are having to reduce their journals lists. Thus a sample of 10 libraries in the United States have cut 175 journals each a year for the past three years but calculate that they will have to cut over 500 each in 1992. Then, culturally, librarians have stopped thinking of themselves as archivists and come to see themselves as information scientists providing readers with the information they need as quickly as possible; in addition, their users—increasingly members of the "Nintendo generation"—are willing to find their information through a computer. Finally, technology has developed to make CASIAS systems easy to run. In particular, computer networks have increased rapidly (from 600 worldwide in 1988 to 3000 now) and fax and optical character readers have become cheap and widely available.

Another factor driving the rapid change—but not mentioned much at the publishers' conference—is the realisation that many journals in a library are consulted only once or twice a year.[2] When subscriptions may be $500 a year it is obviously much cheaper to get that one article faxed through at perhaps $15. These findings by librarians fit with the increasing realisation by information scientists that only a few articles in most journals are scientifically sound and of direct use to most readers.[3,4]

This development in CASIAS systems comes at a time when electronic journals are also appearing.[5,6] These journals should have various advantages over their paper counterparts: potentially faster peer review systems because of electronic transmission of manuscripts backwards and forwards; immediate release once the manuscript has been accepted; the potential to include many more data than is possible in a paper journal; the possibility of attaching structured abstracts or even the full papers of references; and the chance to make corrections on the stored article.

The appearance of these alternatives to paper journals is driving publishers and editors to think about just what value they do add to the process of disseminating science and whether they are needed. Peer review is one added ingredient, but editors need to be sure that they do it speedily and well. Technical editing is also important (as readers of unedited manuscripts will testify), but the most important added value may be to group together different sorts of material—not only original science but also comment, reviews, news, correspondence, and articles—in a way that makes a journal satisfying enough to read in bed.

The final result of these rapid changes in how science is disseminated might thus be that general journals will remain in paper form, whereas specialist journals will eventually cease and instead individual articles will be available electronically. But none of us should be complacent: the Romans assumed that their empire would last forever.

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Vertebral fractures

How large is the silent epidemic?

The ascendancy of osteoporosis to its present status as a leading health problem has led, finally, to the critical study of vertebral fractures. Although these have long been attributed to osteoporosis, only recently have epidemiological data confirmed that low bone mineral density is their most important determinant.[1,2] Large prospective studies have suggested that the risk of sustaining a new vertebral fracture more than doubles with each decrease of one standard deviation in bone mineral density of the lumbar spine.[3,4]

Falls, so prominent in the pathogenesis of fractures of the hip and distal forearm, do not play such a large part in causing vertebral fractures because the spine is subjected to substantial loads during daily activities such as bending forward, lifting objects, and climbing stairs; vertebral fractures result uniquely from such loading.[5,6] Despite the strength of the association between bone mineral density and vertebral fracture the overlap between bone density in patients with vertebral fractures and that in control subjects without fractures is sufficiently large for vertebral fracture to be diagnosed reliably only from radiographs. Densitometry is more appropriately used to assess the future risk of fracture.[7]

Assessment of the impact of vertebral fractures has been hampered by the absence of formal criteria for identifying fractures in radiographs of the thoracolumbar spine. Even in early case series three patterns were recognised: wedge, crush, and end plate (biconcave) fractures. Since then the means of defining vertebral fractures have evolved through several stages. Initial methods, relying on subjective radiological assessment,[8] gave way to morphometric measurement of vertebral height with fractures defined according to fixed cut off values.[9] As each vertebral body in the spinal column has unique dimensions[1,10] recent analyses have focused on deriving the distribution of vertebral dimensions at each spinal level and calculating cut off values from these.[11,12]

The most widely adopted thresholds for defining and grading fractures denote moderate (or grade 1) fractures as deformities that fall between three and four standard deviations from the mean values specific to each vertebra, and severe (or grade 2) fractures as those that fall four standard deviations or more from this mean.[11] When morphometric studies are done without reference to clinical presentation the abnormalities found are usually referred to as deformities rather than fractures.

The application of recently developed morphometric techniques to various population samples in the United States has permitted estimation of the incidence of new vertebral fractures in the general population. One recent estimate of the age adjusted incidence among white American women aged 50 and over was 15·1 per 1000 person years. This is more than twice the incidence of hip fracture (6·2 per 1000 person years).

It has long been clear, however, that some vertebral fractures do not reach clinical attention, although the size of this fraction was unknown.[13] Recently, the age adjusted incidence of clinically ascertained vertebral fractures was estimated at 5·3 per 1000 person years among white American women aged 50 and over, or 35% of the total figure.[14] The incidence of clinically diagnosed vertebral fractures in this

population based study was also 4·4 times greater than that derived from hospital discharge data for spine fractures.[15] The various tiers of service used can therefore be built up among postmenopausal white American women, with a third of all vertebral fractures coming to medical attention and as many as 8% necessitating admission to hospital.

Morphometric measurements taken from radiographs of women with vertebral fractures who sought medical attention showed that 80% had grade 2 deformities.[14] This observation is compatible with cross sectional data suggesting a substantially stronger association between adverse outcomes and severe, rather than moderate, vertebral deformity in postmenopausal women.[16] The most widely studied of these outcomes is back pain. The pain after acute vertebral fracture is a deep bone pain, which usually resolves after two to four weeks of bed rest.[17 18]

Few data are available on the longer term course. In the control arm of one treatment study most patients were noted to have persistent pain for six months after the fracture.[19] This chronic pain may arise from weakness of the spinal extensor muscles, as well as from altered spinal biomechanics, which result from vertebral compression.[18] Physical function, self esteem, body image, and mood also seem adversely affected in those with more severe vertebral deformities.[16 20]

Implications for Britain

What are the implications of these data for the British population? Direct extrapolation of the population based data from Rochester, Minnesota, to England and Wales leads to an annual incidence of 148 000 cases of grade 1 or 2 vertebral deformity in women aged 50 and over. Of these women, about 50 000 would come to medical attention and 12 000 would require admission to hospital. A further 17 000 cases in men would also come to medical attention if the American rates applied. Rates for fractures of the hip and other limbs in Britain,[21 22] however, are generally lower than those reported from Rochester.[23]

Preliminary results of prevalence studies of vertebral fracture also suggest lower rates in Britain.[24 25] Consequently, extrapolations of American data are likely to overestimate the impact of vertebral fractures in the United Kingdom. Even if the British rates were one third less than those of Rochester (a shortfall comparable to that observed for hip fracture), 34 000 women would present with clinically diagnosed vertebral fractures each year, 8000 of whom would attend hospitals.

Scant information on the epidemiology of vertebral fractures has, until recently, limited complete assessment of the burden on public health posed by osteoporosis. Although the social and economic consequences of the 45 000 hip fractures occurring annually in England and Wales are widely recognised,[26] those attributable to vertebral fracture remain elusive. The recent epidemiological data confirm that, whatever the size of the silent epidemic of vertebral fracture,[27] its clinically manifest burden is considerable.

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