

General practice

The impact on general practitioners of the changing balance of care for elderly people living in institutions

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Abstract

Objectives: To describe utilisation of general practitioners by elderly people resident in communal establishments; to examine variations in general practitioner utilisation and estimate the likely impact of the “downsizing” of long stay provision in NHS hospitals.

Design: Secondary analyses of the survey of disability among adults in communal establishments conducted by the Office of Population Censuses and Surveys in 1986, and projection to present day.

Setting: Nationally representative sample of communal establishments in Great Britain.

Subjects: Disabled residents aged 65 or more without mental handicap.

Results: Residents with higher levels of disability, disorders of the digestive system, resident in smaller local authority homes or larger voluntary residential homes were more likely to consult a general practitioner. For those who consulted, higher levels of disability and morbidity and residence in a private nursing home or a larger private residential home were all associated with greater general practitioner utilisation. Overall, when residents’ characteristics and size of home was controlled for, residents in nursing homes had greater predicted utilisation than those in residential care homes. People who would previously have been cared for in NHS hospitals and are now cared for in nursing homes have high predicted utilisation due to their greater morbidity and disability.

Conclusion: The “downsizing” of NHS provision for elderly people has increased demand on general practitioners by 160 whole time equivalents per year in Britain.

Introduction

In Britain, the number of institutional care places for elderly people doubled to 563 000 between 1980 and 1995. NHS beds accounted for less than 10% of the total in 1995 compared with 23% in 1980, while the market share of private and voluntary (not for profit) residential and nursing homes grew to 76%.¹

Residential and nursing homes do not provide for all their residents’ medical care in house and “medical management ... currently rests by default ... on the heavily burdened shoulders of general practitioners.”² However, there is still a lack of evidence on general prac-

tioners taking over the care of patients who might otherwise have been cared for in hospital, including those in nursing and residential homes.³ With secondary analyses of the survey of disability among adults in communal establishments,^{4,5} we estimated changes in demand for general practitioners caused by the reduction in NHS provision between 1986 and 1996.

Methods

The sample

The Office of Population Censuses and Surveys sampled one in 13 establishments (n = 1408) possibly providing care for disabled people in Great Britain. Of the 892 establishments eligible for inclusion, 595 were randomly selected for the study. “Permanent” residents were selected on the basis that they had been permanently resident in the communal establishment for the past six months or, if resident for less than six months, had been in residential care anywhere for at least six months, had no other place of residence at this time, or were likely to remain in residential care for the foreseeable future.³ In smaller establishments (fewer than 80 residents), one in four residents were included in the sample; in larger establishments one in 12 residents were included. Interviews varied: when residents were incapable of answering questions, a member of staff sat in with the subject, or sometimes the administrator was interviewed on behalf of all subjects even though they were competent to answer. In some instances the administrator answered some questions, the subject others.⁵

The survey collected assessments of disability in locomotion, reaching and stretching, dexterity, seeing, hearing, continence, communication, personal care, behaviour, intellectual functioning, consciousness (fits) and digestion. The Office of Population Censuses and Surveys used the views of carers’ organisations, staff, and researchers to scale scores in each of these 13 domains and to develop a composite measure of disability based on the combination of severity scores. The summary measure was calculated as worst + (second worst × 0.4) + (third worst × 0.3).⁵ The disability instrument has good interrater reliability; it is highly correlated with the Barthel index⁶ but is more comprehensive.^{7,8}

Our analyses included people aged 65 or over and excluded people for whom “mental handicap” was reported.



The appendices to this paper appear on our website

General practitioners' workload

For residents of residential and nursing homes, the disability survey collected information about the frequency and typical location of consultations with general practitioners. To compute a measure of workload, we obtained data on the duration of such consultations from the general medical practitioners workload survey 1992-3,⁹ which yielded an estimate of 8.4 minutes for surgery based consultations. For consultations in communal establishments, we used the workload survey's estimate for domestic visits, 13.2 minutes. The mean travelling time for a domestic visit was 12 minutes. We conducted a telephone survey of 38 residential and nursing homes which found that general practitioners see an average of five residents on each visit to a home, equivalent to 2.4 minutes travelling time per resident visit. General practitioners spend time on activities that do not involve direct contact with patients but none the less directly and indirectly contribute to patients' consultations. General practitioners spent a weekly average of 16.9 hours on such activities and conducted 152.1 consultations (equivalent to an additional 6.7 minutes per consultation).⁹

Where data were missing about whether a person consulted a general practitioner we assumed that no consultation was made. Where information was available on the number of consultations made but not on the typical location, we computed an average of the time for a surgery based consultation (15.1 minutes) and the time for a consultation at the establishment (22.3 minutes), weighted by the proportions of people in all types of communal establishments with completed data, who consulted at the surgery or establishment (5.3% and 94.4% respectively).

For people who had been resident in their communal establishment for less than 12 months, we adjusted the number of consultations to enable comparison with people resident for the entire 12 month study period.

To test the sensitivity of our results to assumptions about general practitioners' workload we conducted analyses for two alternative scenarios: that all general practitioners' visits were to individual residents (31.9 minutes per consultation); and that 90% of consultations took place in a clinic at the establishment, with typically 20 residents seeing the general practitioner en bloc, with shorter consultation times equal to the time for a surgery based consultation, and 10% of visits were to individual residents (average 17.3 minutes per consultation).

Analyses

Consultations with general practitioners differed between accommodation categories, as did characteristics of residents.⁵ We used multivariate analyses to determine whether variations in utilisation of general practitioners were associated with residents' characteristics or unobserved but systematic differences between accommodation categories (such as internal services or differing links with general practitioners).

The dependent variable was the weekly utilisation per resident of general practitioners' time. There were five groups of explanatory variables: age and sex, ownership of establishment and residential or nursing homes status (based on a survey question which asked whether the home provided "residential services only or residential services with medical, nursing or other

professional care"), number of permanent residents, reported underlying long term illnesses, and overall severity of disability.

Statistical methods

The distribution of the dependent variable was non-normal: 15% of residents in the survey did not consult a general practitioner, while the distribution for consulters was skewed with a long tail to the right. To allow for this non-normality we conducted a multistage analysis following the approach of Duan and colleagues to examine the demand for medical care under differing types of insurance^{10 11}; more recently this has been used to examine the distribution of fundholders' budgets.¹²

In the first stage a logistic regression was estimated to model the probability that a person consulted a general practitioner. This separated consulters from non-consulters and addressed the first source of non-normality. In the second stage a multiple regression was estimated with the natural logarithm of general practitioner utilisation per resident per week as the dependent variable for those people who consulted. The natural logarithmic transformation reduces the skew in the distribution. The predicted utilisation of general practitioners' time is the product of the predicted probability of consulting (from the first stage) and the predicted utilisation of general practitioners' time (from the second stage) (see Appendix 1 on website).

To allow for differences in residents' characteristics between types of establishment, predictions of general practitioner utilisation were based on utilisation of the entire sample of people in residential and nursing homes, had they been resident in a particular type of accommodation. This was achieved by turning on and off dummy variables (taking the value 0 or 1) as appropriate. We made the predictions more contemporary by substituting mean values for the size of residential and nursing homes from a 1996 survey (32 local authority homes, 17 residential homes, 34 nursing homes).¹³

The survey estimation routines of the software package STATA were used for the analyses to allow for complex survey design and clustered sampling. For example, there was potentially greater homogeneity of residents within individual homes than in comparison with residents in other homes.

Changes since 1986 in the balance of care

Between 1986 and 1996 the number of elderly people grew, resulting in an increase in the number of disabled people. Contemporaneously, provision of institutional care altered radically. We therefore calculated demographically adjusted estimates of the change in provision. Our first step was to estimate the number of disabled elderly people in Great Britain in 1996 using the age specific prevalence rates for disability (excluding mental handicap) from the disability surveys. The proportions of elderly disabled people in different age groups "permanently" resident in communal establishments in 1986 were again estimated from the disability surveys. We then estimated what number of people would have been resident in the different categories of establishments had they comprised the same proportion of the elderly disabled population in 1996 as they had in 1986.

Table 1 Use of general practitioners by elderly disabled people resident in communal establishments

Variable	Local authority homes (n=1152)	Voluntary residential homes (n=184)	Voluntary nursing homes (n=149)	Private residential homes (n=406)	Private nursing homes (n=427)	All establishments (n=2319)
No (%) consulting general practitioner:						
Yes	954 (82.8)	160 (87.0)	134 (89.9)	358 (88.2)	364 (85.4)	1971 (85.0)
No	134 (11.7)	18 (9.9)	9 (5.8)	34 (8.3)	33 (7.6)	228 (9.5)
Don't know or missing	64 (5.6)	6 (3.1)	6 (3.9)	14 (3.5)	30 (7.0)	120 (5.2)
Number of consultations per year*:						
Mean	6.7	5.1	17.9	8.2	14.2	8.9
Median	4.0	3.0	6.0	4.0	6.0	4.0
10th percentile	0.0	0.0	1.0	1.0	1.0	0.0
90th percentile	14.0	12.0	52.0	15.3	31.6	20.0
Range	0-144	0-36	0-216	0-90	0-192	0-216
Typical location of consultation (No (%) of patients who consulted):						
General practitioner's surgery	26 (2.7)	31 (19.4)	3 (2.2)	28 (7.8)	16 (4.4)	104 (5.3)
Communal establishment	924 (96.9)	130 (80.6)	131 (97.8)	328 (91.6)	348 (95.9)	1861 (94.4)
Don't know/missing	4 (0.5)	0	0	2 (0.6)	0	7 (0.3)
General practitioner utilisation per resident per week (minutes)†:						
Mean (range)	2.69 (0-62)	2.00 (0-12)	7.33 (0-92)	3.29 (0-31)	5.61 (0-82)	3.57 (0-92)
Median (10th-90th centile)	1.71 (0-5.55)	1.28 (0-5.13)	2.56 (0.17-22.21)	1.71 (0-6.41)	2.56 (0-12.81)	1.71 (0-8.28)

Data were weighted using a sample weight to allow for non-response, etc.

*Across the sample with complete data.

†People for whom data on general practitioner consultations were missing were recoded as having zero consultations.

Our second step involved estimating the actual numbers of people resident in different categories of communal establishments in 1996 from various official statistics and adjusting them to make them comparable with the disability survey's definition of a permanent resident. The demographically adjusted estimate of the change in provision was equal to the estimates from the first step minus the estimates from the second step (see Appendix 2 on website).

Predicting utilisation by "NHS residents"

We used the sample of people cared for in NHS hospitals in the disability survey to represent people who would previously have been cared for in NHS establishments but who are now cared for outside hospital. We assumed that they would now be cared for in private nursing homes, given the growth in places in this type of

accommodation. We predicted general practitioner utilisation by using the equations for private nursing homes. Various assumptions regarding the extent of "downsizing" in NHS provision were examined by taking subsamples of the NHS sample, divided on the basis of the overall severity score for disability under the assumption that the least disabled people were most likely to be cared for outside NHS hospitals.

Results

For the 3050 subjects included in the analyses, 1004 interviews were conducted with subjects themselves, 589 with the subject and a member of staff, and 1456 with just a member of staff.

Most residents consulted a general practitioner, usually at their establishment of residence (table 1). Interestingly, a greater proportion of residents of voluntary residential homes consulted at the general practitioner's surgery. The "median" resident consulted four times a year, but 10% of residents had 20 or more consultations. Residents of private and voluntary nursing homes utilised significantly more general practitioner time than residents in other accommodation categories.

The type of accommodation itself was not significantly associated with the probability of consulting a general practitioner (table 2). The size of home was more important, with residence in a larger voluntary residential home or a smaller local authority, voluntary, or private nursing home being associated with a higher probability of consulting. Residents' characteristics, such as severity of disability and disorders of the digestive system, were associated with an increased probability of consulting.

For those who consulted, residence in a private or voluntary nursing home was associated with greater utilisation of general practitioners' time (table 3). Residence in larger voluntary residential homes was associated with less utilisation, while residence in larger private residential homes was associated with greater utilisation. These results allow for significant associations between utilisation and severity of disability, the

Table 2 Logistic regression to examine factors associated with consulting a general practitioner for elderly disabled people resident in communal establishments

Explanatory variable	β coefficient (SE)	Odds ratio	P value
Constant	-0.120 (0.820)		0.883
Age	0.011 (0.009)	1.01	0.238
Male sex	0.042 (0.151)	1.04	0.281
Severity of disability	0.078 (0.012)	1.08	<0.0001
Mental disorders	0.017 (0.144)	1.02	0.907
Nervous system disorders	0.122 (0.160)	1.13	0.445
Circulatory system disorders	0.122 (0.177)	1.13	0.493
Respiratory system disorders	0.379 (0.259)	1.46	0.144
Digestive system disorders	0.592 (0.241)	1.81	0.014
Type of accommodation:			
Local authority	—	—	—
Voluntary residential home	-0.610 (0.580)	0.54	0.294
Voluntary nursing home	0.784 (0.591)	2.19	0.185
Private residential home	0.313 (0.324)	1.37	0.335
Private nursing home	0.364 (0.415)	1.44	0.380
Size of establishment (No of residents):			
Local authority	-0.008 (0.004)	0.99	0.043
Voluntary residential home	0.023 (0.012)	1.02	0.051
Voluntary nursing home	-0.006 (0.003)	0.99	0.083
Private residential home	-0.006 (0.006)	0.99	0.303
Private nursing home	-0.025 (0.014)	0.98	0.088

F_(17,422)=5.07; P<0.0001. Sample size=2319 in 440 sampling units.

presence of mental disorders, and disorders of the nervous, circulatory, and respiratory systems.

Overall, residence in voluntary and private nursing homes was associated with significantly greater predicted utilisation than residence in voluntary, private, and local authority residential homes (table 4).

Between 1986 and 1996, the number of elderly disabled people grew by more than 400 000. To keep pace with demographic change, the number of elderly people permanently resident in institutional care would need to have risen by 70 000. Estimates based on official statistics (adjusted to make them comparable with the disability survey's definition of a permanent resident) show that the number has risen by 118 000 (which is within the confidence interval of the projection) (table 5). The striking finding is the change in the pattern of provision, with large reductions in the number resident in NHS and local authority homes and a rapid increase in the number resident in voluntary and especially private residential and nursing homes.

We estimate that NHS beds declined by 70% between 1986 and 1996, generating additional utilisation of 6.7 minutes per resident per week by those who would formerly have been cared for in NHS establishments, equivalent to over 160 general practitioners nationally (table 6). If all NHS long stay provision was removed, the average utilisation of general practitioner time would be 7.1 minutes per resident per week, equivalent to over 240 general practitioners across Great Britain.

Discussion

We have provided empirical estimates in response to a claim that "general practitioners have little more than anecdotal evidence to support their claims of greatly increased workloads."³

Patterns of consultation

Compared with their counterparts in households in 1985, disabled elderly people in residential and nursing homes in 1986 consulted general practitioners more often (mean 8.9 v 6.3 times per year) and were less likely to consult at the surgery (5% v 60%).⁴ These figures are consistent with more recent data for the population (disabled and non-disabled, aged 65 and over).^{14 15} The finding that residents of voluntary residential homes were more likely to consult general practitioners at their surgery is consistent with

Table 3 Ordinary least squares regression to examine factors associated with utilisation of general practitioners' time by elderly disabled people resident in communal establishments (dependent variable=natural logarithm of workload in minutes)

Explanatory variable	β coefficient (SE)	P value
Constant	0.073 (0.353)	0.837
Age	<0.0005 (0.004)	0.923
Male sex	0.024 (0.060)	0.685
Severity of disability	0.043 (0.005)	<0.0001
Mental disorders	0.120 (0.061)	0.047
Nervous system disorders	0.116 (0.062)	0.063
Circulatory system disorders	0.122 (0.066)	0.063
Respiratory system disorders	0.336 (0.115)	0.003
Digestive system disorders	0.057 (0.070)	0.415
Type of accommodation:		
Local authority	—	—
Voluntary residential home	-0.084 (0.183)	0.649
Voluntary nursing home	0.562 (0.320)	0.079
Private residential home	-0.173 (0.157)	0.272
Private nursing home	0.443 (0.228)	0.053
Size of establishment (No of residents)		
Local authority	-0.004 (0.003)	0.170
Voluntary residential home	-0.004 (0.002)	0.069
Voluntary nursing home	-0.002 (0.002)	0.245
Private residential home	0.006 (0.002)	0.017
Private nursing home	-0.007 (0.007)	0.362

R²=0.1098, F_(17,415)=9.71, P=<0.0001. Sample size=1971 in 433 sampling units.

Table 4 Predicted utilisation of general practitioner time (minutes per resident per week) by type of communal establishment

Type of accommodation	Main estimate (No of minutes (SE))*	Sensitivity analysis	
		90% of consultations in clinics	All visits to a single patient
Local authority homes	3.45 (0.41)	2.74	4.82
Voluntary residential homes	3.22 (0.23)	2.75	4.43
Voluntary nursing homes	8.95 (0.54)	6.98	12.75
Private residential homes	3.85 (0.39)	3.06	5.37
Private nursing homes	6.01 (0.52)	4.74	8.46

Sample size = 2319.

*Average visit to home involves consultations with five residents.

evidence that such residents were more likely to make social trips and other excursions outside their home.¹⁶

Systematically higher levels of utilisation in nursing homes may not be associated simply with the higher dependency of their residents but may be due to better management of residents' medical care. People who were resident in NHS establishments in 1986 have high predicted levels of utilisation, consistent with previous evidence that elderly people who had been NHS

Table 5 Elderly people in residential care in Great Britain, 1986 and 1996

Type of accommodation	1986: No of permanent residents	1996		Adjusted to permanent residents	Estimated change 1986-96 in No of permanent residents
		Projected No of permanent residents*	Actual No of all residents		
NHS	72 662	89 606	29 350	29 350	-60 256
Local authority	121 408	149 719	65 094	61 579	-88 140
Voluntary residential homes	19 458	23 995	41 389	37 747	13 752
Private residential homes	42 868	52 864	157 368	134 707	81 843
Voluntary nursing homes	18 444	18 444	—	—	—
Private nursing homes	45 503	56 114	179 252†	173 173	98 615
Total (95% CI)	320 343 (277 787 to 363 265; -13.3% to 13.4%)	390 742 (338 773 to 443 101)	472 453†	438 691	45 814

*In 1986 there were 8 495 000 people aged 65 or over; in 1996 there were 9 032 000, an estimated increase in the decade of 537 000. In 1986 there were 3 719 474 disabled people aged 65 or over; in 1996 there were 4 130 201, an increase in the decade of 410 727. The figures in this column are estimates of the numbers of people in each category of home, had they taken the same proportion of the disabled elderly population as in 1986.

†Official statistics do not distinguish between private and voluntary nursing homes.

Table 6 Predicted utilisation of general practitioners' time (minutes per resident week) for people who would otherwise have been cared for in NHS establishments if they were resident in private sector nursing homes

Decline in No (%) of NHS residents 1986-96	Overall disability severity score	Sensitivity analysis		Main prediction*	
		90% of consultations in clinics	All visits to single patients	Minutes per week (SE)	No of additional general practitioners needed†
35 842 (40)	≤18.30	4.88	8.68	6.18 (0.52)	86
44 803 (50)	≤19.05	5.18	9.36	6.61 (0.54)	115
53 764 (60)	≤19.05	5.18	9.36	6.61 (0.54)	138
62 724 (70)	≤19.55	5.26	9.54	6.72 (0.55)	164
71 685 (80)	≤19.90	5.28	9.57	6.74 (0.55)	188
80 645 (90)	≤20.10	5.43	9.90	6.95 (0.56)	218
89 606 (100)	—	5.51	10.06	7.05 (0.56)	245

*Average visit to home involves consultations with five residents. †Whole time equivalent general practitioners (42.93 hours per week).

long stay patients had 9.3 consultations per year when discharged to alternative residential settings.¹⁷

The presentation of results for alternative scenarios illustrates the sensitivity of our predictions to assumptions about the duration of consultations. It could be argued that more routine consultations at the institution may be shorter. On the other hand, average consultation times may be exceeded by frail elderly people with multiple disorders. Our assumption that where data were missing about consultations the person did not consult a general practitioner is plausible for a well known, commonly used service. Furthermore, we have not included time spent on telephone consultations, which account for 7% of general practitioners' working time.⁹ Taken together, these factors leave our utilisation estimates on the conservative side.

Patterns of provision

We were unable to include supply-side effects, and our results implicitly assume that general practitioners met the extra demand and that the pattern of provision has not changed since 1986. But primary care has changed—for example, the number of practice nurses increased rapidly¹⁸ and now accounts for one in eight consultations,¹⁴ and there has been a downward trend in the proportion of consultations taking place outside the surgery.¹⁵ However, the 1986 survey describes people in NHS establishments before the major shift in provision occurred and so represents the kind of people previously cared for in hospital but now in residential and nursing homes. Recent research confirms the increasing dependency levels of residents of residential and nursing homes.¹⁹

The explanatory variables for disability and morbidity were associated with the use of general practitioners. Nevertheless, some differences in morbidity were not captured by these variables. In this context, the high predicted utilisation for voluntary nursing homes needs to be viewed with caution, especially in view of the relatively small sample size.

Policy implications

Two policy implications of these results can be identified. At a macro level, as beds closed, financial transfers from hospital budgets to other budgets varied enormously in size and orientation across the country, but we are unaware of any transfers to primary care. Changing provision of long term care for elderly people has accounted for a considerable proportion of the increased number of general practitioners^{20 21} while deinstitutionalisation of psychiatric patients and demographic change have also increased workload.

The change in demand will be pronounced for practices in areas with an older population, but territorial equity will be hard to achieve while general practitioners remain independent contractors.²²

At a micro level, primary care groups²³ will receive resources from (merged, larger) health authorities but general practitioners will continue to be independent contractors (although the introduction of the salaried scheme is significant in this context). Defining the appropriate activities of general practitioners as independent contractors as opposed to commissioners and providers of community health services will be critical to the quality of care for elderly people in institutions and, more generally, to the success of primary care groups. Although family health services authorities and health authorities have already been merged, the flexibility of the new arrangements has been questioned.²⁴ Refined funding formulas to allocate funds to primary care groups and to general practitioners as independent contractors may be required—but however refined the formula, the effect will be to shift financial risk to the groups and general practitioners. In this context, care outside hospital of ever more chronically ill people, imposing large demands on general practitioners, may lead to the undertreatment or disenrolment of such expensive patients.^{12 25} Indeed, some general practitioners were unwilling to enrol former long stay patients on their lists (even before the introduction of fundholding).¹⁷ In this context, some homes are paying extra sums to general practitioners for the care of their residents. These charges, passed on in extra fees to local authorities and residents, blur the health and social care boundary and introduce means tested charging for health care.

In the United States some evidence suggests that health maintenance organisations provide poor coverage and treatment for chronically ill people.^{26 27} Contracting arrangements that share the risks between health authorities and primary care groups may be appropriate.²⁸ This could involve the health authority and the group sharing the costs above the target amount set by the formula (for example, 50:50), or an extension of the current stop-loss arrangements where an expenditure limit of £6000 per patient applies to fundholders. The two arrangements could be combined. Another possibility would be to separate (carve out) arrangements for chronically ill groups.²⁸

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Key messages

- General practitioners claim that declining provision of NHS long term care for elderly people has increased workload
- So far evidence has been anecdotal
- Morbidity, disability, and type of care home are significantly associated with utilisation of general practitioners
- The predicted increase in demand for general practitioners in Britain is equivalent to 160 full time doctors

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Identification of patients with atrial fibrillation in general practice: a study of screening methods

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Introduction

Atrial fibrillation is common, affecting around 5% of people over 65.^{1,2} Widespread use of anticoagulants in these patients could greatly reduce the incidence of stroke,³ but many patients are untreated.^{2,4} Although most people with atrial fibrillation are already recorded as having the condition,⁴ they may not be easily identifiable from medical records, and this may partly explain the underuse of anticoagulants.

As part of a population survey of elderly people we examined two methods for detecting people with atrial fibrillation or flutter: identification of patients currently taking digoxin, and pulse palpation by a trained nurse. Ethical approval was granted by the Northumberland Local Research Ethics Committee.

Methods and results

We invited an age and sex stratified sample of 1235 subjects aged 65 years and over, registered with nine contiguous general practices in southern Northumberland, for a screening limb lead electrocardiogram. Subjects were asked to bring any medication they were taking, and this was recorded. A nurse palpated the pulse and recorded its character. A pulse that was not "regular" was considered abnormal.

The ability to detect cases of atrial fibrillation or flutter by searching for digoxin prescriptions and by pulse palpation was compared with the results of the electrocardiograms, which were considered the optimal test. We also considered the effect of using both screening methods together. Confidence intervals

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Characteristics of methods of detecting people with atrial fibrillation, by age. Values are percentages (95% confidence intervals)

Method	Women		Men	
	≥75 (n=287)	65-74 (n=175)	≥75 (n=228)	65-74 (n=226)
Prescriptions for digoxin:				
Sensitivity	57 (29 to 82)	100 (16 to 100)	47 (24 to 71)	50 (12 to 88)
Specificity	98 (96 to 100)	99 (97 to 100)	96 (92 to 98)	98 (95 to 99)
Positive predictive value	67 (35 to 90)	67 (9 to 99)	50 (26 to 74)	38 (9 to 76)
Negative predictive value	98 (95 to 99)	100 (98 to 100)	95 (91 to 98)	99 (96 to 100)
Palpation of pulse:				
Sensitivity	93 (66 to 100)	100 (16 to 100)	95 (75 to 100)	100 (54 to 100)
Specificity	71 (66 to 77)	86 (81 to 91)	71 (65 to 77)	79 (74 to 84)
Positive predictive value	14 (7 to 22)	8 (1 to 25)	23 (14 to 34)	12 (4 to 23)
Negative predictive value	99 (97 to 100)	100 (98 to 100)	99 (96 to 100)	100 (98 to 100)
Both methods used together:				
Sensitivity	93 (66 to 100)	100 (16 to 100)	95 (75 to 100)	100 (54 to 100)
Specificity	71 (65 to 76)	86 (81 to 91)	69 (63 to 76)	78 (72 to 83)
Positive predictive value	14 (8 to 23)	8 (1 to 25)	22 (14 to 32)	12 (5 to 25)
Negative predictive value	100 (97 to 100)	100 (98 to 100)	99 (96 to 100)	100 (98 to 100)

around the test characteristics were calculated with Confidence Interval Analysis software.

The response rate to the survey was 74% (916/1235). As the predictive values of tests vary with the prevalence of the condition studied, and therefore with age and sex, the table shows test characteristics for each stratum separately. The sensitivity of using digoxin prescriptions as an indicator of atrial fibrillation was around 50% in most strata, and the specificity of this method was over 95% in all strata. The sensitivity of pulse palpation was over 90% in all groups, but the specificity of this method fell to 71% in the more elderly groups. Using both methods together produced similar results to using pulse character screening alone.

Comment

This paper reports the sensitivity, specificity, and positive and negative predictive values of two simple methods for detecting patients with atrial fibrillation or flutter. These test characteristics can be greatly affected by the prevalence of the condition of interest. The population we studied was representative of patients in primary care, and our results could be used by general practitioners to estimate the implications of screening in their practices.

Searching for digoxin prescriptions would be relatively simple but would detect only about half of people with atrial fibrillation. Recording the character of the pulse would detect almost all cases, but with a larger number of false positives. This could be done as part of a special screening programme, during routine health checks for elderly people, or opportunistically. Combining both methods provides no advantage over pulse screening alone in terms of test characteristics, but screening using prescriptions could be performed quickly, allowing a proportion of patients needing anticoagulation to be treated earlier than with pulse screening alone.

Atrial fibrillation or flutter fulfils most of the criteria set out by Cuckle and Wald for a worthwhile screening programme,⁵ but controlled trials of the effect of screening on clinical outcomes are needed. For practices that wish to detect cases of atrial fibrillation or flutter in advance of such trials, a combination of

searching for digoxin prescriptions and opportunistic pulse palpation would be a practical approach.

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Conflict of interest: None.

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Endpiece

Heredity and environment

It is not common for people to complain of ails they think hereditary 'till they are grown up; that is, 'till they have contributed to them by their own irregularities and excesses, and then are glad to throw their own faults back at their Parents, and lament a bad constitution when they have spoiled a very good one.

William Cadogan, "An Essay upon Nursing and the Management of Children, from their Birth to Three Years of Age" (1748)

Submitted by Ann Dally, Wellcome Institute for the History of Medicine