Substantial underestimation of the need for outpatient services for TIA and minor stroke

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Abstract

Objectives to measure the number of all transient ischaemic attack (TIAs) and minor strokes managed as outpatients, and hence, the need for ‘TIA clinics’ in comparison to current estimates of 20,000 TIAs annually in England, based on previous rates of incident-definite events.

Subjects all individuals with confirmed or suspected TIA or stroke between 2002 and 2005 in a population-based study of 91,105 individuals in Oxfordshire, UK.

Outcome Measures numbers, rates, and risks of recurrent stroke for incident-definite TIA, any probable or definite TIA, stroke, and all referrals of suspected TIA and stroke, stratified according to inpatient versus outpatient management.

Results of 1,174 confirmed or suspected events ascertained, 729 (62.1%) were managed as outpatients and 445 (37.9%) as inpatients. Among 757 probable or definite events, 432 (57%) were managed as outpatients. Incident-definite TIAs accounted for only 18% of all referrals to outpatient services. Annual rates per 1,000 population were 2.98 (2.77–3.2) for all referrals to outpatient services and 1.88 (1.71–2.06) for inpatient admissions. Of 73 recurrent strokes within 90 days of initial TIA or stroke, 48 (65.8%) occurred in the outpatient population. Applying these rates to the population of England yields approximately 150,000 new referrals annually to TIA clinics with about 10,000 early recurrent strokes.

Conclusion more patients with TIA or stroke are managed as outpatients than inpatients in the UK, and this group has the majority of possibly preventable early recurrent strokes. Current projections of need for TIA clinics in England substantially underestimate the overall requirement for outpatient services.

Keywords: TIA, stroke, outpatients, inpatients, TIA clinic, elderly

Introduction

In the UK, there is widespread agreement on the need for improved inpatient services for major stroke [1, 2]. Most emphasis has been on increasing the provision of thrombolysis in the acute phase, stroke units and post-discharge support services [1], which have been monitored in regular national audits [2]. In contrast, the importance of efficient clinical services for transient ischaemic attack (TIA) and non-disabling stroke has only recently been fully recognised. The risk of stroke after a TIA or minor stroke is as high as 10% within the first week [3–5], clinical scores are now available to predict individual risk [3, 5], the need for urgent carotid endarterectomy in patients with symptomatic stenosis has been established [6] and studies of early medical treatment are ongoing [7, 8].

In the UK, patients with TIA and minor stroke are generally managed as outpatients. The National Service Framework for Older People required all hospital trusts to have rapid-access referrals protocols in place by 2004, [9] and the Royal College of Physicians (RCP) recommends that patients should be seen within 1 week [1]. However, the 2006 National Sentinel Stroke Audit found that 22% of hospital trusts treating stroke patients did not offer TIA clinics and 65% were unable to assess patients within 7 days, with a median time from event to clinical review of 12 days (IQR 7–17) [2]. Similarly, the 2005 National Audit Office (NAO)
The need for outpatient services for TIA and minor strokes

Methods

The Oxford Vascular Study (OXVASC) is a population-based study of stroke and TIA in 91,105 individuals of all ages registered with nine general practices in Oxfordshire, UK. The study methods have been described elsewhere [17]. Briefly, multiple overlapping methods of ‘hot’ and ‘cold’ pursuit were used to achieve near-complete ascertainment of all individuals with TIA or stroke. These include:

1. A daily, rapid-access TIA clinic to which participating GPs and the local accident and emergency department (A&E) refer all individuals with suspected TIA or stroke whom they would not normally admit to hospital.
2. Daily searches of admissions to the medical, stroke, neurology and other relevant wards.
5. Monthly searches of all cranial and carotid imaging studies performed in local hospitals.

All patients referred to the study clinic were assessed as soon as possible by a clinical fellow. A pragmatic definition of definite or probable TIA was used to include any transient symptoms (either incident or recurrent) lasting less than 24 h of likely vascular aetiology that was felt to justify secondary prevention treatment. A standard definition of stroke was used [18]. Imaging was CT based and was not used in the differentiation of TIA and stroke; patients with symptoms lasting less than 24 h with an ischaemic lesion on imaging were therefore classified as TIA. Patients referred to the clinic or admitted to hospital with a suspected cerebrovascular event, and in whom an alternative diagnosis was made following specialist assessment and cranial imaging were classified as ‘referral with non-cerebrovascular diagnosis’. Multiple events (usually multiple TIA’s) leading to a single contact with medical services were counted as one event, and routine follow-up clinic attendances were excluded. Events were classified as either ‘clinic’ or ‘inpatient’ according to where they were managed; a patient who attended A&E and was referred to the clinic where treatment and imaging were initiated was classified as having a ‘clinic’ event, while a patient referred to the clinic but who required immediate hospital admission was classified as an ‘inpatient’ event. Out-of-hospital stroke-related deaths, and patients who were treated solely at home, were excluded. Patients with sub-arachnoid haemorrhage were excluded, as they are not usually managed by stroke services in the UK.

All patients were followed up at 1 and 6 months by a study nurse, and if a recurrent stroke was suspected, they were reassessed by a clinician. Recurrent stroke was defined as any stroke following clinical assessment, which occurred after a period of neurological stability; events on the same day were therefore considered while those occurring prior to first assessment (either as outpatient or inpatient) were excluded from analysis.

The study period was from April 2002 to March 2005. Incidence rates were standardised to the 2005 population of England [19]. Numbers of expected events for a standard district general hospital (DGH) serving a population of 330,000 and for the population of England were estimated by applying measured standardised incidence rates to the population of interest. The OXVASC study was approved by the local ethics committee.

Results

In the 3-year study period, 1,174 events occurred in 1,094 individuals. Of a total of 260 probable or definite TIA’s, 129 (50%) were definite, first-ever-in-a-lifetime (incident), the remainder being either recurrent events [69 (27%)] or probable TIA’s treated with secondary prevention [62 (24%)]. These incident-definite TIA’s accounted for only 18% (129/729) of all referrals of suspected TIA or minor stroke to outpatient services. Table 1 compares total numbers and standardised incidence rates for incident-definite TIA, any probable or definite, incident or recurrent TIA and stroke. The rate for incident-definite TIA (whether clinic or inpatient) was 0.54 (0.44–0.63) per thousand population compared with 1.08 (0.95–1.21) for any probable or definite, incident or recurrent TIA and stroke.

Of 757 probable or definite TIA’s or strokes, 432 (57%) were managed as outpatients. Of all 1,174 suspected TIA’s or stroke, 729 (62.1%) episodes in 694 individuals were managed as outpatients, and comprised 233 (32.0%) TIA’s, 209 (28.7%) strokes and 287 (39.4%) referrals with non-cerebrovascular diagnoses, the commonest being migraine, syncope and undetermined diagnosis. The mean National
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Table 1. Crude and standardised (to the 2005 population of England) annual incidence rates per thousand population for incident-definite TIA, any probable or definite TIA, and stroke

<table>
<thead>
<tr>
<th></th>
<th>Crude figures</th>
<th>Standardised to 2005 population of England</th>
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<tbody>
<tr>
<td></td>
<td>Mean age (SD)</td>
<td>Rate (95% CI)</td>
</tr>
<tr>
<td>Incident-definite TIA</td>
<td>73.8 (13.5)</td>
<td>49 (0.35 (0.26–0.46)</td>
</tr>
<tr>
<td>All probable and definite TIA</td>
<td>73.4 (12.5)</td>
<td>112 (0.79 (0.65–0.96)</td>
</tr>
<tr>
<td>All probable and definite stroke</td>
<td>75.2 (1.5)</td>
<td>248</td>
</tr>
</tbody>
</table>

Table 2. Crude and standardised (to the 2005 population of England) annual incidence rates per thousand population for clinic and inpatient strokes and TIAs and overall activity

<table>
<thead>
<tr>
<th></th>
<th>Crude figures</th>
<th>Standardised to 2005 population of England</th>
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<tbody>
<tr>
<td></td>
<td>Mean age (SD)</td>
<td>Rate (95% CI)</td>
</tr>
<tr>
<td>All TIAs and strokes</td>
<td>73.7 (11.8)</td>
<td>199</td>
</tr>
<tr>
<td>Clinic events</td>
<td>75.9 (12.4)</td>
<td>161</td>
</tr>
<tr>
<td>Inpatient events</td>
<td>70.1 (14.6)</td>
<td>337</td>
</tr>
<tr>
<td>All suspected events</td>
<td>75.5 (12.8)</td>
<td>209</td>
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Table 3. Projected total numbers of events for an average district general hospital serving 330,000 people and for the estimated 2005 population of England (calculated by applying standardized incidence rates to the population of interest)

<table>
<thead>
<tr>
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<th>Average district general hospital</th>
<th>Population of England (2005)</th>
</tr>
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<tbody>
<tr>
<td>Clinic &amp; inpatient events combined</td>
<td>170</td>
<td>26,280</td>
</tr>
<tr>
<td>All definite or probable TIAs</td>
<td>360</td>
<td>54,610</td>
</tr>
<tr>
<td>All definite or probable strokes</td>
<td>700</td>
<td>107,290</td>
</tr>
<tr>
<td>Definite &amp; probable events only:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Clinic TIA &amp; strokes</td>
<td>610</td>
<td>92,570</td>
</tr>
<tr>
<td>Inpatient TIA &amp; strokes</td>
<td>450</td>
<td>69,330</td>
</tr>
<tr>
<td>Definite, probable &amp; suspected events combined:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Clinic activity overall</td>
<td>980</td>
<td>150,440</td>
</tr>
<tr>
<td>Inpatient activity overall</td>
<td>620</td>
<td>94,860</td>
</tr>
</tbody>
</table>

Estimated total numbers of patient episodes for an average DGH serving a 330,000 population and the 2005 population of England (calculated by applying the measured standardised incidence rates) are given in Table 3 and indicate that a DGH may expect approximately 1,000 new referrals per year in a “TIA clinic” (about 20 per week).

Follow-up was completed in 90 days. Seventy-three recurrent strokes occurred during the 90 days after patients had sought medical attention following an initial probable or definite TIA or stroke. Forty-eight of these strokes (65.8%) occurred in patients who were referred for outpatient assessment. Applying these rates to the 2005 population of England would yield 9,920 early recurrent strokes per year in patients referred to TIA clinics. Appendix Figure 1 on the journal website (http://www.ageing.oupjournals.org/) shows a Kaplan Meier curve for recurrent stroke for outpatient and inpatients following initial TIA or stroke.

Discussion

The UK DoH projections of need for TIA clinics are based on previous studies of incident-definite TIA, but we have shown that incident-definite TIAs account for only about 18% of all referrals of suspected TIA or minor stroke to outpatient services. Although our projection of about 26,000 incident TIAs likely to occur in England each year is similar to the estimate of 20,000 per year derived from the OCSP in 1981–86, we calculate that about 48,000 probable or definite

Institutes of Health Stroke Scale (NIHSS) [20] score for 209 clinic strokes was 1.8 (SD 1.9, range 0–8).

Of 445 inpatient episodes in 427 individuals, 298 (67.0%) were for stroke, 27 (6.1%) for TIA and 120 (27.0%) were for referrals with non-cerebrovascular diagnoses. Table 2 compares total numbers and standardised incidence rates for outpatients versus inpatients.
TIAs and 43,000 minor strokes are managed as outpatients each year in England, and a total of 150,000 new referrals to TIA clinics should be expected. About 10,000 possibly preventable early recurrent strokes will occur each year in this group.

There have been few population-based studies of TIA incidence, and all of these have used narrow, research-based definitions of definite TIA, excluding patients with previous TIA or stroke and patients with probable TIA who are investigated and treated in the same way as definite TIAs. Our incidence rate for incident-definite TIA was 0.54 (95% CI 0.44–0.63) per thousand population, somewhat higher than the rate of 0.42 measured in the same population in the 1980s [12]. Comparable studies elsewhere have estimated standardised incidence rates of TIA of 0.42 (0.33–0.54) in Italy between 1986 and 1989 [21], 0.21 (0.12–0.30) in Spain in 1992–94 [22], 0.58 in Italy in 1992–93 [23] and 0.27 (0.09–0.79) in Russia in 1996–97 [24]. The difference in measured rates is partly explained by the use of different definitions, but also by better ascertainment of cases by OXVASC, especially in the elderly [17].

Although we believe that our conclusions are valid, our study does have some shortcomings. First, while we aimed to influence normal referral practice, the numbers of patients attending the study clinic may have been affected by the clinic’s availability. However, the proportions of TIAs and strokes referred to referrals with non-cerebrovascular diagnoses are similar to other published cohorts from (non-research based) TIA clinics [15, 16, 25] and the low NIHSS stroke severity score in clinic attenders with stroke indicates that such patients would not generally have been admitted to hospital elsewhere in the UK. Future usage of TIA clinics is expected to change as recent RCP guidance [1] recommends inpatient management for some patients with minor stroke and high-risk TIA while the large number of TIA patients who are currently managed in general medical, geriatric and neurology clinics [26] may increasingly be referred to specialist services. Secondly, Oxfordshire is more affluent than some other parts of the UK, and therefore, possibly has lower rates of atherosclerotic disease. However, although the electoral wards containing our practices are significantly less deprived than the rest of England, they include a broad range of deprivation with 22% of wards ranking in the lower third nationally [27]. Moreover, standardised rates of admission to hospital for stroke in Oxfordshire are similar to the mean overall rate in England [28] and our estimated number of annual admissions for stroke in England (63,515) is similar to that observed in 2003–04 (65,108) [29], suggesting that our results are likely to be generalisable. Finally, the OXVASC population is 94% white [30] and our results are not necessarily applicable to areas with a very different ethnic mix.

In summary, we have shown that the numbers of patients managed in TIA clinics is considerable, and is divided roughly equally between TIA, non-disabling stroke and suspected TIA. This number is far greater than previous estimates of a TIA clinic workload, based on earlier TIA incidence data and greater than the numbers of patients with stroke or TIA managed as inpatients.

**Supplementary data**

Supplementary data for this article is available online at http://ageing.oxfordjournals.org.

**Key points**

- The risk of stroke after TIA or minor stroke is approximately 10% at 1 week, and guidelines therefore recommend rapid assessment; in the UK, the standard means of managing such patients is in TIA clinics.
- The UK Department of Health (DOH) projections of need for TIA clinics are based on previous studies of incident-definite TIA, which estimate that about 20,000 TIAs occur in England each year.
- Incident-definite TIAs account for only about 18% of all referrals of suspected TIA or minor stroke to outpatient services.
- At least 48,000 probable or definite TIAs, and 43,000 minor strokes are managed as outpatients each year in England, and a total of 150,000 new referrals to TIA clinics should be expected.
- About two-thirds of all referrals of suspected TIA and stroke in the UK are managed by outpatient services, and about 10,000 early recurrent strokes occur each year in this group.

**Conflict of Interests**

None

**References**

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