

## SCIENTIFIC LETTER

## The health care burden of acute chest pain

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Each year, over 15 million people attend an emergency department in England and Wales.<sup>1</sup> It has been estimated that 2.4% of attendances are because of chest pain,<sup>2</sup> representing 360 000 emergency department attendances. Despite this, surprisingly little data have been published describing this problem. Studies typically report selected groups of patients, or retrospective audits of routinely collected data. Both approaches may lead to biased results. Accurate estimates of the size and nature of the problem are required to allow rational planning of services and to put the findings of research into context.

The ESCAPE (effectiveness and safety of chest pain assessment to prevent emergency admissions) randomised controlled trial of chest pain observation unit versus routine care<sup>3</sup> required prospective identification of all patients attending with acute chest pain; it thus provided an ideal opportunity for a descriptive study of the health care burden created by this problem. We aimed to describe the clinical epidemiology of acute chest pain, the incidence of emergency department presentation and hospital admission, the proportion with ECG evidence of acute coronary syndrome (ACS), clinically diagnosed ACS, non-ACS, or undifferentiated chest pain, and variations in these parameters by hour of day and day of week.

## METHODS

The Northern General Hospital emergency department is the only adult department for the 530 000 population of Sheffield and receives approximately 90 000 new attendances per year. For 442 days, between 5 February 2001 and 5 May 2002, a randomised controlled trial compared chest pain observation unit to routine care.<sup>3</sup> All patients attending with the following complaints: chest pain, chest tightness, chest ache, chest soreness, chest heaviness, cardiac, heart attack, heart pain, angina, and unstable angina were recorded on computer by reception staff and were screened for trial eligibility by specialist chest pain nurses.

The chest pain nurses categorised each patient to: (1) ECG evidence of ACS (interpreted by the chest pain nurse): > 1 mm ST elevation or depression, or > 3 mm T wave inversion, in two or more consecutive leads; left bundle branch block; tachyarrhythmia (> 120 beats per minute); second or third degree heart block; (2) clinical diagnosis of probable ACS: prolonged (over one hour) or recurrent episodes of angular type pain in a patient with known coronary heart disease (CHD) or a patient unable to undergo treadmill testing to rule out CHD; (3) suspected or proven non-ACS, life threatening pathology, such as pulmonary embolus, aortic dissection or pneumonia; (4) negligible risk of ACS or other life threatening pathology, such as pain only on chest wall movement, or age under 25 years; (5) undifferentiated chest pain: any patient not falling within the above categories

The categories were applied sequentially, so patients were categorised according to the first definition that applied to them. Only those with undifferentiated chest pain were considered for inclusion in the randomised trial. The

computer records of all patients were subsequently reviewed and their disposal from the emergency department recorded. The North Sheffield Research Ethics provided ethical approval for both the ESCAPE trial and this descriptive study.

## RESULTS

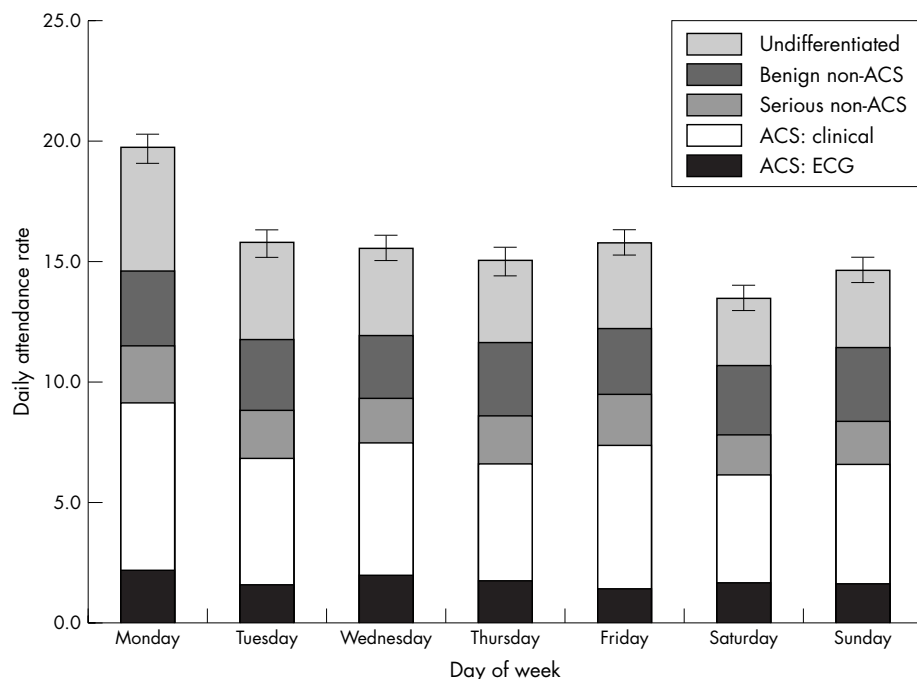
Chest pain or a related complaint accounted for 6957 of the 115 620 emergency department attendances during the study period (6.0%) and 4438 of the 16 222 medical admissions (27.4%). The mean age of attendances was 57.1 years (range 13–100 years); 3834 (55.1%) were male; 764 (11.0%) had ECG evidence of ACS; 2402 (34.5%) had clinically diagnosed ACS; 869 (12.5%) had other potentially life threatening pathology; 1291 (18.6%) had negligible risk of life threatening pathology; and 1631 (23.4%) had undifferentiated chest pain. The mean age of those admitted was 64.1 years; 2308 (52.0%) were male; 713 (16.1%) had ECG evidence of ACS; 2155 (48.6%) had clinically diagnosed ACS; 814 (18.3%) had other potentially life threatening pathology; 92 (2.1%) had negligible risk of life threatening pathology; and 664 (15.0%) had undifferentiated chest pain.

The mean daily attendance rate was 15.7 (range 5–29). This varied by day of week, as shown in fig 1, being highest on Mondays and lowest on Saturdays. This pattern was seen in all categories of chest pain. Patients attending on Monday or Wednesday were slightly more likely to be admitted (proportions admitted 65.5% and 65.6%, respectively) than patients attending on Tuesday or Thursday (60.9% and 61.7%, respectively).

The hourly rate of attendance varied from 0.33 patients per hour, between 5:00 am and 6:00 am, to 1.17 patients per hour, between 10:00 am and 11:00 am, with a second peak of 0.86 per hour between 18:00 pm and 19:00 pm. This diurnal variation was seen for all categories of chest pain, especially those with undifferentiated or benign chest pain, with very few attendances in these categories between 2:00 am and 7:00 am. The proportion admitted varied little throughout the day (a consistent 60–67%), but increased to 77% between 5:00 am and 7:00 am.

## DISCUSSION

Rigorous, prospective data collection revealed that chest pain and related complaints accounted for 6% of adult emergency department attendances, suggesting that there are around 700 000 such attendances per year in England and Wales (over double our previous estimate). Two thirds were admitted, creating a substantial health care burden, yet only a minority had diagnostic ECG changes. Approximately one third of attendances and half of the admissions had a clinical diagnosis of ACS without clear ECG changes. If management of these patients is based upon studies that predominantly included patients with ECG changes of ACS, then it may be inappropriate. Attendances and admissions were more frequent on Mondays, reflecting previously reported patterns of CHD mortality.<sup>4</sup> The diurnal variation in attendance was consistent with other studies<sup>5</sup> and reflects more general patterns of emergency department use.



**Figure 1** Rates of attendance by day of week.

This study had some limitations. The primary purpose of data collection was screening for a randomised trial. Categorisation of patients may not have been ideal for a descriptive study, being based upon data available to the chest pain nurse. However, this pragmatic approach has clear relevance to clinical practice. The trial may also have influenced disposal of patients from the emergency department. The chest pain observation unit is intended to reduce admissions; admissions rates for patients with undifferentiated chest pain may therefore be even higher elsewhere.

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