

# Non-specific abdominal pain: the resource implications

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Non-specific abdominal pain (NSAP) is responsible for a significant proportion of emergency surgical admissions with resultant resource implications. The extent of the problem was assessed in a consecutive group of 100 patients, aged between 15 and 35 years, admitted with lower abdominal pain to one general surgical firm.

No less than 67 of these patients (67%) were diagnosed as having NSAP (13.29% of all general surgical admissions), most (75%) being female and having a mean hospital stay of 4.1 days. Only 11 patients (11%) had appendicitis and the remaining 22 had miscellaneous gynaecological, urological or gastrointestinal problems.

Detailed analysis of the resources used revealed that the mean cost to the NHS of each case of NSAP was £807, the bulk of which was attributable to the hospital stay. Wider assessment of the problem (by means of postal questionnaire) suggests that the cost to the NHS in Wales is in the region of £6 million per year and may be over £100 million per year in the UK as a whole.

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Relatively young patients, especially females, with non-specific abdominal pain (NSAP) constitute a significant proportion of emergency general surgical admissions. Many of these patients have persistent symptoms and are difficult to discharge, undergo multiple, often costly investigations and have repeat admissions. One multi-centre study in the UK found that no less than 43% of patients attending hospital with acute abdominal pain had no diagnosis made on discharge (1).

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Most patients with NSAP are referred as possible cases of acute appendicitis, frequently with right iliac fossa pain and tenderness. A number of these may erroneously undergo operation for suspected appendicitis and, indeed, in one recent study, NSAP was eventually diagnosed in 33% of 135 patients undergoing appendicectomy (2).

The aims of this study, therefore, were (1) to audit the extent of the problem of NSAP on one surgical firm and (2) to carry out an analysis of the resources consumed by patients with NSAP.

## Patients and methods

A prospective study was undertaken of 100 consecutive patients in the age group 15 to 35 years admitted as an emergency under one general surgical firm with symptoms of pain located in or predominantly in the lower abdomen. A standard proforma was completed for each patient, including relevant clinical details and information on the number and nature of all investigations, operations, etc. performed.

On each patient three diagnoses were recorded: (1) that of the referring physician, when available; (2) that of the admitting junior surgical team based only on the results of history and physical examination; (3) the final discharge diagnosis. The registrar/senior registrar examining the patient after admission was also required to record whether he considered the case an appropriate emergency general surgical admission, based only on the results of history and physical examination.

Up-to-date costings supplied by the Finance Department of the University Hospital of Wales were used to assess the resource implications. These included details of costs of individual laboratory and radiological

investigations, hospital stay ('hotel') costs and theatre costs. Using these figures, the total cost of each individual admission was calculated.

In order to make a wider assessment of the extent of the problem of NSAP, a postal questionnaire was sent out to all consultant general surgeons in Wales. Each completed questionnaire provided details of the total number of emergency general surgical admissions over an average 24 h 'intake' period and also an estimate of the percentage of these admissions who were aged between 15 and 35 years and had NSAP as a discharge diagnosis. Details of the frequency of various investigations carried out in patients with lower abdominal pain in this age group were also obtained from each consultant surveyed.

## Results

During a 7 month period beginning in April 1990, a total of 504 patients were admitted as emergencies to one general surgical firm. Of these, 165 were in the 15 to 35 year age group, 100 of whom (61%) had symptoms of pain located in or predominantly in the lower abdomen. These 100 patients (76 females and 24 males) were studied in detail.

NSAP was the discharge diagnosis in 67 of these 100 patients, only 11 had acute appendicitis and a further 22 had miscellaneous gynaecological, urological or gastrointestinal diagnoses (Table I). As a proportion of the patients admitted, therefore, patients with NSAP constituted 13.3% of total emergency general surgical admissions, 40.6% of those aged 15–35 years and no less than 67% of those aged 15–35 years with lower abdominal pain. Most patients with NSAP were female (51 females vs 16 males). However, an individual female admitted with abdominal pain in this age group was not significantly more likely to have NSAP (67.1%) than a male admission (66%). The characteristics of these three diagnostic groups are shown in Table II. It will be noted that patients with appendicitis had a significantly lower incidence of previous admissions with similar symptoms.

Accuracy of diagnosis (Table III) was assessed by comparing the final discharge diagnosis with (1) that of

the referring physician (the patient's general practitioner in 94% of cases) and (2) that of the admitting junior surgical team. The referring doctor suggested a diagnosis or differential diagnosis in 89 cases, but this agreed with the final diagnosis in only 20%. The diagnostic accuracy of the junior hospital team, based on history and physical examination was 62%. Emergency general surgical referral was, however, considered by the hospital team to have been appropriate in 77% of cases. In the group of 67 patients subsequently diagnosed as having NSAP, appendicitis was considered as a diagnosis or possible differential diagnosis in 85% of cases by the referring doctor (they were noncommittal with regard to a diagnosis in the other 15%) and in 46% of cases by the hospital team, with six patients (9%) undergoing a negative surgical exploration.

A breakdown of the financial cost to the NHS of patients in the three diagnostic groups is shown in Table IV. The average cost of a patient admitted with NSAP

Table II. Comparison of patients aged 15–35 years with lower abdominal pain based on discharge diagnosis ( $n = 100$ )

|                          | Appendicitis | Miscellaneous | NSAP |
|--------------------------|--------------|---------------|------|
| <i>n</i>                 | 11           | 22            | 67   |
| Male:female              | 2:3          | 1:7           | 1:3  |
| Total stay (days)        | 49           | 88            | 276  |
| Mean stay (days)         | 4.45         | 3.98          | 4.12 |
| Range of stay (days)     | 4–7          | 1–10          | 1–34 |
| PH similar admission (%) | 9            | 45            | 46   |

Table III. Accuracy of diagnosis: a comparison of the diagnoses of (1) referring doctors and (2) junior surgical staff with (3) the discharge diagnosis

| Diagnostician    | <i>n</i> | Agreement with discharge diagnosis |
|------------------|----------|------------------------------------|
| Referring doctor | 89*      | 18 (20%)                           |
| Admitting team   | 100      | 62 (62%)                           |

\* Diagnosis or differential diagnosis not provided in all referrals

Table I. Final discharge diagnoses of patients in the miscellaneous diagnoses group

| Diagnosis               | <i>n</i> |
|-------------------------|----------|
| Urinary tract infection | 7        |
| Gastroenteritis         | 5        |
| Mesenteric adenitis     | 2        |
| Meckel's diverticulitis | 2        |
| Ectopic pregnancy       | 1        |
| Salpingitis             | 1        |
| Endometriosis           | 1        |
| Ruptured ovarian cyst   | 1        |
| Pregnant                | 1        |
| Viral illness           | 1        |

Table IV. Comparison and breakdown of costs to the NHS of resources used in 100 emergency general surgical admissions aged 15–35 years with lower abdominal pain

| Item                       | Appendicitis ( $n = 11$ ) | Miscellaneous ( $n = 22$ ) | NSAP ( $n = 67$ ) |
|----------------------------|---------------------------|----------------------------|-------------------|
| Radiology                  | £ 345                     | £ 417                      | £ 1694            |
| Laboratory                 | £ 319                     | £ 841                      | £ 2451            |
| Operating theatre          | £3047                     | £ 1385                     | £ 1939            |
| 'Hotel' costs              | £5769                     | £14555                     | £48031            |
| Total cost                 | £9480                     | £17198                     | £54115            |
| 'Hotel' cost as % of total | 61%                       | 85%                        | 90%               |
| Cost per patient           | £ 862                     | £ 781                      | £ 807             |

**Table V.** Frequency of performing investigations in emergency general surgical admissions aged 15–35 years with lower abdominal pain: comparison of this study with results of postal survey of 52 Welsh surgeons (all figures given as percentages)

| <i>Investigation</i>       | <i>Present study</i> | <i>Survey</i> |
|----------------------------|----------------------|---------------|
| <i>Laboratory</i>          |                      |               |
| Full blood count           | 99                   | >90           |
| Urea and electrolytes      | 93                   | >90           |
| Liver function tests       | 21                   | —             |
| Serum amylase              | 52                   | 44            |
| MSU                        | 60                   | 79            |
| <i>Radiological</i>        |                      |               |
| Plain abdominal radiograph | 33                   | 52            |
| Chest radiograph           | 4                    | —             |
| Ultrasound scan            | 31                   | 37            |
| Barium meal ±FT            | 8                    | 2             |
| Barium enema               | 4                    | 7             |
| CT scan                    | 2                    | 1             |

**Table VI.** Financial implications of NSAP on the NHS

| <i>Unit Area</i>   | <i>NSAP<br/>(cases/year—<br/>approx.)</i> | <i>Cost/year</i>     |
|--------------------|---|----------------------|
| <i>University</i>  |   |                      |
| Hospital of Wales  | 220                                       | £228 610             |
| South Glamorgan HA | 961*                                      | £798 889             |
| Wales              | 7708*                                     | £6 405 348           |
| UK                 | 120000                                    | approx? £100 000 000 |

\* Based on results of postal questionnaire of Welsh consultant surgeons

(£807) was similar to that of a patient in the appendicitis (£862) or miscellaneous diagnoses (£781) group. However, the total cost to the NHS of patients with NSAP (£54 115) was equivalent to twice the combined costs of patients in the other two diagnostic groups (£26 678). 'Hotel' costs accounted for the bulk of the costs in all three groups, being proportionally highest in the NSAP group (90% of total cost) and lowest in the appendicitis group (61% of total cost).

A questionnaire forwarded to all 65 consultant general surgeons in Wales achieved an 80% response rate (52 consultants). This survey revealed that the overall frequency with which various tests were carried out in the investigation of emergency general surgical admissions with lower abdominal pain differed little from the present study (Table V). It also suggested that 16.5% of emergency general surgical admissions in Wales consisted of patients between 15 and 35 years with NSAP. From the results of the questionnaire, it was also possible to calculate the mean number of emergency general surgical admissions per day, throughout Wales, as being 128 (average 8.5 cases per hospital per day, range 3–16).

On the basis of these results, it is calculated that NSAP might be responsible for a total of 7708 emergency general surgical admissions per year in Wales, utilising 31 757 bed days and costing the NHS in Wales in the region of £6.4 million. Extrapolating these figures to the UK as a whole, on the basis of relative populations, the annual cost of NSAP to the NHS could be over £100 million per year (Table VI).

## Discussion

The results of this study confirm the clinical impression that relatively young patients with NSAP constitute a significant proportion (13.3%) of emergency general surgical admissions. This figure is similar to the 16.5% NSAP rate estimated by the consultant surgeons surveyed. The resource implications for the NHS are not inconsiderable and it is therefore tempting to speculate on means by which the management of this problem can be improved. This might be achieved in two ways—by reducing the admission rate of patients with NSAP and by reducing the hospital stay of those patients admitted.

Reduction in numbers of patients admitted with NSAP could, theoretically, be achieved by reducing the referral rate from general practitioners and by admitting fewer of those referred. This, however, would require improved diagnostic accuracy in abdominal pain among both general practitioners and admitting hospital doctors. The diagnostic difficulties in this area are illustrated by the present study, showing that the diagnostic accuracy of both referring doctors (20%) and junior surgical team (62%) was poor, although not altogether dissimilar to those in an earlier large UK study (39% and 57%, respectively) (3). It should be mentioned, however, that the reason for the relatively poor accuracy rate among the referring doctors in this study was that appendicitis was almost invariably suggested as a diagnosis or differential diagnosis, and the possibility of NSAP was never raised. This may reflect a fear among referring doctors that such a suggestion may in some way devalue the case for hospital admission. That such fears would be largely unjustified, however, is shown by the fact that emergency referral was considered appropriate by the hospital team in 77% of cases.

Indeed, general practitioners perform an invaluable 'triage' task in filtering patients with acute abdominal pain for referral to hospital. This is shown by studies of general practitioner referral patterns, showing that, of all patients presenting as urgent consultations with abdominal pain, only 4–6% are referred to hospital as emergencies (3,4). It has been shown, however, that closer liaison between surgical team and general practitioner, involving the provision of admission guidelines, joint audit and feedback, results in improved diagnostic accuracy and decreased admission rates in acute abdominal pain (3).

Further reductions in admission rates may be achieved by having a more senior member of the surgical team assess the patient in an admissions unit (studies show that

senior surgeons can achieve clinical diagnostic accuracy rates in appendicitis of over 80% (5,6). With the evolution within the NHS of the consultant-based service, more senior input at an earlier stage of a patient's admission may become the norm.

It is unlikely, however, that the above approaches could safely reduce the admission rates of patients with NSAP by more than 20–25%, and indeed the results of the present study suggest that 77% of referred patients needed admission for a period of observation and/or investigation. Further conservation of resources can, therefore, only be achieved by reducing the mean hospital stay and thus 'hotel' costs.

On analysis of the resource implications of NSAP (Table IV), it becomes obvious that 'hotel' costs comprise the major proportion (90%) of the resultant expenses, reflecting the relatively long mean hospital stay (4.12 days) of these patients. This figure was skewed, however, by a number of patients who had exceptionally long hospital stays and multiple investigations because of persistent symptoms. Indeed, bitter complaints of persistent symptoms and resistance to discharge from hospital without a 'diagnosis' are not atypical features of many patients with NSAP. Without doubt, these features, combined with a natural desire in the surgeon to ensure that nothing serious is overlooked, contribute to the excessive hospital stay of this group of patients.

In most cases, the major condition to be excluded is acute appendicitis. More reliable investigative methods of diagnosing or excluding appendicitis and other intra-abdominal and pelvic emergencies at an early stage should, therefore, by ensuring that nothing serious is missed, facilitate earlier discharge. The diagnosis of appendicitis, however, remains elusive, as reflected by the negative appendectomy rate (the number of normal appendices removed). A recent review article showed negative appendectomy rates of 5–50% in different series (7) and a recent study in the UK revealed a 33% overall negative appendectomy rate, where the appendix was normal and no other pathology was found at operation (2). It is generally agreed, however, that diagnosis is particularly difficult in females of childbearing age where negative appendectomy rates approach 50% (2,8).

This difficulty in accurately diagnosing appendicitis has stimulated the evaluation of various techniques to improve diagnostic rates in this condition (7), with laparoscopy, barium enema, ultrasonography and scoring systems all being of proven value. For obvious reasons, however, the first two techniques would not be acceptable as routine screening investigations. The other two approaches, however, appear to be both acceptable (for patient and clinician) and of value. Indeed, simple scoring systems, based on the presence or absence of certain signs and symptoms and the white cell count, have been shown to improve diagnostic accuracy significantly (9–11).

For the future, ultrasound scanning, being both rapid and non-invasive, may offer the most promise as a routine diagnostic test in these patients, with its proven

worth in gynaecological disorders, and increasingly demonstrated usefulness in acute appendicitis (7,12–15). Indeed, one study of ultrasound scanning in suspected appendicitis reports of 75% success rate (sensitivity) in diagnosing acute appendicitis and a specificity of no less than 100% (in excluding appendicitis) (15). As the cost of such an investigation is relatively insignificant when compared to that of a day's hospital stay, it is imperative that such facilities should be available within 24 h of admission and, if necessary, performed as an emergency either by the radiology department, or ideally by a surgeon trained in ultrasound using portable scanning equipment on the ward.

Although NSAP is unlikely to be a single disease entity, but rather the presenting symptom of a large number of minor and self-limiting conditions (16), many of these patients may have some psychological basis for their symptoms, as has been demonstrated in 50% of patients attending a GIT clinic (17). This view is supported by studies of patients undergoing appendicectomy which have demonstrated significantly more emotional and psychological problems in patients who had had a histologically normal appendix removed (18,19). Simple psychological scoring systems (20) may therefore also be of value in the assessment of these patients.

It is likely, however, that to achieve maximum diagnostic accuracy, a combination of senior clinical acumen, ultrasound scanning and scoring systems (both clinical and psychological) will be necessary.

This study confirms the clinical impression of the magnitude of the problem of NSAP in emergency general surgery and identifies the heavy resultant resource implications for the NHS. Although it is extremely unlikely that the problem will ever be eliminated, it is suggested that a modest reduction in the admission rate of patients with NSAP could be obtained and that a combination of diagnostic aids applied to each case soon after admission, could, by excluding appendicitis or other acute pathology, facilitate earlier discharge of those admitted with this condition, significantly reducing 'hotel' costs and improve bed availability for the treatment of other conditions. The problems posed by patients with NSAP will require increasingly serious consideration in the market orientated NHS.

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## Assessor's comment

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This is an interesting contribution on an important topic. It has been well known for some time that many patients (perhaps the majority) on surgical wards with 'acute abdominal pain' actually have self-limiting pain which does not warrant any form of urgent or surgical intervention. These have been loosely classified as 'non-specific abdominal pain' (NSAP). The present paper advances the discussion by defining further both the nature of the problem, its extent, and its costs in terms of resources.

It is possible to question some of the authors' findings—their series is rather small, and the definition of NSAP is inevitably somewhat vague (though the authors here have adopted a rather strict definition, which means the problem may be even greater than they estimate).

However, it is noteworthy that their data and findings accord very well with other large-scale surveys on the same topic; and taken together these studies reveal considerable expenditure of resource on NSAP patients—resource which, as they rightly point out, might be put to better use.

The crucial question, of course, is whether NSAP patients can be admitted less frequently, and whether this can be done safely. Fortunately, in many other studies (some of which have been reported previously in the *Annals*) exactly this improvement has been demonstrated. These studies have clearly indicated that between one-quarter and one-third of all NSAP patients can safely avoid admission to hospital at all; and as the present authors demonstrate, on a national basis this would lead to savings of tens of thousands of bednights on acute surgical wards. To this extent, the authors' present contribution on this important topic is to be welcomed.

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