START (screening tool to alert doctors to the right treatment)—an evidence-based screening tool to detect prescribing omissions in elderly patients

P. J. Barry[1], P. Gallagher[1], C. Ryan[2], D. O'Mahony[1]

[1]Cork University Hospital, Department of Geriatric Medicine, Ireland
[2]University College Cork, School of Pharmacy, Ireland

Address correspondence to: P. J. Barry. Email: pat_barry@eircom.net

Abstract

Background inappropriate prescribing encompasses acts of commission i.e. giving drugs that are contraindicated or unsuitable, and acts of omission i.e. failure to prescribe drugs when indicated due to ignorance of evidence base or other irrational basis e.g. ageism. There are considerable published data on the prevalence of inappropriate prescribing; however, there are no recent published data on the prevalence of acts of omission. The aim of this study was to calculate the prevalence of acts of prescribing omission in a population of consecutively hospitalised elderly people.

Methods a screening tool (screening tool to alert doctors to the right treatment acronym, START), devised from evidence-based prescribing indicators and arranged according to physiological systems was prepared and validated for identifying prescribing omissions in older adults. Data on active medical problems and prescribed medicines were collected in 600 consecutive elderly patients admitted from the community with acute illness to a teaching hospital. On identification of an omitted medication, the patient's medical records were studied to look for a valid reason for the prescribing omission.

Results using the START list, we found one or more prescribing omissions in 57.9% of patients. In order of prevalence, the most common prescribing omissions were: statins in atherosclerotic disease (26%), warfarin in chronic atrial fibrillation (9.5%), anti-platelet therapy in arterial disease (7.3%) and calcium/vitamin D supplementation in symptomatic osteoporosis (6%).

Conclusion failure to prescribe appropriate medicines is a highly prevalent problem among older people presenting to hospital with acute illness. A validated screening tool (START) is one method of systematically identifying appropriate omitted medicines in clinical practice.

Keywords: *inappropriate prescribing, elderly, acute illness, START screening tool*

Introduction

0 Inappropriate prescribing of medications in older people is an important cause of morbidity and mortality and has been studied well in Europe and the United States [1–9]. It encompasses the overuse of drugs, prescribing drugs that are predictably tolerated poorly by most older people, prescribing drugs that are likely to exacerbate a clinical problem in an older person (e.g. benzodiazepines in the presence of recurrent falls) and the underuse of appropriate medication [2]. Most of the published literature on inappropriate prescribing in late life deals with acts of commission, i.e. the prescribing of drugs that should be avoided. There is also literature on underprescribing in the elderly although most studies identify single instances only. In contrast, there are very few published data on screening tools that measure multiple acts of prescribing omission i.e. the failure on the part of doctors to prescribe drugs that are

clearly indicated and likely to benefit the patient [10–12]. This may, in part, result from the lack of suitable screening tools designed to alert the clinician to consider indicated drugs when identified in individual patients. Screening tools designed to detect acts of commission of inappropriate prescribing in elderly patients, such as Beers' criteria [13–15] and the inappropriate prescribing the elderly tool (IPET) [16, 17] have been researched widely, although not used routinely in clinical practice.

The aims of this study were therefore threefold: (i) to devise and validate an evidence-based screening tool for indicated medicines of particular relevance to older people and (ii) to determine the prevalence of omission of indicated medicines in a population of older people hospitalised with acute illness. As a corollary to these aims, we also sought to (iii) calculate the cost of prescribing the indicated but omitted medicines in this population of patients.

Methods

A senior academic geriatrician (DOM) composed the original list of prescribing criteria on the basis of extensive literature review, recent texts on geriatric pharmacotherapy and clinical experience. Twenty two evidence-based common prescribing indicators for elderly patients were identified and arranged according to the relevant physiological systems into a systematic list called screening tool to alert doctors to the right treatment (i.e. indicated, but not prescribed) (START) for older people. Eighteen experts, with recognised credentials in their specialist areas, were invited by letter to participate in the Delphi process [18]. Study design and aims were explained. The panel comprised teaching hospital consultants in geriatric medicine ($n = 9$), clinical pharmacology ($n = 3$) and old age psychiatry ($n = 1$), two senior academic primary care physicians and three senior hospital pharmacists with an interest in geriatric pharmacology. In addition to seeking consensus from the panel on the list of 22 specific evidence-based prescribing indicators, we asked each panel member to suggest any further important prescribing indications.

The first round questionnaire was posted to each panellist and START criteria were presented as statements describing each instance of potentially inappropriate prescribing in people aged 65 years. The Delphi process was completed in two rounds and full consensus was reached without the need to proceed to a third round. Subsequently, inter-rater reliability was addressed by the review of 100 charts by two observers using the START tool. A κ-coefficient of 0.68 was calculated. This suggested that the tool performed well with substantial agreement obtained.

The local research ethics committee approved the patient study protocol. The validated version of START (Figure 1) was applied to concurrent medical diagnostic and prescription information in a prospective, unselected consecutive cohort of 600 community-dwelling patients (aged 65 years and over) on admission to hospital with acute illness. The mean age (SD) of the patients was 77.9 (6.8) years. Two hundred and one patients were aged 65–74 years (33% of total), 299 patients were aged 75–84 years (50%) and the remaining 100 patients were aged 85 years or over (17% of total). Fifty-six per cent of the patients were female. Patients who were resident in local community hospitals were excluded because of the possible influence of hospital-based consultant geriatricians on their medications (regular input into community hospital care of elderly people being part of the remit of geriatricians in the catchment area of the teaching hospital where the research was carried out). Baseline demographic information was obtained as well as the results of relevant baseline investigations from each patient's hospital case records. Medical co-morbidities and the full list of current medications list were documented following detailed clinical assessment and prescription review at the time of admission to hospital, and before any changes to medications were made by the attending physician in the hospital. These lists were documented from a number of sources including General Practitioners referral letters, the patients' own medication list, pharmacy records where necessary and the hospital admission records and notes. Data capture occurred once for each patient and was completed by a specialist registrar in geriatric medicine, supported by an experienced research nurse. Medication details were corroborated from as many sources as possible. The START criteria were then applied to the defined handwritten list of co-morbidities on the day of hospital admission and the patients' medication lists on admission. The number of omitted appropriate prescriptions was identified and recorded accordingly. The precise definition of co-morbidities on admission facilitated deployment of the START tool in less than 3 minutes in the majority of cases.

The contra-indications to the medicines in the START tool refer to the clearly defined contra-indications specified in the British National Formulary [British National Formulary: 48th edition (Sep 2004)]. Formalised assessment tools scoring was not used in the tool. This was partly to allow for variations in assessments used in different centres but also to prevent a screening tool from becoming an over-elaborate document requiring inclusion of multiple other assessment tools.

In addressing the secondary aim of calculating the financial cost of those indicated but omitted medicines, current drug-manufacturing costs (wholesale costs) were derived from a national formulary of prescription medicines. [Medical Publications (Ireland) Limited, Monthly index of medical specialties. Dublin; September 2004.] Where possible, the costs of the cheapest generic formulation of the indicated but omitted medicines were calculated. Cost calculation was based on 30 days' prescription of each indicated but omitted medicine, excluding pharmacist's dispensing charges which are variable.

Results

A total of 3,234 medications were prescribed to the 600 patients up to the point of acute admission to hospital. The median number of medications per patient was five. Using

Cardiovascular System
 (i)   Warfarin in the presence of chronic atrial fibrillation, where there is no contraindication to warfarin.
 (ii) Aspirin in the presence of chronic atrial fibrillation, where warfarin is contraindicated, but not aspirin.
 (iii) Aspirin or Clopidigrel with a documented history of coronary, cerebral or peripheral vascular disease in patients in sinus rhythm, where therapy is not contraindicated.
 (iv) Antihypertensive therapy where systolic BP consistently >160 mmHg, where antihypertensive therapy is not contraindicated.
 (v)   Statin therapy in patients with documented history of coronary, cerebral or peripheral vascular disease, where the patients' functional status remains independent for activities of daily living and life expectancy id more than 5 years
 (vi) ACE inhibitor in chronic heart failure, where no contraindication exists.
 (vii) ACE inhibitor following acute myocardial infection.
 (viii) Beta blocker in chronic stable angina, where no contraindication exists.

Respiratory System
 (i)   Regular inhaled β2-agonist or anti-cholinergic agent for mild to moderate asthma or COPD
 (ii) Inhaled steroid in moderate-severe asthma or COPD, where reversibility of airflow obstruction has been shown.
 (iii) Home continuous oxygen where chronic type 1 respiratory failure ($pO_2 < 8.0kPa$, $pCO_2 < 6.5kPa$) or type 2 respiratory failure ($pO_2 < 8.0kPa$, $pCO_2 > 6.5kPa$) has been well documented and where there is no contraindication to continuous oxygen therapy.

Central Nervous System
 (i)   L-DOPA in idiopathic Parkinson's disease with definite functional impairment and resultant disability.
 (ii) Antidepressant in the presence of clear-cut depressive symptoms, lasting at least 3 months.

Gastrointestinal System
 (i)   Proton pump inhibitor in the presence of chronic severe gastro-oesophageal acid reflux or peptic stricture requiring dilatation.
 (ii) Fibre supplement for chronic, symptomatic diverticular disease with constipation.

Locomotor System
 (i)   Disease-modifying anti-rheumatic drug (DMARD) with known, moderate–severe rheumatoid disease lasting more than 12 weeks.
 (ii) Bisphosphonate in patients taking glucocorticoids for more than 1 month (i.e. chronic corticosteroid therapy).
 (iii) Calcium and vitamin D supplement in patients with known osteoporosis (previous fragility fracture, acquired dorsal kyphosis).

Endocrine System
 (i)   Metformin with type 2 diabetes +/– Metabolic Syndrome (in the absence of renal impairment present i.e. blood urea >12.0 mmol/l, ± serum creatinine >200 mmol/l).
 (ii) ACE inhibitor or Angiotension Receptor Blocker in diabetes with nephropathy i.e. overt dipstick proteinuria or microalbuminuria (>30 mg/24 h) ± serum biochemical renal impairment (blood urea > 8.0 mmol/l or serum creatinine >130 µmol/l).
 (iii) Aspirin therapy in diabetes mellitus with well controlled blood pressure.
 (iv) Statin therapy in diabetes mellitus if fasting serum cholesterol >5.0 mmol/l or additional cardiovascular risk factor(s) present.

Figure 1. Screening tool to alert doctors to the right (i.e. indicated, but not prescribed) treatment for older people (START).

the START criteria, one or more appropriate medicines were omitted in 347 (57.8%), where no contra-indication existed. The probability of omission of an appropriate medicine increased with advancing age (detailed below). The medications omitted are detailed here. These were in order of frequency: statins for atherosclerotic cardiovascular disease, warfarin thrombo-embolic prophylaxis in chronic atrial fibrillation, angiotensin coverting enzyme (ACE) inhibitor therapy for congestive cardiac failure, aspirin for symptomatic stenotic arterial disease and calcium supplementation for established symptomatic osteoporosis (i.e. prior history of fragility fractures). See Table 1.

The top five 30-day prescription costs (rounded off to the nearest Euro) associated with these indicated but omitted medicines for all 600 patients were as follows in order of decreasing cost:

(i) Statins in symptomatic cardiovascular disease .. €3926
(ii) Bisphosphonates with long term corticosteroid treatment €1056
(iii) ACE inhibitors in congestive cardiac failure €738
(iv) Statins in diabetes mellitus with hypercholestero laemia €604
(v) ACE inhibitors with a prior history of myocardial infection €446

Table 1. Itemised 30-day cost of indicated, but omitted generic drug therapy in 600 acutely- ill hospitalised elderly people, based on START criteria

Indication	Medication	No. of subjects	Daily dose (mg)	30 day cost (€)	Omitted med's cost (€)
• Statin therapy in patients with documented history of vascular disease	Atorvastatin	156	10	25.17	3926.52
• Warfarin in the presence of chronic atrial fibrillation	Warfarin	57	10	5.70	303.90
• ACE inhibitor in chronic heart failure	Ramipril	48	5	15.38	738.24
• Aspirin with a documented history of coronary, cerebral or peripheral vascular disease	Aspirin	44	75	2.24	98.56
• Calcium and vitamin D supplement in patients with osteoporosis	Calcium/vitamin D	35	1 g/800 iu	10	350
• Metformin with type 2 diabetes +/− metabolic syndrome	Metformin	34	1500	2.88	97.92
• Bisphosphonate in patients taking glucocorticoids >1 month	Alendronate/weekly	30	70	35.26	1057.80
• ACE inhibitor following acute myocardial infection.	Ramipril	29	5	15.38	446.02
• β-blocker in chronic angina	Bisoprolol	28	5	8.51	238.28
• Regular inhaled β 2-agonist or anti-cholinergic agent for mild to moderate asthma or COPD	Salbutamol	24	0.2	3.31	79.44
• Inhaled steroid in moderate−severe asthma or COPD	Budesonide	24	0.4	24.02	576.48
• Statin therapy in diabetes mellitus if fasting serum cholesterol >5.0 mmol/l	Atorvastatin	24	10	25.17	604.08
• ACE inhibitor in diabetes with overt proteinuria or microalbuminuria	Ramipril	23	5	15.38	353.74
• Aspirin therapy in diabetes mellitus with well controlled BP	Aspirin	16	75	2.24	35.84
• Aspirin in the presence of chronic atrial fibrillation, where warfarin contra-indicated	Aspirin	14	75	2.24	31.36
• Disease-modifying drug with known, moderate-severe rheumatoid disease	Methotrexate	13	7.5	2.00	26.00
• Antidepressant in the presence of clear-cut depression	Citalopram	10	10	17.39	173.90
• Antihypertensive therapy	Bendrofluazide	8	2.5	1.40	11.20
• Fibre supplement for chronic, symptomatic diverticular disease with constipation.	Fybogel	4	2 sachets	2.92	8.76
• PPI in the presence of chronic severe gastro-oesophageal acid reflux or peptic stricture requiring dilatation.	Omeprazole	4	20	41.46	165.84
• L-DOPA in Parkinson's disease with definite functional impairment	Levodopa + Carbidopa	4	62.5 × 3	10.12	40.48
• Home continuous oxygen where chronic type 1 or type 2 respiratory failure has been well documented.	Oxygen concentrator	0	N/A	76.82	0

Total cost of medications/month €9364.34

Details of the total 30-day costs of omitted but indicated medicines are shown in Table 1. The total cost of all omitted medications for the patient group was €9364.34. The probability of omission of a potentially appropriate medication was significantly related to patients' age. The likelihood of having an appropriate medication omitted did not change in the 65–74 age group (55.2% with one medication omitted) and the 75–84-year-old group (54.8% with one medication omitted)—Odds Ratio 1.0512, CI 0.71–1.45, $P = 0.93$. However there was a significant likelihood of omission of appropriate medication in the group older than 85 years (72.2% with one medication omitted)—Odds Ratio 2.08, CI 1.24–3.50, $P<0.01$. The likelihood of having an appropriate medication omitted in females compared to males was also increased (Odds Ratio 2.29, CI 1.65–3.19, $P<0.01$).

Discussion

This study describes the development and validation of a new systems-based tool to help medical practitioners identify possible appropriate medications in older adults. It was validated using a technique described previously in other similar tools [15–17]. It may prove useful if applied in a prospective manner in primary care and in an acute general medical setting among hospital in-patients. One of the major limitations in the use of tools to identify prescription of inappropriate medications or underutilisation of appropriate drugs is that studies to date have in essence calculated only prevalence rates and have not identified if these tools can actually influence prescribing in the longer term. There is scant evidence to support the clinical benefit of these tools and well-designed pragmatic randomised controlled trials are required to evaluate this.

This is one of the few studies to report the rate of omission of appropriate, evidence-based medicines in elderly people [10–12, 19, 20] In the current study, over half of the elderly acutely-ill newly hospitalised patients—57.9%—had at least one appropriate medication omitted from their list of regular prescription medicines. The probability of not receiving an appropriate medication increased with age over 85 years and female gender. Failure to prescribe appropriate medicines, which have a proven important role in primary and secondary disease prevention, could have a substantial clinical and economic impact over time, although there are, as yet, no prospective randomised controlled trial data to support this suggestion. Our data show that the over 85 age group were less likely to be prescribed appropriately; this may reflect a desire to avoid polypharmacy or lack of clear-cut evidence of efficacy of particular therapeutic interventions in this age group. Limitations in data collection could have underestimated use of appropriate medications also and complete records of patients' medication lists depended on access to referring general practitioners' letters or the patients' own list of medicines. However, where there were doubts about prescribed agents, confirmation was sought by telephone from the patients' general practitioners and in some instances, from the dispensing pharmacy to ensure the list of medications included in the study were complete and accurate.

The financial cost of the omitted medicines was not large; in this study it was calculated at € 112,745 per year for the 600 subjects, this being the wholesale cost of the omitted drugs in generic form (and not including extra costs such as pharmacists' dispensing fees and use of non-generic drugs). This may seem substantial until viewed with the perspective of secondary prevention. For example, 71 subjects with chronic atrial fibrillation did not receive warfarin or aspirin, despite the absence of clear-cut contra-indications to these medicines. In this patient age group not receiving thrombo-embolic prophylaxis, the annual risk of stroke is approximately 10–15% [21]. Therefore, in the 71 patients with chronic atrial fibrillation and intrinsic heart disease, approximately 7–11 stroke events would be expected in this group each year. Warfarin therapy would be expected to reduce the annual stroke risk by approximately 60% i.e. to prevent 4–7 cases of avoidable stroke [21]. The total cost of treating these 4–7 stroke cases in a teaching hospital in 2006 is calculated at € 38,000 (4 cases) to € 66,500 (7 cases). This estimate is based on recent cost estimations and taking annual healthcare inflation taken into account [22]. However, it is recognised that warfarin therapy in this age group does carry a risk of bleeding and this cost may also needed to be taken.

However, omission of evidence-based appropriate medicines by physicians in almost 58% of elderly patients being hospitalised with acute illness remains unacceptably high. The present study was not designed to identify the precise reasons for this high omission rate. There are several possible reasons for this finding. These include a lack of knowledge of evidence-based secondary preventive therapies, low levels of therapeutic expectation in frail people aged over 80 years, a desire to avoid polypharmacy, greater focus on palliation of symptoms than on secondary disease prevention and, in some cases, negative ageist and sexist attitudes leading to therapeutic nihilism. There is limited evidence for many drug therapies in the over 80 year age group and some decisions not to prescribe certain drugs in the over 80s may have been rational, based on the lack of high quality evidence, in certain age groups. Further work needs to be done to clarify the main causes of inappropriate omission of medicines, since these causes will determine the necessary interventions needed for corrective action. This is particularly relevant given that, ironically, the most frequent omissions of evidence-based preventive drug therapy in the present study related to cardiovascular disease, the leading cause of death in older people globally.

The real clinical value of screening tools for inappropriate medication remains unclear. Several studies describe the prevalence of prescription of inappropriate drugs in older people, using screening tools such as Beers' criteria and IPET [13–17]. However, whether the regular use of such screening tools in day-to-day clinical practice results in significantly reduced morbidity, hospitalisation and mortality

remains speculative. Similarly, it is unknown whether the routine use of inappropriate prescription-screening tools leads to significant drug expenditure savings. Future large scale randomised controlled studies will need to focus on these fundamental research questions, if screening tools are to have any clinical value in routine practice.

In conclusion, the present study shows that the prevalence of omission of evidence-based appropriate drug therapy in acutely-ill hospitalised elderly people was high, particularly in relation to cardiovascular disease prevention. START is a validated, effective and easy-to-use systems-based screening tool that is capable of identifying inappropriate omission of essential drug therapy in a matter of minutes. Further work needs to be done using START in other populations of elderly people, such as non-hospitalised elderly people living at home and in nursing homes. Ideally, START would be combined with a complimentary screening tool for identifying drug therapy that may need to be avoided in the same patient. To this end, we have completed preliminary validation work on such a complimentary screening tool to START, called screening tool of older persons' potentially inappropriate prescriptions (STOPP). Similar to START, STOPP is systems-based and evidence-based, and is quick and easy to use in day-to-day practice. Our research group is currently completing the Delphi validation of STOPP.

Acknowledgements

Conflicts of interest

None

Key points

- START (screening tool to alert doctors to the right treatment) is an evidence-based, systems-defined screening tool to detect prescribing omissions in elderly patients and has been validated using best practice.
- The use of the START tool identified that approximately 57% of older adults admitted to a teaching hospital had at least one appropriate medication omitted.
- Older female adults were significantly more likely not to have appropriate medication prescribed. This may reflect the age bias of most large scale randomised controlled trials.

References

1. Barry M. Drug expenditure in Ireland 1991–2001. Ir Med J 2002; 95: 294–5.

2. Kinirons MT, Wood AJJ. Pharmacokinetics. In: George CF, Woodhouse K, Denham MJ eds. Drug Therapy in Old Age. Wiley 1998.

3. Juurlink DN, Mamdami M, Kopp A *et al*. Drug-drug interactions among elderly patients hospitalised for drug toxicity. JAMA 2003; 289: 1652.

4. Onder G, Pedone C, Landi F *et al*. Adverse drug reactions as a cause of hospital admissions: results from the Italian Group of Pharmacoepidemiology in the Elderly (GIFA). J Am Geriatr Soc 2002; 50: 1962.

5. Goldberg RM, Mabee J, Chan L *et al*. Drug-drug and drug-disease interactions in the emergency department: analysis of a high-risk population. Am J Emerg Med 1996; 14: 447–50.

6. Hanlon JT, Schmader KE, Kornkowski MJ *et al*. Adverse drug events in high risk older outpatients. J Am Geriatr Soc 1997; 45: 945–8.

7. Bootman JL, Harrison DL, Cox E. The health care cost of drug related morbidity and mortality in nursing facilities. Arch Intern Med 1997; 157: 2089–96.

8. Bates DW, Cullen DJ, Laird N *et al*. Incidence of adverse drug events and potential adverse drug events: Implications for prevention. ADE prevention Study Group. JAMA 1995; 274: 29–34.

9. Bates DW, Leape LL, Petrycki S. Incidence and preventability of adverse drug events in hospitalised adults. J Gen Intern Med 1993; 8: 289–94.

10. Oborne CA, Batty GM, Maskrey V, Swift CG, Jackson SH. Development of prescribing indicators for elderly medical inpatients. Br J Clin Pharmacol 1997; 43: 91–7.

11. Oborne CA, Hooper R, Swift CG *et al*. Explicit evidence based criteria to assess the quality of prescribing to elderly nursing home residents. Age Ageing 2003; 32: 102–8.

12. Batty GM, Grant RL, Aggarwal R *et al*. Using prescribing indicators to measure the quality of prescribing to elderly medical in-patients. Age Ageing 2003; 32: 292–8.

13. Beers MH, Ouslander JG, Rollingher I *et al*. Explicit criteria for determining inappropriate medication use in nursing home residents. Arch Intern Med 1991; 151: 1825–32.

14. Beers MH. Explicit criteria for determining potentially inappropriate medication use by the elderly. An update. Arch Intern Med 1997; 157: 1531–6.

15. Fick DM, Cooper JW, Wade W *et al*. Updating the Beers criteria for potentially inappropriate medication use in older Adults–Results of a US consensus panel of experts. Arch Intern Med 2003; 163: 2716–24.

16. McLeod PJ, Huang AR, Tamblyn RN *et al*. Defining inappropriate practices in prescribing for elderly people: a national concensus panel. CMAJ 1997; 156: 385–91.

17. Naugler CT, Brymer C, Stolee P *et al*. Development and validation of an improved prescribing for the elderly tool. Can J Clin Pharmacol 2000; 7: 103–7.

18. Dalkey N, Brown B, Cochran S. The Delphi Method, III: Use of Self Ratings to Improve Group Estimates. Santa Monica Rand Corp, 1969,; NovemberPublication RM-6115-PR.

19. Batty GM, Grant RL, Aggarwal R *et al*. National clinical sentinel audit of evidence-based prescribing for older people. J Eval Clin Pract 2004; 10: 273–9.

20. Steinman MA, Seth Landefeld C, Rosenthal GE *et al.* Polypharmacy and prescribing quality in older people. J Am Geriatr Soc 2006; 54: 1516–23.
21. Wolf PA, Abbott RD, Kannel WB. Atrial fibrillation as an independent risk factor for stroke: the Framingham Study. Stroke 1991; 22: 983–8.
22. McGowan B, Heerey A, Tilson L *et al.* Cost of treating stroke in an Irish teaching hospital. IMJ 2003; 96: 234–6.

Smoking cessation and transition into retirement: analyses from the English Longitudinal Study of Ageing

IAIN A. LANG[1], NEIL E. RICE[2], ROBERT B. WALLACE[3], JACK M. GURALNIK[4], DAVID MELZER[2]

[1]Epidemiology & Public Health Group, Peninsula Medical School, Exeter, UK
[2]Epidemiology & Public Health Group, Peninsula Medical School, RD&E Wonford Site, Barrack Road, Exeter EX2 5DW, UK
[3]Department of Epidemiology, College of Public Health, The University of Iowa, Iowa City, IA, USA
[4]Laboratory of Epidemiology, Demography and Biometry, National Institute on Aging, National Institutes of Health, Bethesda, MD, USA

Address correspondence to: Iain A. Lang. Tel: +44 (0) 1392 406749. Email: iain.lang@pms.ac.uk

Abstract

Background transitions such as retirement may represent points at which changes in health behaviour occur.
Objective to assess whether transition into retirement is associated with increased rates of smoking cessation.
Design population-based prospective cohort study in England.
Setting and Participants one thousand seven hundred and twelve smokers aged 50 years and over, followed up for 5 to 6 years.
Measurements work status (working/retired) and smoking status (non-smoker/smoker) at baseline and follow-up.
Results at baseline, 381 (22.2%) of our respondents had retired, 444 (25.9%) were working and remained in work at follow-up, and 167 (9.8%) transitioned from work to retirement. Seven hundred and twenty (42.1%) had some other status (e.g. unpaid work/unemployment). A total of 42.5% (95% CI 34.9–50.1) of those who retired quit smoking; for those remaining in employment this figure was 29.3% (95% CI 25.0–33.6), and for those already retired it was 30.2% (95% CI 25.5–34.9). In adjusted regression analyses, those aged 55–70 who retired were more than twice as likely (fully adjusted odds ratio 2.50 (95% CI 1.35–4.62)) to quit smoking as those who continued to work. Results were robust when those who retired for reasons of ill-health were excluded.
Conclusions our results suggest individuals who undergo the transition into retirement are more likely to quit smoking than those who do not. Interventions should be developed to specifically target those who are retiring, or soon to retire, and those who are due to retire should be helped to incorporate smoking cessation into their retirement planning.

Keywords: *retirement, smoking, smoking cessation, health behaviour, elderly*

Introduction

The promotion of positive changes in behaviour is central to improving the health of individuals and communities. Evidence indicates timing is important in intervening effectively to bring about such changes, i.e. that interventions must be appropriate to an individual's stage of thinking about