conditions, with ensuing knowledge about pathogenesis and therapy and responsive shifts in medical practice, we would gradually see a realignment of health services use toward the conditions that bother and disable many persons for many years.

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A Recode C is available from the Illness and Disability Statistics Branch, Division of Health Interview Statistics, National Center for Health Statistics, 6525 Belcrest Rd, Hyattsville, MD 20782.

B Tables 1 to 5 show ranks to rank 10. For fuller ranks to 15 or 20, contact Dr Verbrugge.

C The National Health Interview Survey Medical Coding Scheme has codes closely adapted from the ICD-9. "b" means blank. No decimal means that all codes from .1 to .9 are included. "X" is a special code section for impairments (structural, sensory, and communications abnormalities).

D Overall rates are the product of two factors: namely, a condition's prevalence in the population and its probability of impact among persons with the condition; these are $P\{\text{Condition}\}$ and $P\{\text{Outcome:Condition}\}$. There is no way to see the relative importance of the two factors in a given overall rate.

E Direct assessment of met and unmet needs depends on subjective data about emotional, social, economic, medical care, or community needs.⁽¹⁷⁾ The available literature for the target conditions is summarized here. For cancer, frequently reported unmet needs are for emotional support and assistance with household management (independent activities of daily living, such as shopping and heavy housework).⁽¹⁸⁻²¹⁾ For diabetes, help with maintaining a dietary regimen, prevention of obesity, need for foot care, and treatment for depression are commonly reported.⁽²²⁻²⁵⁾ Needs can be very condition specific, such as dental care for persons with acquired immunodeficiency syndrome⁽²⁶⁾ or sexual counseling for persons with some cancers.⁽²⁷⁾ Not surprisingly, need for financial support is nearly universal. Perception of unmet needs is higher among persons with fewer financial and social resources and whose conditions are more disabling.^(28,29) Finally, needs of persons with chronic conditions often fluctuate, requiring frequent or ongoing appraisal.⁽²⁰⁾ Unmet needs of cancer patients diminish over time except for help with managing medical bills.

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Details

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