

# Economic and social impact of migraine

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## Summary

We sent an anonymous self-administered questionnaire to 4200 employees of a Trust hospital, 1903 of whom returned it. We identified 158 migraine sufferers according to International Headache Society (IHS) criteria. These sufferers estimated 2.0 days/year absence from work, and an equivalent of 5.5 days/year lost by reduced effectiveness at work, caused by their migraine at an estimated financial cost of over £50,000 to the Trust. An additional 220

individuals who had received a diagnosis of migraine from a doctor but fulfilled only 3/4 IHS criteria lost the equivalent of 6.7 days off work at a further cost of £63,000. Few patients had consulted their general practitioner about their migraines in the last 3 months. Most (78%) were using only over-the-counter medication. Migraine patients should be encouraged to seek medical attention.

## Introduction

Migraine is a common condition affecting approximately 8% of the adult population in the UK.<sup>1</sup> In spite of its frequency, it gives rise to little financial burden on the NHS, costing only £20 to £30 million per annum, or less than 0.1% of total NHS expenditure.<sup>2</sup> The real cost of migraine is measured more in the suffering of individual patients. Migraines can be severe enough to limit sufferers' activities both at work and at home, and there may be significant psychological impact between attacks.

Until recently, little work has been done on the impact of migraine on quality of life. In a recent Canadian study, migraine caused problems with interpersonal relationships in over 70% of patients, and had a major impact on their social plans.<sup>3</sup> In spite of this, only 44% were taking prescription medication, compared with 91% taking over-the-counter medication and 19% of migraine sufferers had never sought medical attention.

The cost of migraine to the economy in terms of lost productivity is considerable, and has been valued at greater than £600m per annum in the UK. In the US, the equivalent burden has been estimated at between \$5.6 and 17.2 billion.<sup>4</sup> Such losses are undoubtedly substantial, but despite these and the

social costs of migraine, there appears to have been little drive to improve management of the condition.

Given the paucity of studies examining the social and economic impact of migraine on sufferers, the opportunity was taken to explore these issues amongst the employees of a NHS trust hospital. The NHS is a major employer within the UK and trust hospitals offer a unique environment in which to examine the impact of migraine on sufferers' lives and to assess the financial burden generated by the condition through sickness absence from work.

## Methods

### Study population

The Royal Hull Hospitals (RHH) Trust is comprised of four sites (Hull Royal Infirmary, Kingston General Hospital, Princess Royal Hospital, and Hull Maternity Hospital). A postal questionnaire was sent to the 4200 staff employed by the Trust with their March 1994 pay packet. This was accompanied by an explanatory letter from a consultant neurologist (CEC) from Hull Royal Infirmary outlining the nature of the

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study, reinforcing its confidentiality, and encouraging participation. The study was supported within the trust hospitals by a poster campaign in the restaurants and items in the trust's staff newsletter. A period of 4 weeks from issuing the questionnaires was allowed for completion and return to a data-processing house using a reply-paid envelope.

## Questionnaire

The tick-box format questionnaire was divided into three sections: (i) classification of headache; (ii) social and economic impact of migraine; (iii) demographic information. In (i), patients responded to questions designed to allow the identification of migraine sufferers according to the International Headache Society (IHS) classification of headaches.<sup>5</sup> Diagnostic criteria are detailed in the Appendix. Additional data on the number of attacks suffered in the last 12 months and the perceived severity of attacks was also collected at this stage. The questionnaire was designed such that those tick boxes which allowed identification of migraine without aura were shaded although data on migraine with aura was also collected. Upon completing the first section, staff either went on to section 2 or section 3 depending upon the combination of shaded tick boxes they had completed. Those suffering from migraine without aura according to IHS criteria were taken through to section 2 of the questionnaire, and IHS-defined non-migraine-sufferers to section 3. It is important to note that no direct reference to migraine was made in section 1, to ensure that patients identified their own symptomatology rather than through possible suggestion by use of the word. After patients had classified their headaches by section 2, the term 'migraines/severe headaches' was used.

Section 2 assessed the impact of migraine on social and work-related activities both during and between attacks. Sufferers were asked to agree or disagree with the statements on a 4-point scale ranging from strongly agree, agree, disagree, and strongly disagree. Information on the actual number of days lost from work due to migraines/severe headaches in the previous 3 months was also collected. The level of efficiency whilst remaining at work during migraines/severe headaches was noted, along with information on the number of attacks suffered in the past 3 months. These figures were recalculated pro-rata to give days lost from work and number of attacks suffered over a 12-month period. Information was also generated about general practitioner and hospital consultations, as was the patient's use of therapy, including over-the-counter medication.

The demographic data acquired in section 3 consisted of age, sex, whether in part-time or full-

time work, and job title. Type of employment was divided into four categories: nursing, medical and medical support (including doctors, therapists, and paramedical support staff), management, and other. All respondents completed sections 1 and 3; only staff identified as migraine sufferers in section 1 completed section 2.

## Results

### Response rate

Of the 4200 questionnaires circulated, 1903 were returned (45%). Migraine was diagnosed according to IHS criteria in 158 staff, 8.3% of those returning the questionnaire. The majority of these were female (93%) in comparison with 81% of all respondents. The frequency of occurrence in females was 9.5% compared with 2.5% in males. The age structure of the migraine group was comparable to that of the remainder. In the migraine patients, 62% were in full-time employment compared with 60% in the total sample.

### Characteristics of migraine

The characteristics of patient's migraine without aura are outlined in Table 1. All patients had suffered at least five attacks fulfilling the IHS criteria in their life. The mean duration of attack was 20 h. Of those who were classified by IHS criteria as having migraine without aura, 70% had experienced visual disturbances, 18% problems with speech, and 16% feelings of weakness down one side of the body, suggesting that they also had some attacks of migraine with aura. In the preceding 12 months, they suffered a mean of 20 attacks. The majority (94%) claimed to suffer from moderate to severe intensity attacks, with only 6% classifying attacks as mild.

In addition to identifying 158 migraine sufferers in the study, 293 individuals had received a diagnosis of migraine from a doctor but did not satisfy the IHS criteria for migraine. Within this group of 293, a subset of 220 individuals fulfilled three out of the four IHS criteria for migraine without aura (Appendix) and their headaches were similar in character to the 158 IHS-defined migraine patients (Table 1). The greatest similarity between these two groups was in the area of headache symptomatology, rather than in associated symptomatology such as nausea or vomiting (Table 1).

### Impact of migraine on daily functioning

The profound effect of individual migraine attacks on patient's daily lives is shown in Table 2. However, migraine also exerts a significant impact in between attacks (Table 3). Of particular note was the 33% of

**Table 1** Characteristics of headache in IHS-defined and GP-diagnosed migraine sufferers

	IHS-defined	GP-defined*	GP-defined subset*
Patients (n)	158	293	220
Headache symptoms (absolute percentages):			
A throbbing or pulsating type of pain	75%	72%	77%
Painful only on each side of head	64%	62%	69%
A pain which gets worse even when making normal movements	78%	57%	60%
Moderately/severely painful which makes it difficult or impossible to get through normal daily work	62%	52%	60%
Associated symptoms (weighted means**):			
Nausea	67%	44%	47%
Vomiting	37%	22%	24%
Photophobia	65%	46%	49%
Phonophobia	61%	45%	48%
Mean duration of attack (h)	20.0	24.5	24.5
Mean number of attacks in 12-month equivalent period	19.7	13.9	14.1

\* GP-defined sufferers are those patients **not** classified by the IHS criteria as suffering from migraine but who had received such a diagnosis. The subset of these refers to those who fulfilled 3 out of 4 criteria for IHS defined migraine without aura (Appendix).

\*\* Questions referring to the frequency of associated symptoms included preset answers ranging from never (0%), occasionally (25%), sometimes (50%), often (75%), to always (100%) experiencing these symptoms. Individual weighted 'percentage' responses were then summed and averaged to provide a 'weighted mean' figure.

**Table 2** Impact of migraine attack on daily activities (adapted from Reference 21)

Statement	Agreed (%)
When I have one of my migraines/severe headaches, I postpone household chores	90
I always have to lie down when I have one of my migraines/severe headaches	76
My migraines/severe headaches limit my ability to work as carefully as I usually do	73
I have difficulty performing work activities because of my migraines/severe headaches	72
I cancel/postpone meetings/appointments when I have one of my migraines/severe headaches	67
I generally have to miss work when I have a migraine/severe headache	50
When I have one of my migraines/severe headaches, I rely on other people to help me	45

patients agreeing with the statement 'my migraines/severe headaches do not disrupt my life'. This would seem to imply that the remaining two-thirds feel that their attacks disrupt their lives. Equally illustrative of the impact of migraine is the 34% of patients who agreed with the statement 'I feel I am not in control of my life because of my migraines/severe head-

**Table 3** Impact of migraine between attacks (adapted from Reference 21)

Statement	Agreed (%)
I'm afraid of letting others down because of my migraine/severe headaches	66
My migraines/severe headaches interfere with how I get on with members of my family and friends	54
My migraines/severe headaches interfere with how I get on with colleagues/friends at work	35
I feel I'm not in control of my life because of my migraines/severe headaches	34
My migraines/severe headaches do not disrupt my life	33
When planning my social life, I take into account suffering from my migraines/severe headaches	27
I feel my migraines/severe headaches may affect my chances of promotion	15

aches'. Whilst data were collected from different groups of employees within the hospital, responses to the statements did not differ significantly between groups.

### Economic impact of migraine

The frequency of migraine attacks in the previous 3 months is detailed in Table 4. A mean of 4.9

**Table 4** Number of migraines suffered in previous 3 months

Number of attacks	Patients	
	<i>n</i>	%
0	12	(8)
1	16	(10)
2	38	(24)
3	26	(16)
4	15	(9)
5	4	(3)
6–10	27	(18)
11–20	12	(9)
> 20	3	(2)
Not stated	5	(3)
Total	158	

attacks occurred over the 3 months, equivalent to approximately 20 attacks per year. Seventy-six per cent of migraine sufferers had taken no time off work due to their migraines over the last 3 months, 13% had taken one day off, 6% 2 days, 6% 3–5 days, and 1% over 6 days. Sufferers lost a mean of 0.49 days off work over the preceding 3-month period due to attacks, equivalent to approximately 2 days per year.

The most substantial element of total working time lost due to migraine stems from reduced effectiveness when patients stay at work with an attack. Sufferers spent 15.5 days at work with an attack each year. Of these, 12.4 days were affected by the episode of migraine, and respondents estimated that they were only 56% effective, equivalent to a loss of a further 5.5 days. Table 5 summarizes the effect of migraine on the Trust in terms of working time lost.

There were no differences in time taken off work between different groups of hospital employees. No significant differences in the absolute number of days off work between part-time and full-time staff were found, implying that part-time employees take a higher proportion of their working time off due to migraine than do full-time staff.

### Management of migraine

Although 94% of sufferers reported that they suffered from moderate to severe headaches, only 32% had consulted their general practitioner, 6% a hospital doctor, and 5% the occupational health service in the previous three months. Indeed, 60% had not consulted anyone. Of the 158 migraine sufferers identified by the IHS classification, only 62% had migraine diagnosed by a doctor in the past and 39% had had tension headaches diagnosed.

Only 28% of migraine sufferers took medication

prescribed by a doctor compared with 78% who took medication bought from a pharmacy or shop. The most common over-the-counter preparations were simple analgesics followed by analgesics combined with anti-emetics (Table 6). Amongst those patients taking prescription-only medications, the most common were analgesics alone or analgesics in combination with anti-emetics. Only four patients claimed to be taking the acute medication sumatriptan, with eight claiming to take prophylactic medication, split evenly between propranolol and pizotifen (Table 6). Interestingly, 13% admitted to using alternative therapies such as homeopathy, yoga, and acupuncture.

## Discussion

### Study design

The response rate to the postal questionnaire of 45% was encouraging given that staff, in general, may be wary of completing a questionnaire which as part of its content examined absenteeism. Response rates in previous studies have depended on their design. Thus, the response rate in a self-administered questionnaire mailed to households achieved 63%<sup>6</sup> compared with 12% in a population-based telephone survey.<sup>3</sup>

### Occurrence of migraine

The criteria used in this study identified 158 sufferers, equivalent to 8.3% of the 1903 respondents. Since the response rate was 45%, this figure is likely to overestimate the true occurrence of migraine within the Trust. The occurrence could be as low as 3.8% using, as the denominator, the total circulated payroll number of 4200 employees. The gender distribution in the present study of 9.5% for females and 2.5% for males compares with the 5.8–17.6% in females and 2.3–10.3% in males reported in previous studies.<sup>10–16</sup> However, it must be acknowledged that the skewed sex distribution due to the majority of workers in the trust being female may have introduced bias in these calculations.

The wide variation in occurrence of migraine in other studies may in part be due to variance in the identification criteria and methodology used in the study. Whilst the specificity<sup>11</sup> and exhaustiveness<sup>12</sup> of the IHS criteria have been established in some previous studies, others have shown that the sensitivity is less than 50%.<sup>13</sup> The criteria used in this study thus identify a very pure group of migraine sufferers, and exclude some who may have the condition. In the present study, 293 respondents were excluded even though they claimed to have had migraine diagnosed by a doctor. One possibility for their

**Table 5** Economic impact of migraine

Category	Mean 12 month equivalents		
	IHS-defined	GP-defined*	GP-defined subset*
No. of patients	158	293	220
Number of migraines/severe headaches per patient	20.0	13.9	14.1
<b>Days off work due to migraines/severe headaches</b>	<b>2.0</b>	<b>2.3</b>	<b>2.4</b>
Days at work with migraines/severe headaches	15.5	11.7	10.7
Number of days at work when migraine affects work capacity	12.4	9.9	9.8
Level of effectiveness at work when suffering with migraines/severe headaches	56%	59%	57%
<b>Calculated days lost due to reduced effectiveness</b>	<b>5.5</b>	<b>4.0</b>	<b>4.2</b>
<b>Total equivalent days absence</b>	<b>7.5</b>	<b>6.3</b>	<b>6.7</b>
Non-working days missed due to migraines/severe headaches	10.9	8.4	9.1

\* GP-defined patients are those **not** classified by the IHS criteria as suffering from migraine but who had received such a diagnosis. The subset of these refers to those who fulfilled 3 out of 4 criteria for IHS-defined migraine without aura (Appendix).

**Table 6** Medication usually taken by migraine sufferers

Medication	Over-the-counter (n)	Prescription (n)
<i>Simple analgesics</i>		
Paracetamol	46	0
Paracetamol + Aspirin	10	0
Paracetamol + Codein & derivatives	17	4
Paracetamol + Dextropropoxyphene	2	8
Aspirin	3	0
Aspirin + Codeine	1	0
Aspirin + Paracetamol + Codeine	1	0
Ibuprofen	22	1
<i>Anti-emetics +/- analgesics</i>		
Buclicline + Paracetamol + Codeine	26	6
Metoclopramide	NA	5
Metoclopramide + Paracetamol	NA	7
Prochlorperazine	NA	1
Sumatriptan	NA	4
Ergotamine-derivative-containing	NA	2
Pizotifen	NA	4
Propranolol	NA	4

NA, not applicable as unavailable without prescription.

exclusion could be that they were diagnosed as migraine sufferers sometime in the past by a doctor, but could no longer recall their attacks well enough to satisfy the IHS selection criteria. Another possibility is that their doctor incorrectly diagnosed migraine at the time of consultation. Alternatively, the IHS selection criteria may indeed be too stringent, and exclude some individuals who genuinely have migraine. In many respects these 293 individuals, and in particular a subset consisting of 220 individuals, closely resemble our defined migraineur group (Table 1).

They suffered headache symptoms to a similar degree to the IHS-defined patients, and had attacks of similar duration and frequency (Table 1). However, they were more likely to consider the intensity of their headaches to be moderate rather than severe, and they suffered fewer associated migraineous symptoms than the IHS-defined migraine group.

The high frequency of migraine in females in this study is in line with previous work.<sup>1,6-10</sup> Since a large proportion of hospital staff are female, including nurses, secretaries, and domestic staff, the NHS may

be worse hit by the condition than employers with a larger proportion of male workers. Since 53% of migraine sufferers were nurses, it may be of value to concentrate efforts to improve self-referral rates on this group.

## Social impact of migraine

This study demonstrates the profound effects migraine has on the daily functioning of sufferers, both in the work environment and at home. Attacks lead to difficulty in performing work activities, to reduced effectiveness at work, and to the cancellation of meetings. Household tasks are postponed due to migraine, and patients often have to give up all activities and lie down. Similar effects on interpersonal relationships, social, family, and work activities have been reported in a recent Canadian study.<sup>3</sup> The deleterious effects of the disorder have also been documented using health-related quality-of-life questionnaires such as Short Form Health Surveys.<sup>14,15</sup> The same instruments have also been used to monitor the effects of novel migraine treatments.<sup>16</sup>

Interestingly, although half of the migraineurs claimed they 'generally have to miss work when they have a migraine', this was not corroborated by their responses to the more detailed items relating to actual time off work, since 76% claimed they had taken no time off work due to migraine in the previous 3 months, in spite of the majority suffering attacks in this time period. It is difficult to explain this inconsistency but it may, in part be due to an unwillingness to specify just how much time has been lost from work.

Although migraine sufferers acknowledged the effect of their attacks on work activities, they overwhelmingly disagreed that their migraines affected their chances of promotion. This implies that they either believed the effects of their migraines were not noticeable to their superiors, or that they do not suffer many attacks at work. This is in stark contrast to patients with epilepsy whose employment can be placed in jeopardy by generalized tonic/clonic seizures.

## Economic impact of migraine

The significant economic impact of migraine to the Trust is demonstrated by migraine sufferers taking an average of two full days off per year due to their attacks. While this may seem relatively insignificant, it is equivalent to 25% of the mean annual sickness per head in manufacturing industry or around 20% of the annual time off in the NHS.<sup>17</sup> When the effect of migraine on reduced efficiency at work is considered, the total equivalent days absence rises to 7.5 days. This compares with the 1.5 complete days of

absence and 4.1 days of reduced effectiveness per year reported by Cull *et al.* in 374 patients.<sup>1</sup> An earlier study found annual absenteeism to be as high as 4 days in migraine sufferers.<sup>7</sup>

To derive a financial equivalent for this loss, the conventional economic approach is to value the foregone working time according to current rates of remuneration. For the 158 sufferers in the RHH trust study, the loss of 7.5 days each per year equates to a total of 1185 days lost per year. Given a mean daily rate of pay across all employee groups of £42.74, it may be estimated that £50 647 of work time is lost each year as a result of migraine. However, this is likely to be an underestimate, since the response rate to the survey was under 50%, with some migraine sufferers not responding to the survey.

An additional contribution to this underestimate may be found when the impact of migraine on the working and non-working life is explored amongst the subset of 220 individuals said to have migraine by their general practitioner but excluded from our sample by the IHS criteria. Significant similarities in the symptomology of the two groups have been noted above. Both groups exhibit a similar loss of time from paid work with 6.7 equivalent working days missed due to headache compared to 7.5 days amongst the IHS-defined migraine group. Applying the same calculation as above to this group, an additional £62 717 is being lost by the Trust per year. The combined sum of over £113 000 may appear modest, but to set it in context, this amount could pay the annual salary of two additional consultants in the Trust. When considered nationwide, the financial implications of this loss are considerable. The annual cost of absenteeism and reduced effectiveness in the United Kingdom has been estimated at £611m.<sup>1</sup> The equivalent in the United States is between \$5.6 and \$17.2bn.<sup>4</sup>

## Management of migraine

Despite 94% of patients rating their migraine as moderate to severe in intensity, 60% had not contacted a doctor about the condition in the previous 3 months. In some cases, the patient may have been under regular follow-up and their appointment had not fallen in the last 3 months. Nevertheless, it seems a large number of patients are not seeking medical attention for their migraine. In a Canadian telephone survey of 222 migraine sufferers, 36% had never sought medical help for their attacks.<sup>3</sup> The reasons given for never seeking attention in the latter study were low frequency of headaches, insufficient severity of headaches, and the availability of over-the-counter medications of equal or greater effectiveness than those obtainable only by prescription. Those who had elected not to return for further medical

follow-up cited similar reasons. However, over 50% of these were unhappy with their physicians or were experiencing problems with their medication. It would appear that patients belittle the severity of their attacks and require some encouragement to seek medical attention.

In relieving their attacks, the majority of patients (78%) relied on medication bought at a pharmacy or shop, with only 28% using prescription drugs. In a Canadian study,<sup>3</sup> 44% of migraine sufferers were taking prescription medication, compared with 28% of males and 40% of females in a US study.<sup>6</sup> For most patients simple analgesics with or without an anti-emetic were used (Table 6) with probably little to choose between agents in terms of efficacy. Only four patients were receiving sumatriptan, despite its ability to abort migraine attacks in around two-thirds of sufferers.<sup>18,19</sup> The use of ergotamine derivatives has declined in recent years because of the risk of headaches induced by overuse and withdrawal, and more effective agents are now available. Only two patients were receiving this class of drug in the present study.

Although only 8 patients were receiving anti-migraine prophylaxis with propranolol or pizotifen, 42 patients claimed to have suffered 6 or more attacks in the last 3 months (Table 4), the generally accepted frequency at which prophylaxis is considered effective. Thus, five times as many patients should have been on some form of prophylaxis. This does not take into account the patients who may have tried such preparations in the past without benefit.

This study shows that there is a significant number of patients who should be using better acute treatment for their migraine, with or without additional prophylactic medication. In a recent open-label study in 130 nurses with migraine, sumatriptan significantly reduced workplace productivity losses compared with patients' usual medication.<sup>22</sup> Further work is required in this area, but it seems likely that improving the treatment of migraine will have significant economic benefits.

### Action taken in the Trust following the study

The staff of the Royal Hull Hospitals Trust have been informed of the results of the study in posters sited in the restaurants and by an article in the trust magazine. In these it was suggested that staff with headaches which fulfil the IHS criteria who have not contacted their general practitioner or occupational health in the last 3 months should do so with a view to considering more effective anti-migraine therapy. Further continuing medical education sessions for general practitioners are planned to improve the

diagnosis of migraine and its treatment. Guidelines for migraine treatment were issued to all general practitioners in the Humberside area in a laminated two-sided A4 sheet 2 months before the questionnaire was dispatched and these will now be updated and recirculated. Similar proposals regarding public and physician education have recently been made in Canada and the US.<sup>3,20</sup>

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### Conflict of interest

Glaxo Pharmaceuticals manufactures the anti-migraine preparation Sumatriptan.

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## Appendix: International Headache Society diagnostic criteria for migraine (adapted from reference 5)

### *Migraine without aura (syn. common migraine)*

- A. At least five attacks fulfilling B–D
- B. Headaches lasting 4–72 h

C. Headaches characterized by at least two of the following:

1. Unilateral location
2. Pulsating quality
3. Moderate or severe intensity (inhibits or prohibits daily activities)
4. Aggravation by climbing stairs or similar routine physical activity

D. During headache at least one of the following:

1. Nausea and/or vomiting
2. Photophobia and phonophobia

### *Migraine with aura (syn. classical migraine)*

A. At least two attacks fulfilling B

B. At least three of the following characteristics:

1. One or more fully reversible aura symptoms indicating focal cerebral cortical and/or brain stem dysfunction
2. At least one aura symptom develops gradually over more than 4 minutes or 2 or more symptoms occur in succession
3. No aura symptom lasts more than 60 minutes. If more than one aura symptom present, accepted duration is proportionally increased
4. Headache follows aura with a free interval of less than 60 minutes. (It may also begin before or simultaneously with the aura)