Primary Health Care Research & Development 2012; **13:** 22–29
doi:10.1017/S1463423611000077

RESEARCH

Health risk appraisal for older people 4: case finding for hypertension, hyperlipidaemia and diabetes mellitus in older people in English general practice before the introduction of the Quality and Outcomes Framework

Mareeni Raymond[1], **Steve Iliffe**[1], **Kalpa Kharicha**[1], **Danielle Harari**[2], **Cameron Swift**[3], **Gerhard Gillmann**[4] and **Andreas E. Stuck**[5]

[1]Department of Primary Care and Population Health, University College London, London, UK
[2]Department of Ageing and Health, St Thomas' Hospital, London, UK
[3]Kings College London, Clinical Age Research Unit, Kings College Hospital, London, UK
[4]Department of Social and Preventive Medicine, University of Bern, Bern, Switzerland
[5]University Department of Geriatrics, Spital Bern-Ziegler and Inselspital, Morillonstr, Bern, Switzerland

Background: Early intervention can help to reduce the burden of disability in the older population, but many do not access preventive care. There is uncertainty over what factors influence case finding in older patients in general practice. **Aim:** To explore factors associated with case finding for hypertension, hyperlipidaemia and diabetes mellitus in older patients. **Method:** Two thousand four hundred and ninety-one patients aged 65 years and above were recruited from three large practices in suburban London before the introduction of the Quality and Outcomes Framework (QOF) completed a questionnaire on health, functional status, health behaviours and preventive care. **Findings:** Those not reporting heart disease, diabetes or hypertension were included in a secondary data analysis to explore factors influencing uptake of preventive care measures. Approximately one-third denied having had a blood pressure check in the previous year. They were more likely to have had little contact with doctors and to have an unhealthy lifestyle (smoking and a high-fat diet). One-third reported a cholesterol test in the previous five years. Cholesterol measurement was reported more often by men and those with a high body mass index. Those with unhealthy lifestyles (smoking and high-fat diet), those who had only received the state pension and those who limited their activities because of a fear of falling were less likely to report cholesterol measurement. About 10% reported a fasting blood glucose measurement and were more likely to consult more often and have more medications, but they were less likely to have a high-fat diet. Preventive care uptake was associated with frequent contacts with doctors, but overall the uptake of preventive care was low. Older people with healthier lifestyles were more likely to have primary preventative care interventions. These findings provide a baseline against which the effect of the QOF on the care of older people can be measured in future studies.

Key words: ageing; general practice; older people; prevention; primary care

Received 22 July 2010; accepted 24 February 2011; first published online 21 April 2011

Correspondence to: Professor Steve Iliffe, Department of Primary Care and Population Health, University College London, Hampstead Campus, Rowland Hill St, London NW3 2PF, UK. Email: s.iliffe@ucl.ac.uk

Introduction

Older people are a high-risk group for functional disability, depression, social isolation and medical

illness, but they can benefit from good preventive primary care, with improved quality of life and potential reductions in hospital admissions. The evidence base for case finding and early intervention in primary care for hypertension, heart disease and diabetes has been robust for a decade or more (Iliffe *et al*., 2005a) and expectations of primary care based on this evidence are part of the National Service Frameworks for England and National Institute for Health and Clinical Excellence (NICE) guidelines. General practice is organised around case finding and risk factor assessment, but there appear to be variations in systematic preventive care.

There have been no previous studies in the United Kingdom into reasons for poor uptake of preventive care in the older population in Britain. However, studies from the United States can give hints about patient characteristics that promote or impede uptake of preventive care. For example, a study of a community-dwelling population aged 65 years and above examined preventive services in older people (German *et al*., 1995), and found that for men, being married and having a single-handed practitioner were positively associated with uptake of preventive care services. For women, having a confidant, a high school education and a female practitioner were associated with greater uptake of preventive care. Those using preventive care had a significantly lower death rate than those who did not: 8.3% versus 11.1%. In this study, those with very low and very high scores on a quality of life scale were significantly less likely to take up preventive care services, suggesting that the very ill and the very well did not see the benefit of doing so.

Another North American study showed that health-related functional limitations were associated with fewer attempts to change behaviour and less preventive care use (Green *et al*., 2003). Minority group membership and receipt of supplementary security income benefit were negatively associated with uptake of preventive services. Falls in the prior year, more use of prescription medications and receipt of psychiatric treatment were positively associated with use of preventive care, suggesting that regular contact with health providers leads to more opportunities for preventive medicine, at least in the US context.

The older populations of North America may think and act differently about their health than their peers in the United Kingdom, and we cannot extrapolate findings from the United States to the United Kingdom. This study explores the factors associated with older people's receipt of three case finding activities – blood pressure (BP), cholesterol and fasting blood glucose measurements – using data collected using a health risk appraisal questionnaire completed by older patients registered with four general practices in London in 2001.

These three activities were chosen because of the strength of the evidence base for case finding, and their incorporation in routine clinical practice. Absolute benefit from treatment of diastolic hypertension and isolated systolic hypertension is greater in older people than younger age groups, particularly with respect to cardiovascular complications (including heart failure) and vascular dementia (Veld *et al*., 2001). Antihypertensive treatment is beneficial until at least 80 years of age, and regular screening of BP should continue until this age. As a rule of thumb, a minimum annual check is appropriate for older individuals with no history of hypertension (British Hypertension Society, 1999). All older adults should have their total cholesterol levels tested every five years (SIGN, 1999). The estimated prevalence of unrecognised diabetes in older people (5%) and the frequently asymptomatic or non-specific clinical presentation in this population provide the basis for guidelines recommending screening every three years (Meltzer *et al*., 1998). The European Guidelines on diabetes in older people recommends that for those with risk factors, screening should be two-yearly for those aged 65–74 years, and annually for those aged 75 years and above.

This paper explores associations between the demographic and lifestyle characteristics of older people and their uptake of three preventive care activities, using baseline data from a randomised controlled trial of health promotion in people aged 65 years and above, recruited through general practice before the introduction of the Quality and Outcomes Framework (QOF) in the United Kingdom. This reimbursement framework was introduced in the United Kingdom in 2004 and is a voluntary incentive scheme for general practitioners' (GP) practices, containing indicators against which practices score points according to achievement. NICE is involved in developing the clinical and health improvement

indicators in the QOF, which include domains such as coronary heart disease and hypertension.

Methods

Three large group practices in suburban London were recruited to participate in a multi-centre, multinational randomised controlled trial investigating the effect of the health risk appraisal for older persons (HRA-O) on health behaviours and status (Stuck *et al*., 2002). Practices were purposively selected for their interest in primary care for older people, location in London (suburban) and routine use of electronic medical recording systems in clinical encounters. Local research ethics committee approval was obtained from the Brent Medical Ethics Committee and King's College Hospital Research Ethics Committee. A full account of the methodology of the study is available elsewhere (Stuck *et al*., 2007), including the recruitment of practices and patients, training of GPs in health promotion with older people, use of reminders and the evidence justifying the preventive care recommendations given. For more information on the HRA-O study and papers derived from it on the topics of social isolation, living alone, the experience of pain and predicting disablement, go to http://www.ucl.ac.uk/pcph/dev/research-groups-themes/age-stud-pub/previous-research/#6.

To identify eligible patients aged 65 years and above, practice lists were cleaned by GPs. Eligibility criteria were: those living at home, without (a) evidence of need for human assistance in basic activities of daily living; (b) high dependency due to major physical or psychiatric illness, or cognitive impairment; or (c) a terminal illness. Patients also had to have a sufficient level of English to complete the questionnaires. This patient population was further evaluated using the Probability of Recurrent Admissions (Pra) questionnaire (Pacala *et al*., 1993) and asked to complete a consent form, by post. The Pra measures the risk of hospital admission and stratifies the population by level of risk for future in-patient care, and was used in the main study as the basis for risk-stratified outcome analyses.

Eligible and consenting patients were posted the HRA-O questionnaire. The HRA-O is a multidimensional self-completion questionnaire that collects information on health, functional status, health behaviours, preventive care and psychosocial factors in older people (see Table 2). The development of the HRA-O questionnaire, the derivation of the instruments used in it, the exact definitions of categories (eg, 'low physical activity') and the feasibility of its use in British primary care have been reported elsewhere (Iliffe *et al*., 2005b).

To reduce the amount of missing information on self-reported preventative care uptake, participating general practices were asked to review patient medical records for information on preventative care use (vaccination coverage, blood glucose and cholesterol measurement, colon cancer screening) for those patients who had returned the one-year follow-up questionnaire but had incomplete information on some items of preventative care. In total, 97 patient records were reviewed and data from them added to the study database.

Three preventive care activities were selected for study: BP within the past year, cholesterol measurement within the past five years and fasting blood glucose measurement within the past three years. A subset of the study population was created by excluding all those who reported established diagnoses of hypertension, hyperlipidaemia, heart disease (of any kind) or diabetes mellitus so that measurements that were part of a risk factor or disease monitoring process could be distinguished from case finding activity. This subset was used to estimate the extent of case finding, and the factors associated with case finding for hypertension, hyperlipidaemia and diabetes.

Data analysis

Data from all the questionnaires were entered on a database designed for the study, with double data entry for purposes of quality control, and analysed in a two-stage process using SPSS 12 for Windows. In the first stage of the analysis, χ^2 tests were used to explore the associations between BP measurement in the past year, cholesterol measurement in the past five years and fasting blood glucose measurement in the past three years with: female gender, increasing age, low educational level, low income, current tobacco use, low physical activity (according to the PASE (physical activity scale for the elderly) score

Table 1 Preventive care uptake

	Whole sample		Subset	
	n	%	*n*	%
Blood pressure within the past year	1408/2491	41.5	613/950	64.5
Cholesterol measurement within the past five years	1274/2491	51.1	316/950	33.3
Fasting blood glucose measurement within the past three years	611/2491	24.5	106/950	11.2

(Washburn *et al*., 1993)), hazardous alcohol use, social isolation (measured with the Lubben social network scale (Lubben, 1998; Lubben and Gironda, 2000), living alone, limitation of activities due to a fear of falling, assistance with more than one IADL (Instrumental Activities of Daily Living), high-fat intake, low fibre/fruit consumption, memory impairment, multiple falls, low mental mood score, body mass index (BMI) < 20 and BMI $> 27\,kg/m^2$, receipt of four or more repeat medicines and frequent contact with doctors (defined as six or more visits per year).

In the second stage of the analysis, the variables with a significant association with preventive care were entered in a single step into the binary logistic regression model for each preventive care activity.

Results

Of the 3139 people aged 65 years and above who returned the questionnaires, 44.5% were male ($n = 1398$), 56.9% were below 75 years ($n = 1787$), 34.5% ($n = 907$) received the state pension only and 63.1% of the 2636 who answered questions on education had had a basic (up to secondary school level) education only ($n = 1663$). Six hundred and forty-eight did not answer the questions on preventive care uptake, giving a study population of 2491. A subset of this population, after exclusion of all those with hypertension, hyperlipidaemia, any form of heart disease or diabetes mellitus, consisted of 950 older people who did not have risk factors for vascular disease.

The proportions of respondents reporting uptake of different preventive care activities in the whole sample, and in the subset not being monitored for established biochemical or physiological risk factors or diseases, are shown in Table 1.

First stage analysis

Table 2 summarises the associations between uptake of preventive care and characteristics of the subset of older people without established biochemical or physiological risk factors or diseases. As multiple comparisons were made, a probability level of less than 0.01 was taken as significant; these associations are shown in bold.

Respondents were significantly more likely to report a BP measurement in the last year if they were taking four or more medicines, or had frequent contact with doctors. They were significantly less likely to report BP measurement if they were current tobacco users or had reduced their activity levels recently.

Cholesterol checks within the previous five years were reported significantly more often by those below 75 years, and by those who had frequent contact with doctors. Cholesterol measurement was reported significantly less often by women, those receiving only the state pension, those with a high-fat diet, those describing limitations in activity because of a fear of falling, those at risk of social isolation and those needing assistance with one or more IADLs.

Fasting blood glucose measurements were reported significantly more often by those who had frequent contact with doctors, and significantly less often by women and those with low fruit or fibre content in their diet.

Second stage analysis

Multivariate analysis of factors significantly associated with uptake of each preventive care activity showed different relationships between preventive care uptake (or not) and other aspects of health or lifestyle. Table 3 shows the significant associations (taking 95% CI above or below 1 as significant) with each case finding activity.

Table 2 Associations between preventive care uptake and demographic, health and lifestyle factors in the subset of the population without established biochemical or physiological risk factors or diseases

$n = 950$	Blood pressure measured			Cholesterol measured			Fasting glucose measured		
	OR	95% CI's	*P*-value	OR	95% CI's	*P*-value	OR	95% CI's	*P*-value
Demography									
Age 65–74 years ($n = 588$; 62%)	1.16	0.88–1.52	0.30	0.69	0.52–0.91	**<0.01**	0.74	0.48–1.14	0.18
Female ($n = 519$; 55%)	0.86	0.66–1.13	0.28	0.49	0.37–0.64	**<0.01**	0.60	0.40–0.90	**<0.01**
Higher education ($n = 365$; 38%)	1.03	0.78–1.35	0.84	0.90	0.68–1.18	0.44	0.80	0.53–1.21	0.30
State pension only ($n = 300$; 32%)	0.99	0.74–1.32	0.93	1.80	1.32–2.44	**<0.01**	1.19	0.76–1.86	0.45
Living alone ($n = 276$; 29%)	0.93	0.68–1.25	0.62	0.75	0.55–1.03	0.07	0.75	0.47–1.20	0.23
Service use									
Four or more repeat medicines ($n = 122$; 13%)	3.85	2.26–6.56	**<0.01**	1.32	0.89–1.95	0.17	1.53	0.89–2.62	0.12
Frequent doctor visits ($n = 638$; 67%)	4.38	3.26–5.88	**<0.01**	1.67	1.23–2.27	**<0.01**	1.99	1.20–3.32	**<0.01**
Lifestyle									
Current tobacco use ($n = 109$; 12%)	0.54	0.36–0.81	**<0.01**	0.57	0.36–0.90	0.02	0.96	0.51–1.83	0.908
Low physical activity ($n = 185$; 19.5%)	1.10	0.78–1.54	0.59	0.80	0.57–1.14	0.22	0.80	0.57–1.14	0.22
Hazardous alcohol use ($n = 177$; 19%)	0.69	0.50–0.97	0.03	1.22	0.87–1.72	0.25	0.40	0.86–2.27	0.17
High-fat intake ($n = 803$; 85%)	0.83	0.52–1.33	0.44	0.40	0.25–0.62	**<0.01**	0.55	0.30–1.01	0.05
Low fruit and fibre intake ($n = 592$; 70%)	0.79	0.59–1.06	0.12	0.79	0.59–1.06	0.12	0.59	0.38–0.90	**<0.01**
BMI									
BMI < 20 ($n = 50$; 5%)	1.30	0.70–2.43	0.40	0.46	0.23–0.93	0.03	0.86	0.33–2.21	0.75
BMI > 27 ($n = 263$; 28%)	1.01	0.75–1.36	0.95	0.11	0.10–1.80	0.05	1.17	0.75–1.82	0.48
Function									
At risk of social isolation ($n = 147$; 15%)	0.68	0.47–0.97	0.03	0.6	0.40–0.90	0.01	0.74	0.40–1.36	0.33
Multiple falls ($n = 91$; 10%)	1.35	0.84–2.16	0.21	0.80	0.50–1.29	0.36	0.87	0.42–1.78	0.70
Assistance with one or more IADL ($n = 295$; 31%)	1.10	0.88–1.47	0.53	0.65	0.48–0.88	**<0.01**	0.61	0.38–0.98	0.04
Decreased frequency of activities ($n = 267$; 28%)	1.52	1.11–2.07	**<0.01**	0.842	0.62–1.14	0.27	0.18	0.44–1.17	0.18
Psychological well-being									
Memory impairment ($n = 85$; 9%)	1.17	0.72–1.89	0.52	0.99	0.62–1.58	0.96	0.91	0.44–1.88	0.80
Fear of falling ($n = 194$; 20%)	1.42	1.01–2.00	0.05	0.57	0.39–0.81	**<0.01**	0.78	0.46–1.34	0.37
Depressed mood ($n = 139$; 15%)	1.08	0.74–1.58	0.69	0.69	0.46–1.03	0.07	1.03	0.59–1.81	0.91

IADL = Instrumental Activities of Daily Living.
BMI = body mass index.
ORs are unadjusted.
Variable denominators reflect incomplete answers to questions.

Table 3 Findings from logistic regression analysis

	Increased likelihood of measurement being reported is associated with	Decreased likelihood of measurement being reported is associated with
BP check in the last year	Frequent doctor visits OR 5.05 (95% CI 3.50–7.28) Four or more repeat medications OR 3.06 (95% CI 1.52–6.18)	Current tobacco use OR 0.54 (95% CI 0.34–0.9) High-fat consumption OR 0.50 (95% CI 0.26–0.96)
Cholesterol measurement in the past five years	Frequent doctor visits OR 1.97 (95% CI 1.34–2.90) BMI 27 or more OR 1.55 (95% CI 1.07–2.24) Receiving more than only the state pension OR 1.80 (95% CI 1.32–2.44)	Female sex OR 0.70 (95% CI 0.50–0.99) Current tobacco use OR 0.35 (95% CI 0.19–0.63) High-fat consumption OR 0.25 (95% CI 0.14–0.45) Reduced activity because of fear of falling OR 0.52 (95% CI 0.31–0.87)
Fasting glucose measurement in the past three years	Frequent doctor visits OR 2.24 (95% CI 1.21–4.15) Four or more repeat medications OR 2.27 (95% CI 1.18–4.34)	High-fat consumption OR 0.49 (95% CI 0.24–0.97)

BP = blood pressure; BMI = body mass index.
Variable denominators reflect incomplete answers to questions.

Discussion

Summary of main findings

BP measurement is a routine activity in general practice, but almost 60% of the whole study population and approximately one-third of older people without a diagnosis of hypertension, heart disease or diabetes reported that they had not had a BP check in the previous year. Little is known about factors associated with BP monitoring for primary prevention in healthy older people. In this population, those reporting no BP check were more likely to have had no or little contact with doctors, and to have an unhealthy lifestyle, in terms of tobacco use and a high-fat diet.

One-third of the subgroup without relevant diagnoses reported having their cholesterol tested in the previous five years. Cholesterol measurement was reported more often by men and those with a high BMI. Older people with an unhealthy lifestyle (in terms of smoking and having a high-fat diet) were less likely to report a cholesterol measurement, as were those who had curtailed their activities because of a fear of falling.

About 10% of the subgroup without relevant diagnoses reported having had a fasting blood glucose measurement in the previous three years. This test was reported significantly more often by those who had had two or more consultations with doctors, and by those receiving four or more repeat medications. The test was reported less often by those describing a high-fat diet.

Among those with frequent visits to their doctor, uptake was significantly higher as compared to those with less frequent visits. Those with a low number of doctor visits were at a high risk for not having the recommended preventive care. However, even among those with a higher number of doctor visits, there was still a considerable proportion of persons not having had the recommended preventive care.

Limitations of the study

Owing to the cross-sectional nature of the data, it is not possible to determine causality in the relationships between preventive care uptake and other characteristics of older people. There are also a number of methodological limitations, which should be taken into account when interpreting the results of this study. The sample was drawn from three general practices in suburban London and, subject to eligibility criteria and disability screening, implemented for recruitment into a trial of health promotion, which may limit the generalisability of the results. The use of preventive care in this sample

may be different from that in the general population of older primary care patients, partly because we deliberately excluded disabled older people and partly because the participants were a self-selecting subgroup who returned lengthy questionnaires. We may be underestimating the extent of case finding because an individual found to have, for example, raised BP in the year before the study could have acquired the diagnosis of hypertension through case finding, but have been excluded from our analysis. The one-year follow-up study which was used to provide supplemental data did not include complete information as some patients did not answer certain questions that had not been used in the second study, and again, questions that were asked in the one-year follow-up study were not all used in the initial questionnaire. Finally, the self-report of diagnoses and of preventive care uptake may be inaccurate.

Comparison with existing literature

The benefits of treating older people with hypertension are greater than in younger age groups, in terms of cardiovascular outcomes like heart failure and vascular dementia (British Hypertension Society, 1999). Antihypertensive treatment is beneficial at least until the age of 80 years, and regular screening of BP is recommended until this age. The current guidelines have recommended that once the treatment is started, it should be continued after the age of 80 years. The GPs of the respondents in this study were checking BPs in older patients, at all ages, but a subgroup with lifestyle risk factors for heart disease appears to have been missed.

At the time of this study, it was recommended that all older adults should have their total cholesterol levels tested every five years, in combination with an assessment for other cardiovascular risk factors (SIGN, 1999). In this sample, cholesterol testing was associated with some risk factors for heart disease, but not others. The lower likelihood of reporting a cholesterol test in the older age group is consistent with the lack of evidence of effectiveness of lipid-lowering therapies for individuals aged 75 years and above, and the gender difference reflects the different prevalence of heart disease in men and women (McKnight and Powell, 2006).

Consensus guidelines recommend screening older people for diabetes every three years (Clinical practice guidelines for the management of diabetes in Canada, 1998) because of the relatively high prevalence of unrecognised diabetes, and its non-specific clinical presentation. Diabetes is more prevalent in men than women at all ages over 65 years (Personal communication, 2009), making the sex difference in testing congruent with the epidemiology of the disease if not with clinical guidelines. The independent association between polypharmacy and increased uptake of diabetes screening suggests that contact between older people and practitioners for medication monitoring increases the likelihood of preventive care being offered and given.

The independent association between increased uptake of preventive activities and frequent doctor visits implies that opportunist case finding is occurring. Those with risk factors for illness and disability like smoking, low levels of physical activity and high-fat or low-fibre intake were less likely to report having cholesterol and blood sugar measurements, suggesting that this subgroup with unhealthy lifestyles may not be offered or avoid preventive care. High fat consumption is the only variable negatively associated with all three preventive care activities, and may be a marker for higher health risks.

Conclusions

This study was conducted before the introduction of the QOF, and showed that overall the uptake of preventive care was low. Case finding did not appear to target those most at risk, as a subgroup of older people with less healthy lifestyles (smoking and high-fat diet) were less likely to take up cholesterol tests and diabetes screening. High-risk groups such as those with a poor lifestyle and those who did not see their doctor frequently may need to be targeted to improve their access to preventive care. These findings provide a baseline against which the effect of the QOF on the care of older people can be measured in future studies.

Acknowledgements

The authors thank the practices and patients involved in the study. This study was funded by the European Commission project QLK6-CT-1999-02205 and

the Federal Education Science Ministry, Bern, Switzerland BBW 990311.1. Local research ethics committee approval was obtained from Brent & Harrow ethics committee and Kings College Hospital ethics committee. The authors have no conflicts of interest to declare.

References

British Hypertension Society. 1999: Guidelines for management of hypertension: report of the third working party of the British Hypertension Society. *Journal of Human Hypertension* 13, 569–92.

Meltzer, S., Leiter, L., daneman, D., Gerstein, H.C., Lau, D., Ludwig, S., Yale, J.F., Zinman, B. and **Lillie, D.** 1998: Clinical practice guidelines for the management of diabetes in Canada. *Canadian Medical Association Journal* 159 (Suppl 8), S1–28.

European Guidelines on diabetes in older people. 2001–2004: Clinical Guidelines for Type 2 diabetes mellitus. Retrieved 16 March 2011 from http://www.instituteofdiabetes.org/wpcontent/themes/IDOP/other/diabetes_guidelines_for_older_people.pdf

German, P.S., Burton, L.C., Shapiro, S., Steinwachs, D.M., Tsujji, I., Paglia, M.J. and **Damiano, A.M.** 1995: Extended coverage for preventive services for the elderly: response and results in a demonstration population. *American Journal of Public Health* 85, 379–86.

Green, C.A., Polen, M.R. and **Brody, K.K.** 2003: Depression, functional status, treatment for psychiatric problems, and the health-related practices of elderly HMO members. *American Journal of Health Promotion* 17, 269–75.

Iliffe, S., Harari, D. and **Swift, C.** 2005a: Older people. In Lakhani, M. and Charlton, R., editors, *Recent advances in primary care.* RCGP Publications, 289–304.

Iliffe, S., Kharicha, K., Harari, D., Swift, C. and **Stuck, A.** 2005b: A health risk appraisal for older people in general practice using an expert system: a pilot study. *Health and Social Care in the Community* 13, 21–29.

McKnight, C., and **Powell, C.** 2006: Epidemiology of heart disease. In Pathy, J., Sinclair, A., Morley, J., editors, *Principles & practice of Geriatric medicine*, fourth edition. London: Wiley, 475–85.

Lubben, J.E. 1998: Assessing social networks among elderly populations. *Family and Community Health* 11, 42–52.

Lubben, J.E. and **Gironda, M.W.** 2000: Social support networks. In Osterweil, D., Brummel-Smith, K. and Beck, J.C., editors, *Comprehensive geriatric assessment*. New York: McGraw Hill Publisher, 121–37.

Pacala, J.T., Boult, C. and **Boult, L.** 1993: Predictive validity of a questionnaire that identifies older persons at risk for hospital admission. *Journal of the American Geriatrics Society* 43, 374–77.

Personal communication. 2009: Data kindly supplied from the Somerset Morbidity Project and CHDGP (June 1998). Data is amalgamated from 14 schemes across the UK. (Special thanks to Mrs Lesley Gallier).

Scottish Intercollegiate Guidelines Network (SIGN). 1999: Lipids and the primary prevention of coronary heart disease. Retrieved 16 March 2011 from http://www.show.scot.nhs.uk/sign/clinical.htm

Stuck, A.E., Elkuch, P., Dapp, U., Anders, J., Iliffe, S., Swift, C. and **For the Pro-Age Pilot Study Group.** 2002: Feasibility and yield of a self-administered questionnaire for health risk appraisal in older people in three European countries. *Age and Ageing* 31, 463–67.

Stuck, A.E., Kharicha, K., Dapp, U., Anders, J., von Renteln Kruse, W., Meier-Baumgartner, H., Iliffe, S., Harari, D., Bachmann, S., Egger, M., Gilman, G., Beck, J. and **Swift, C.** 2007: Health Risk Appraisal for older persons: design of an international randomised trial based in general practice. *BMC Medical Research Methodology* 7, 1, (www.biomedcentral.com/1471-2288/7/1/abstract).

Veld, B.A., Ruitenberg, A. and **Hofman, A.** 2001: Antihypertensive drugs and incidence of dementia: the Rotterdam study. *Neurobiology of Aging* 22, 407–12.

Washburn, R.A., Smith, K.W., Jette, A.M. and **Janney, C.A.** 1993: The physical activity scale for the elderly (PASE): development and evaluation. *Journal of Clinical Epidemiology* 46, 153–62.