Population based epidemiology of ankle sprains attending accident and emergency units in the West Midlands of England, and a survey of UK practice for severe ankle sprains

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Objectives: To estimate the incidence of ankle sprains and severe ankle sprains attending accident and emergency (A&E) units; to describe current practice for severe ankle sprains in A&E units in the United Kingdom.

Methods: Crude age and sex specific incidence rates were calculated for four health districts from cases ascertained from data on seven A&E clinical information systems. Case records of patients with ankle sprains at an A&E unit in another health district were audited and the proportion of severe ankle sprains calculated. UK A&E units were surveyed about their usual treatment of patients with severe ankle sprains.

Results: The estimate of the crude incidence rate of ankle sprains was a minimum of 52.7 per 10 000, rising to 60.9 (95% CI 59.4 to 62.4) when figures were adjusted for the proportion of patients without a diagnostic code (13.7%). There were important age-sex differences with unadjusted rates observed from 127.8 per 10 000 (CI 115.5 to 140.0) in girls aged 10–14 years to 8.2 (CI 4.2 to 12.3) in men aged 70–74 years. As 14% of ankle sprains attending A&E were classed as severe, this would equate to 42 000 severe ankle sprains per year in the UK. In the UK wide survey, there was a response rate of 79% (211 of 274). Among the responders, Tubigrip was used routinely in 55%, below knee casts in 3%, and braces in 2%. Boots were not used routinely in any unit.

Conclusion: While there is considerable variation in severe ankle sprain management in UK A&E units, most are treated with the minimal mechanical support of Tubigrip.

Severe ankle sprains are associated with both short and long term disability.¹ Their management is controversial.² Acute surgical repair of damaged ligaments has been advocated, but overall there is little good evidence that it is cost effective.³ Casts can be useful to enable patients to return to activities more quickly, but may have the disadvantages of muscle atrophy and joint stiffness. There is some evidence that casts may be less effective than functional treatments, but the trials are generally small and of limited quality.⁴ Protected immobilisation with a brace or boot may offer the best of both worlds.⁵ Walking boots mechanically restrict ankle and subtalar joint motion, while permitting the boot to be removed at rest for a range of motion and dynamic exercises. Braces mechanically restrict inversion and eversion movements at the subtalar joint, while permitting free plantar and dorsiflexion. It has been argued that even the minimalist NHS approach of a double layer of tubular bandage is a waste of considerable resources.⁶

To investigate existing evidence on the epidemiology of severe ankle sprains, and variations in management, we searched Medline from 1970 using the terms 1. “Sprains and Strains”; 2. Ankle injuries: 3.1 and 2; 4. (ankle$1 adj4 sprain$)tw; 5. (ankle$1 adj4 strain$)tw; 6. (ankle$1 adj4 inver$)tw; 7. (ankle adj$4 ligament$ adj$4 injur$)tw; 8. or/4–7; 9.3 or 8; 10. limit 9 to human. We also searched the Cochrane Controlled Trials Register, and the bibliographies of the articles we obtained. Studies describing incidence from particular populations, population based studies, are necessary to provide comparisons of the relative frequency of injuries between different areas. We found one population based study, from a county in Denmark with a population of 110 000.³ Holmer et al³ reported a crude incidence rate of ankle sprains attending the emergency department of 70 per 10 000 people per year. We found no studies on variations in management of severe ankle sprains.

The objectives of this study are: to estimate the incidence in four health districts of ankle sprains and severe ankle sprains attending accident and emergency (A&E) units; to estimate the number of ankle sprains and severe ankle sprains seen at A&E units in the United Kingdom (UK); and to describe current practice for severe ankle sprains in A&E units in the UK.

METHODS

Firstly, we undertook a population based study on four adjacent urban West Midlands health districts. They have a combined population of about 1.1 million people. The districts were: Dudley (305 000 people), Sandwell (290 000 people), Walsall (260 000 people), and Wolverhampton (242 000 people) (Office of National Statistics 1998 population estimates).³ This population is largely served by four A&E units located within each district. Datasets are supplied routinely from these units to the West Midlands A&E Surveillance Centre at the University of Birmingham and stored in an Access database. Cases included were defined as a first attendance at A&E between April 2000 and March 2001, and having a diagnostic code of ankle sprain. Incidence rates were calculated as the number of ankle sprains in residents of these four districts, divided by the resident population using the most recently available Office of National Statistics population estimates (1998).³ The 95% confidence intervals were also calculated.⁷ Some A&E records
Ankle sprain epidemiology

Ankle sprain epidemiology

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302 000. per 10 000 (95% confidence intervals (CI) 51.3 to 54.0).

districts from April 2000 to March 2001 was a minimum 52.7
of recorded ankle sprains in the four West Midlands health
districts. A total of 5761 (99.7%) of these were recorded

diagnosis was 88%, 100%, 89%, and 68% respectively. Of A
populations (using the 1998 UK population estimates, 6 the
60.9 (CI 59.4 to 62.4) per 10 000 persons. If the adjusted rate
without a diagnostic code, it is calculated to be 6678, a rate of

RESULTS

Population based incidence

We recorded 5776 new cases of ankle sprain in residents of
Dudley, Sandwell, Walsall, and Wolverhampton health
districts. A total of 5761 (99.7%) of these were recorded
from one of the four local hospitals. The crude incidence rate of
recorded ankle sprains in the four West Midlands health
districts from April 2000 to March 2001 was a minimum 52.7
per 10 000 (95% confidence intervals (CI) 51.3 to 54.0).

At the four hospitals above, the data completeness for
diagnosis was 88%, 100%, 89%, and 68% respectively. Of A&E records at these hospitals 86.3% (241 644 of 280 107) had a
diagnostic code, and 13.7% (38 452 of 280 107) did not.

When the number is adjusted for records at these hospitals
without a diagnostic code, it is calculated to be 6678, a rate of
60.9 (CI 59.4 to 62.4) per 10 000 persons. If the adjusted rate of
60.9 per 10 000 is applied to the England and Wales
populations (using the 1998 UK population estimates,6 the
most recently available) the estimated number of sprains is
302 000.

There were marked age-sex differences. Observed unad-
justed rates varied from 127.8 per 10 000 (CI 115.5 to 140.0)
in girls 10–14 years to 8.2 per 10 000 (CI 4.2 to 12.3) in men
aged 70–74 years (fig 1, table 1).

Audit at North Staffordshire Hospital

Ankle sprains were the diagnosis recorded in 2.77% (1115 of
40 308) of new attenders at North Staffordshire Hospital
NHS Trust A&E department. Of these, 14% were classed as
current UK practice for severe ankle
sprains in patients without a
diagnostic code is the same as that in those with one.

DISCUSSION

This study is the first we are aware of in the United Kingdom
the true incidence rate in the general population,
because a proportion of patients with ankle sprains may not
seek health advice or will have been seen in an alternative
care setting, such as primary care. It would be
expected, however, that the vast majority of patients with
severe ankle sprains will be seen in an A&E unit. An
unknown, but probably very small proportion of cases, will
not have been ascertained because they were seen either at
units outside the West Midlands, or in West Midlands units
from where we do not have data.

One of the limitations of using routinely collected A&E
data is that there are currently no standard data quality
checks in place. Those performed are hospital specific, and
are primarily designed to check that codes are valid rather

Figure 1 Age-sex specific rates of ankle sprain attendance at A&E units in residents for four West Midlands health districts (1 April 2000 to 31 March 2001).

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than correct. The only way of investigating the accuracy of the codes would be to manually check against the paper records, and this is outside the scope of this study. The authors are unaware of any published studies that have investigated the quality of A&E data. In the field of A&E, there is relatively little information available. The standard dataset of A&E information supplied to the West Midlands A&E Surveillance Centre is a readily available data source, containing the basic information needed for analysis. Although we are making an assumption that the data are correct, we believe that this is justified through the validation checks performed by the hospitals and a lack of any other routinely collected information.

Our incidence rates for ankle sprain cases attending A&E of 60.9 per 10,000 were slightly lower than those in the only other population-based study we are aware of, the 70 (95% CI 65 to 75) per 10,000 reported by Holmer et al., in Denmark.

While Tubigrip is the predominant support given in the UK, there was considerable variation in practice. Devices such as boots or braces may become more popular in the UK. The unit costs of devices and the labour to fit them is estimated to be, per each patient, £60 for boots (Bledsoe), £30 for braces (Aircast), £12 for below-knee plaster casts, and £2 for Tubigrip (from retailers list prices, estimates of nurse time to fit devices in a pilot study, and standard NHS nursing costs at North Staffordshire Hospital NHS Trust A&E unit). These are approximate estimates, and wide variations in price may exist between countries both in device and labour charges. Also, there is a large number of different devices available. If all severe ankle sprains in the UK were treated by one method only, this would equate to £3 million for boots, £1.5 million for braces, £0.6 million for below-knee plaster cast, and £0.1 million for Tubigrip per year. This is a hypothetical illustration of costs, but illustrates the possible financial implications of practice change on the UK National Health Service.

There is some evidence that interventions that immobilise the ankle, such as below-knee plaster cast, are less effective than those which permit early movement. Given the absence of commercial necessity to undertake trials of devices for the management of ankle sprains, the paucity of high-quality trials in this field, and the wide range of costs of different treatments, evidence is needed to identify the most cost-effective strategy of managing such a common problem.

ACKNOWLEDGEMENTS

Ms Rachel Raybould, clinical auditor, assisted with the conduct and analysis of the ankle sprain audit at North Staffordshire Hospital. Dr Richard Wilson advised on the West Midlands ankle sprain epidemiology analysis.

A copy of the questionnaire used in the study is available on the journal web site (http://www.emjonline.com-supplemental).

Table 1 Numbers and rates of ankle sprain attenders in residents of four West Midlands health districts, April 2000 to March 2001, by age (years) and sex

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