Left ventricular systolic dysfunction and atrial fibrillation in older people in the community – a need for screening?

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Abstract

Background: heart failure and stroke are major causes of morbidity and mortality in older people. Angiotensin converting enzyme inhibitors improve symptoms and survival in left ventricular systolic dysfunction. Anticoagulants are effective in stroke prevention in atrial fibrillation with aspirin being a less effective alternative.

Objectives: to determine the prevalence of left ventricular systolic dysfunction, health services utilisation and prescribing of diuretics and angiotensin converting enzyme inhibitors in left ventricular systolic dysfunction, and the prevalence of atrial fibrillation and anti-platelet/thrombotic therapy in atrial fibrillation in older people in the community.

Methods: 500 subjects were drawn by two-stage random sampling from 5,002 subjects aged 70 years and over living at home. Subjects were screened for atrial fibrillation and left ventricular systolic dysfunction using electrocardiography and echocardiography.

Results: the population prevalence amongst older people of left ventricular systolic dysfunction was 9.8% and of atrial fibrillation 7.8%. More than two-thirds of those with left ventricular systolic dysfunction were not on angiotensin converting enzyme inhibitors. Of those in atrial fibrillation, 35% were taking aspirin, 24% were taking warfarin and 41% were on neither aspirin nor warfarin. Nearly 90% of older people in the community have had contact with their general practitioner over the past year, and over half of those with left ventricular systolic dysfunction have had contact with hospital-based services over the past 2 years.

Conclusions: left ventricular systolic dysfunction is under-treated in older people in the community. Despite the high level of contact with hospital and community-based services, the majority of those with systolic left ventricular dysfunction are not on angiotensin converting enzyme inhibitors and a significant proportion of those in atrial fibrillation are not on any treatment for stroke prevention.

Keywords: left ventricular systolic dysfunction, atrial fibrillation, older people, anticoagulation, angiotensin converting enzyme inhibitors, screening, community, elderly

Introduction

Both heart failure and atrial fibrillation (AF) are common, particularly in older people [1, 2]. Largely because of the ageing of the population, the overall prevalence of both these conditions is currently increasing, such that the literature warns of emerging epidemics of heart failure and AF in the 21st century [3–5]. The economic implications and the need for health service planning for the older population with these conditions have recently been highlighted [3, 4]. There is increasing emphasis on the need to identify and treat patients with left ventricular systolic dysfunction (LVSD) as early as possible, given the well established benefits of angiotensin converting enzyme (ACE) inhibitors and beta-blockers in
left ventricular (LV) function was assessed by echocardiography. Emphasis was placed on clinical and social details using a semi-structured proforma. Clinical and social details were collected. The remaining statistical analysis on drug utilisation and health services use was performed on the sample rather than extrapolating back to population level, bearing in mind the small numbers of individual drug types in the sample. Standard categorical analysis was used to examine differences in proportions between categories using chi-square and odds ratio as measures of association [20].

Results

One thousand one hundred and sixty-nine (91% of eligible cases) responded to the postal questionnaire. There were 34 withdrawals including 15 deaths from the sub-sample of 500, leaving 466 in the sub-sample. Three hundred and fifty-eight (77% of eligible) in the final sample attended the study centre, of whom 351 were echogenic.

Prevalence of left ventricular systolic dysfunction and atrial fibrillation

The overall population prevalence of LVSD in older people in the community was 9.8% (95% CI 6.8, 12.9). LVSD was commoner in men [16% (9.9, 22.2)] than in women [5.5% (2.7, 8.4)] (P<0.01). The population prevalence of significant dyspnoea (MRC Grades 3–5, i.e. breathless when walking with other people his/her own age on level ground, or worse) was 32.3% (30.3, 34.3), 27.6% in men and 35.4% in women. Breathlessness was associated with LVSD; the prevalence of LVSD in breathless subjects was 17.1% (11.4, 22.9) compared with 6% (2.6, 9.5) in those non-breathless (P<0.001). Nearly three-quarters of those with LVSD were symptomatic with significant breathlessness.

The population prevalence of AF was 7.8% (4.9, 10.7); 10.6% (6.7, 15.7) in men and 6% (3.6, 8.4) in women. There was an association between AF and LVSD (P<0.01).

Co-morbidities

Co-morbidities were common in this population. The population prevalence of ischaemic heart disease was 18.8% (14.9, 22.8), hypertension 37% (32.3, 41.7), diabetes mellitus 8.3% (5.7, 11.4), stroke 7.7% (5.0, 10.4), COPD 11.3% (8.4, 14.2), arthritis 34.2% (29.6, 42.9) and obesity 26.7% (22.4, 31.0).
The prevalence of ischaemic heart disease was much higher in LVSD (51.2%) and AF (51.7%) compared with the rest of the population (P<0.005). There were no other significant negative or positive associations between comorbidities and LVSD or AF.

**Medical therapy of left ventricular systolic dysfunction and atrial fibrillation**

Importantly, more than two-thirds of older people in the community with LVSD were not on ACE inhibitors. Those with LVSD were more likely to be prescribed diuretics (50% versus 31.2%, P<0.05), aspirin (47.5% versus 25.7%, P<0.05) and ACE inhibitors (30% versus 9%, P<0.001) compared with those with normal systolic function (Table 1).

Of those in AF, 34.5% were taking aspirin, 24.1% were taking warfarin and 41.4% were on neither aspirin nor warfarin. Less than half of those in AF were on digoxin and only 6.9% of those in AF were on amiodarone. Subjects in AF were more likely to be prescribed digoxin (44.8% versus 3.8%, P<0.001) compared to those without, but there was no significant association between AF and amiodarone therapy (P=0.06). Examining possible reasons for the lack of warfarin prescribing, all subjects scored at least 7 out of 10 on the abbreviated mental test and all were living in the community and able to attend a hospital-based research clinic (residents of care homes were excluded). There appeared to be no significant difference in mobility between those on warfarin and those not prescribed warfarin. Of those in AF, 42.9% of those on warfarin and 40.9% of those not on warfarin reported that they walk around outside ‘alone easily’ (P 0.927). Difficulty in walking over uneven ground was reported in 85.7% of those on warfarin and 63.6% of those not on warfarin (P 0.382).

**Utilisation of health services and prescribed medication**

Older people with LVSD had high levels of health services utilisation, the majority having had contact with their GP over the past year and about half having had at least one out-patient clinic appointment or hospital admission over the previous 2 years (Table 2). Of those with LVSD, 32.5% took six or more prescribed medications.

However, when comparing those with and without LVSD, the main excess in health services utilisation was in hospital admissions over the previous 2 years (P<0.01) (Table 2). There was no excess in the number having hospital out-patient attendance (P=0.16), GP consultations (P=0.77) or polypharmacy (six or more prescribed medications over the previous 24 hours) (P=0.23). Those with LVSD (37.5%) were more likely to report having had an echocardiogram previously (37.5%) than those without LVSD (12.5%), OR 4.18, P<0.001. Of those with LVSD, those prescribed ACE inhibitors were more likely to report having had an echocardiogram previously (58.3%) than those not on ACE inhibitors (28.6%), OR 3.5 (P<0.07). Of those with LVSD, 17.5% reported being under regular follow-up for their heart, compared with 8.7% of those without LVSD (P<0.08).

Older people in AF also had similarly high health services utilisation, 86.2% had consulted their GP within the last 12 months, 51.7% had had an out-patient visit and 31% had a hospital admission in the last 2 years. They were more likely to report using more prescribed medication than those without AF (six or more medications; 55.2% versus 23.1%, P<0.001). There were no significant differences between those with and without AF in the proportion who consulted their GP over the previous 12 months, had hospital outpatient visits or hospital admissions in the previous 2 years.

**Discussion**

The overall prevalence of LVSD has been shown in this population-based study to be 9.8% amongst older people living at home. This is higher than in the Rotterdam study [21], which reported prevalence rates of 3.9% for LV dysfunction in the general population aged between 55 and 95 years, and 4.2% in those aged 70 years and above. A lower response rate especially in the higher age groups, and patient selection bias in the Dutch study may have contributed to the low prevalence of heart failure. Our findings are broadly similar to those of Morgan et al. [22] who reported a

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**Table 1. Medical therapy of LVSD and AF**

<table>
<thead>
<tr>
<th>Therapy</th>
<th>LV dysfunction no. of patients (%)</th>
<th>Normal LV function no. of patients (%)</th>
<th>P value</th>
<th>Odds ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics</td>
<td>20 (50.0)</td>
<td>97 (31.2)</td>
<td>&lt;0.05</td>
<td>2.21</td>
<td>(1.13, 4.29)</td>
</tr>
<tr>
<td>ACE inhibitors</td>
<td>12 (30.0)</td>
<td>28 (9.0)</td>
<td>&lt;0.0001</td>
<td>4.33</td>
<td>(1.99, 9.45)</td>
</tr>
<tr>
<td>Aspirin</td>
<td>19 (47.5)</td>
<td>80 (25.7)</td>
<td>&lt;0.05</td>
<td>2.61</td>
<td>(1.34, 5.11)</td>
</tr>
</tbody>
</table>

**Table 2. Health service utilisation and LV systolic dysfunction**

<table>
<thead>
<tr>
<th></th>
<th>LVSD n=40</th>
<th>No LVSD n=311</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP consultation within 12 months</td>
<td>90%</td>
<td>88.1%</td>
<td>0.77</td>
</tr>
<tr>
<td>Out-patient visit within last 2 years</td>
<td>52.5%</td>
<td>40.8%</td>
<td>0.16</td>
</tr>
<tr>
<td>Hospital admission within last 2 years</td>
<td>47.5%</td>
<td>26.1%</td>
<td>&lt;0.01</td>
</tr>
</tbody>
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prevalence of 7.5% for LV systolic dysfunction amongst
patients aged 70–84 years in the general practice setting in
the UK. We found that LVSD was more common in men,
which is consistent with other studies [21, 22].

We found a prevalence of AF of 7.8%, which is consistent
with that found by Sudlow et al., who found a prevalence in the
general population aged 65 and over of 4.7% but a prevalence
of 10.0% in those aged 75 and over [23]. We had a good
response rate, so our estimates of population prevalences
are likely to be reasonably representative of the population
aged 70 years and over in the UK. By excluding subgroups
living in residential care or continuing care hospitals, our
study has if anything underestimated the burden of morbidity
in the total population.

In this study, we found that despite the high level of contact
with hospital out-patient and in-patient services, and community-based health services, LVSD and AF were under-
treated in older people in the community. Nearly three-
quarters of those with LVSD were symptomatic but less than a third of subjects with LVSD were on ACE inhibitors and
only one-quarter of those in AF were taking warfarin, 41% being on neither anticoagulant or antiplatelet therapy.

Importantly in this study, we have identified LVSD and AF from amongst a random sample of older people living in
their own homes. Subjects with significant cognitive impairment, and nursing and residential home residents were
excluded. Thus, under-treatment of subjects on clinical or quality of life grounds seems unjustified, given we have
excluded the frail, more dependent residential/nursing home population. Furthermore, mobility appeared to be no worse in those in AF not prescribed warfarin than in those taking
warfarin. With newer anticoagulants becoming available which are likely to be easier to use than warfarin, it is imperative that patients with AF are identified and their stroke risk managed appropriately [24].

There may be a number of factors underlying current poor implementation of evidence-based treatment in day-to-
day clinical practice. Older people may not seek medical advice because they feel that their symptoms may be part of the inevitable processes of ageing or a consequence of previous or present lifestyle habits like smoking. Older people’s expectations of improvement are commonly relatively limited [25]. They often have important co-morbidity and may be misdiagnosed clinically [26]. Access to appropriate investigations is therefore particularly important for the older population. Lack of previous echocardiograms may have contributed to the undertreatment of LVSD in our population – only 37.5% of our patients with LVSD had had an echocardiogram previously, 58.3% of those on ACE inhibitors and 28.6% of those not on ACE inhibitors.

The under-treatment of LVSD has major cost implications for the National Health Service (NHS). We found that those with LVSD were much more likely to be admitted into hospital. There is an ever increasing number of hospital admissions and readmissions due to heart failure [27]. Hospital care accounts for 60–70% of healthcare expenditure on heart failure [28, 29]. Organised care, particularly targeted at older people at home, has the potential to reduce hospital admissions [30, 31]. There is some evidence from Scottish data that case fatality and hospitalisation rates with heart failure are beginning to improve, though there is still much room for improvement [32, 33].

We have shown that the majority of older patients in the community with AF or LVSD are in contact with their GP or hospital-based services, and yet are not on appropriate treatment. Three-quarters of older people with LVSD are symptomatic with significant breathlessness. Despite this, opportunistic case finding does not appear to be happening. One of the limiting factors in the community is believed to be access to echocardiography [34] and this appears to have been borne out in our study. The recently published National Institute for Clinical Excellence guidelines on heart failure have therefore advocated using a normal 12-lead electrocardiogram or B-natriuretic peptide to rule out heart failure, so that the limited resource of echocardiography is used more appropriately [35]. This approach would have the advantage of also identifying those in AF. Such screening strategies need to be urgently evaluated in the older population. It should be a major public health issue to ensure improvements in identifying eligible patients with LVSD and AF as early as possible, given the mortality, morbidity and healthcare costs associated with LVSD and stroke disease, and presently available effective treatments.

Key points

- One in ten people aged over 70 who live in their own homes have LVSD on screening.
- Over two-thirds of these are not on ACE inhibitors, despite three-quarters having significant breathlessness, 90% having contact with their GPs and over half having contact with hospital-based services.
- One in 13 people aged over 70 who live in their own homes have AF, of whom only one-quarter take warfarin.
- Strategies to identify and appropriately manage these older patients in the community need to be urgently evaluated.

Acknowledgements

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