Detected health and well-being problems following comprehensive geriatric assessment during a home visit among community-dwelling older people: who benefits most?

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Abstract

Background. Preventive home visits including comprehensive geriatric assessment for potentially frail older people are increasingly implemented in general practice. It remains unclear how to select older people who benefit most from it.

Objectives. To determine which community-dwelling older people benefit most from a comprehensive geriatric assessment by a practice nurse during a home visit in terms of detected problems.

Methods. A cross-sectional study in 45 general practices in the Netherlands. Practice nurses visited 562 randomly selected older people (aged $\geq$ 75 years) and 1180 purposefully selected based on the following criteria: last visit to general practice >6 months ago; partner or child(ren) deceased within past 12 months; cognitive or psychosocial functioning unknown to GP; $\geq$2 chronic conditions; uses $\geq$5 medications and/or living alone.

Results. Mean age of older people was 82.50 years, 65.50% was female. More problems were detected among women, higher age groups, those living alone and the less educated (all $P < 0.001$). Overall, more problems were detected in purposefully selected older people than in randomly selected older people ($P < 0.001$). Selection of older people with $\geq$2 chronic conditions and those using $\geq$5 medications resulted in more detected problems in general (both $P < 0.05$).

Conclusion. Although the findings are in favour of purposeful selection, observed differences in detected problems between the two selection procedures are relatively small. GPs should at least target older people with $\geq$2 chronic conditions, using $\geq$5 medications, being female, of an older age, living alone and the less educated.

Introduction

With the global rise in the number of older people, government policies need to deliver appropriate health systems that support the ability of older people to remain healthy and independent (1). In line with this, many preventive interventions have been developed with the ultimate goal to maintain independent living and to prevent or delay disability among community-dwelling older people (2,3). Especially preventive home visitation programmes for potentially frail community-dwelling older people have received considerable attention in the last decades.

An element of preventive home visitation programmes that has been defined as important in eliciting beneficial effects on patient outcomes is the comprehensive geriatric assessment (4). Elsawy and Higgins (5) define a comprehensive geriatric assessment as '… a multidimensional, multidisciplinary assessment designed to evaluate an older person's functional ability, physical health, cognition and mental health, and socioenvironmental circumstances'. As such, the assessment aids in the organization and coordination of individually appropriate care and well-being services, stimulation of self-management as well as in monitoring and evaluation during follow-up. Preventive home visits including comprehensive geriatric assessment are increasingly implemented in primary care and community settings. The importance of addressing older people's needs is acknowledged and this should be accomplished by self-management support and individualized care, with the GP as the central care provider responsible for early detection of health and well-being issues (6–8).

An often-asked question is which older people tend to benefit most from a comprehensive geriatric assessment in terms of detected problems. Illife and Orrell (9) suggest to identify common unmet needs by means of a focused, brief assessment or a two-staged process instead of a comprehensive but time-consuming multidimensional assessment among all older people. Targeting specific groups of older people is also topic of discussion in studies investigating the effects of home visits in general. For example, beneficial effects of home visits were only found among older people at low risk of functional decline (10) or the effects were more pronounced among the younger-old (4), while others contradict these findings and state that home visits are equally beneficial for the general population of older people (11). Further research is needed to assist health care professionals working in community and/or primary care in deciding whether and how to select specific groups of older people that benefit most from a comprehensive geriatric assessment.

This study aims to determine which community-dwelling older people (aged ≥75 years) benefit most from a comprehensive geriatric assessment by a primary care professional during a home visit in terms of detected problems. Data are used from the implementation of the [G]OLD home visitation programme ('Getting OLD the healthy way') in 45 general practices in the south of the Netherlands. Due to various ways in which general practices selected older people for the home visits, the influence of different selection criteria on the yield of the comprehensive geriatric assessment in terms of detected problems is examined.

Methods

Study design and setting

A cross-sectional design was applied. Data were derived from 45 general practices located in two regions in the south of the Netherlands: 23 general practices in 'Maastricht–Heuvelland' and 22 general practices in 'Parkstad'.

General practices

Between January 2010 and April 2012, 45 out of 143 general practices in the two regions (31.47%) implemented the [G]OLD home visitation programme. A prerequisite for participation was the availability of a practice nurse (PN) with sufficient time for care for older people. In the Netherlands, PNs are employed by the GP and they were introduced to relieve the GP's tasks by offering screening, treatment, care and education to chronically ill patients. Increasingly, care for older people is delegated to the PN, due to their familiarity with a patient-centred, holistic approach in providing care. All 47 PNs from participating general practices were trained in performing the comprehensive geriatric assessment during a home visit and organizing follow-up care.

Selection of older people

Community-dwelling older people aged 75 years and older were eligible to receive a home visit by the PN. Those not living independently, on a waiting list for admission to a nursing home or home for older people, under close medical supervision (chemotherapy, chronic haemodialysis or other therapies posing a high burden on the person), and the terminally ill were excluded. In addition, general practices applied one of the two following approaches in selecting older people for a home visit: (i) random selection or (ii) purposeful selection. The random selection procedure was applied by 13 general practices (seven from 'Parkstad'; six from 'Maastricht–Heuvelland') who agreed

to participate in the intervention group of a quasi-experimental trial (12). After taking into account the amount of time PNs could dedicate to care for older people and the eligibility criteria, 1817 older people (47.95%) were randomly excluded. The remaining 1972 older people were approached by means of an information letter and consent form and 721 older people (36.56%) consented to participate. In total, 131 older people were not visited at home for a comprehensive geriatric assessment by a PN due to time constraints of the PN ($n = 42$), they had declined participation ($n = 29$), deceased ($n = 14$), illness ($n = 14$), moved or switched general practice ($n = 13$), admission to nursing home ($n = 7$), admission to home for older people ($n = 2$) or unknown reason ($n = 10$). Of the remaining 590 older people, data are included in this study from 562 randomly selected older people for whom complete data were available in the electronic patient record. The other 32 general practices not involved in the quasi-experimental trial (17 from 'Maastricht–Heuvelland'; 15 from 'Parkstad') applied the purposeful selection procedure. At the start of the [G]OLD project, an expert panel consisting of among others GPs, decided on the following criteria for the purposeful selection of older people, based on their personal experiences in daily practice and available scientific evidence (13): last visit to general practice >6 months ago; partner or child(ren) deceased within past 12 months; cognitive or psychosocial functioning unknown to GP; has ≥2 chronic conditions; uses ≥5 medications (polypharmacy) and living alone. The panel reached consensus that these criteria are expected to be indicative of older people in whom more problems will be detected. Based on the GP's knowledge of the older patients and a review of the GP Information System by the PN, each general practice created a list of older people who fulfilled one or more of the selection criteria. These older people were approached by the PN by phone or regular mail to invite them for a comprehensive geriatric assessment during a home visit. Once PNs finished the list, they could use the same procedure to create a new list of older people to visit. The PNs conducted 1180 home visits between January 2010 and April 2012. The exact response rate of older people cannot be determined as there are no records of the total number of people selected and approached by PNs. However, our earlier work in a similar context showed that 88.24% of those purposefully invited by the PN for a home visit agreed to participate (14). Complete data were available in the electronic patient record from all 1180 purposefully selected older people.

Data collection

During the home visit, PNs administered the [G]OLD instrument: a comprehensive geriatric assessment comprising evidence-based and practice-based tests and questions covering 30 topics related to the older person's physical, psychological, cognitive and social functioning, as well as lifestyle and medication use (for a detailed overview, see online supplementary Table 1). It assists the PN in uncovering early signs of decline or in identifying existing health and/or well-being problems that may threaten the ability of older people to grow old at home. Both GPs and PNs judged the [G]OLD instrument to be useful for application during the home visit (14).

PNs used a paper format during the home visit and afterwards, the results of the assessment were registered by the PN or the primary health care organisation in the electronic patient record used for chronic disease management. Relevant data on behalf of this study were extracted anonymously from the electronic patient record by the responsible primary healthcare organization of each region.

Data analysis

The prevalence of individual problems detected through the comprehensive geriatric assessment was determined using the pre-specified cut-off points of the [G]OLD instrument. Chi-square tests were performed to compare differences in prevalence rates between randomly and purposefully selected older people. The total number of detected problems was calculated and used as an outcome measure to test for differences between randomly selected and purposefully selected older people, as well as to examine differences in sociodemographic characteristics (gender, age, living status and level of education). Because the data did not meet the assumption of normality (based on the Kolmogorov–Smirnov and Shapiro–Wilk statistics) and relevant transformations did not improve the distributions, non-parametric tests were used (i.e. Mann–Whitney U-test and Kruskal–Wallis H-test). In addition, for the purposefully selected older people, Mann–Whitney U-tests were conducted to examine per selection criterion to what extent the number of detected problems differed between older people selected based on that criterion versus those selected based on the other criteria. In all Mann–Whitney U-tests, the distributions compared had homogeneous variances but different shapes. Therefore, means ranks and corresponding interquartile ranges are reported for non-normally distributed continuous variables. Percentages are reported for categorical variables. Data were analysed using the statistical package SPSS for windows, version 19 (SPSS, Chicago, IL). Differences were considered statistically significant at $P < 0.05$.

Results

Sociodemographic characteristics
In total, 1742 home visits were conducted by the PNs. The average number of home visits performed per general practice was 38.71 visits (SD = 32.57; range: 1–129). Mean age of the visited older

people was 82.50 years (SD = 4.52; range: 75.01–97.72), 65.50% was female, 60.15% lived alone, 50.71% had completed secondary education or lower to middle professional education and 56.13% was widowed (Table 1). Compared with the randomly selected older people, purposefully selected older people were significantly older (+1.72 year), were more often female (+12.11%), more often lived alone (+11.19%) and more often had no education or only primary education (+7.57%). No significant regional differences were found with respect to these sociodemographic variables and, therefore, the two regions were combined in subsequent analyses. The proportion of randomly selected to purposefully selected older people was ~1:2 in both regions.

Prevalence of individual problems detected through comprehensive geriatric assessment

The prevalence of individual problems detected through comprehensive geriatric assessment is presented in Table 2. Overall, the most frequently detected problems among older people were discrepancy between registered and actual medication use (86.29%), dependency in (instrumental) activities of daily living ((I)ADL; 81.92%), polypharmacy (48.95%), high systolic blood pressure (47.46%) and decreased mobility (42.05%). The least common problems were financial problems (2.68%), unsatisfied with daily routines (4.12%), underweight (4.68%), faecal incontinence (5.45%) and absence of

a social network (8.17%). For nearly all individual problems, the prevalence rates were higher among purposefully selected older people compared with the randomly selected older people, and for 16 out of 30 problems the difference was statistically significant ($P < 0.05$). In particular, all five psychological/mental problems and more than half of the physical problems were significantly more prevalent among the purposefully selected older people. Only overweight (body mass index > $27\,kg/m^2$) showed a significant result in the opposite direction.

Median number of detected problems by sociodemographic characteristics

Table 3 illustrates that more problems were detected in purposefully selected older people than in randomly selected older people (mean rank 932.91 versus 738.97, $P < 0.001$). Overall, significantly more problems were detected among women than men (mean rank 923.08 versus 770.85, $P < 0.001$). The number of detected problems was also significantly affected by age ($P < 0.001$). Jonckheere–Terpstra test revealed a significant trend, meaning that the number of detected problems increased with age ($P < 0.001$). Further, significantly more problems were detected among older people who live alone compared with those who live with a partner or others ($P < 0.001$). Finally, the number of detected problems was significantly affected by level of education ($P < 0.001$). With increasing level of education, the

Table 1. Sociodemographic characteristics of older people enrolled according to selection procedure and region

	Overall	Randomly selected	Purposefully selected	P	Maastricht–Heuvelland	Parkstad	P
Number of subjects (*n*)	1742	562 (32.26)	1180 (67.74)	–	703 (40.36)	1039 (59.64)	–
Age (years)							
Mean (SD)	82.50 (4.52)	81.33 (4.26)	83.05 (4.54)	<0.001	82.44 (4.59)	82.54 (4.48)	0.676
Range	75.01–97.72	75.02–95.52	75.01–97.72		75.02–97.72	75.01–96.66	
Gender, *n* (%)							
Male	601 (34.50)	240 (42.70)	361 (30.59)	<0.001	238 (33.85)	363 (34.94)	0.641
Female	1141 (65.50)	322 (57.30)	819 (69.41)		465 (66.15)	676 (65.06)	
Living status, *n* (%)							
Living alone	1028 (60.15)	288 (52.55)	740 (63.74)	<0.001	406 (58.25)	622 (61.46)	0.183
Living with partner or others	681 (39.85)	260 (47.46)	421 (36.26)		291 (41.75)	390 (38.54)	
Level of education, *n* (%)							
No education or primary education	674 (39.60)	190 (34.48)	484 (42.05)	0.011	258 (37.61)	416 (40.94)	0.214
Secondary education or lower to middle professional education	863 (50.71)	302 (54.81)	561 (48.74)		353 (51.46)	510 (50.20)	
Higher professional education	165 (9.69)	59 (10.71)	106 (9.21)		75 (10.93)	90 (8.86)	
Marital status, *n* (%)							
Married	584 (33.62)	242 (43.29)	342 (29.03)	NA	248 (35.28)	336 (32.49)	NA
Living together, unmarried	31 (1.78)	10 (1.79)	21 (1.78)		15 (2.13)	16 (1.55)	
Single, widowed	975 (56.13)	270 (48.30)	705 (59.85)		373 (53.06)	602 (58.22)	
Single, never married	147 (8.46)	37 (6.62)	110 (9.34)		67 (9.53)	80 (7.74)	

NA, not applicable.

Table 2. Prevalence of individual problems detected through comprehensive geriatric assessment among randomly selected and purposefully selected older people

Problem areas	All (n = 1742)		Randomly selected older people (n = 562)		Purposefully selected older people (n = 1180)		P
	%	95% CI	%	95% CI	%	95% CI	
Physical problems							
Dependency in (I)ADL	81.92	80.11–83.73	71.07	67.30–74.84	87.09	85.17–89.00	<0.001
High systolic BP (>140 mmHg)	47.46	45.03–49.88	50.00	45.79–54.22	46.18	43.21–49.15	0.145
Decreased mobility	42.05	39.09–45.00	34.42	29.32–39.52	45.53	41.93–49.13	0.001
Impaired hearing	41.52	38.63–44.42	42.39	37.32–47.46	41.10	37.56–44.63	0.680
Overweight (BMI > 27 kg/m^2)	36.21	33.68–38.74	40.93	36.26–45.60	34.10	31.09–37.10	0.014
Fall incidents in past 6 months	31.29	29.09–33.49	28.70	24.92–32.48	32.53	29.82–35.23	0.110
Urine incontinence	31.10	28.90–33.29	26.12	22.47–29.77	33.51	30.78–36.23	0.002
Impaired sight	25.06	23.01–27.11	24.59	20.99–28.19	25.28	22.78–27.78	0.759
Decreased appetite	14.43	12.73–16.14	10.73	8.13–13.32	16.31	14.11–18.52	0.002
Undesired weight loss	11.66	10.12–13.20	6.56	4.48–8.63	14.13	12.10–16.17	<0.001
High diastolic BP (>90 mmHg)	8.59	7.23–9.95	7.72	5.47–9.97	9.02	7.32–10.73	0.376
Faecal incontinence	5.45	4.37–6.52	4.11	2.46–5.77	6.09	4.71–7.48	0.091
Underweight (BMI < 20 kg/m^2)	4.68	3.57–5.79	1.16	0.15–2.18	6.26	4.72–7.79	<0.001
Psychological/mental problems							
Memory problems	38.72	36.36–41.08	31.86	27.93–35.79	42.11	39.19–45.04	<0.001
Concerned about falling	17.09	15.28–18.89	11.43	8.77–14.10	19.87	17.53–22.22	<0.001
Depressive complaints	15.53	13.80–17.27	8.48	6.16–10.81	19.02	16.72–21.32	<0.001
Personality disorder	15.51	13.78–17.25	12.86	10.06–15.66	16.81	14.63–19.01	0.036
Anxiety	9.60	8.19–11.00	3.78	2.19–5.38	12.44	10.52–14.37	<0.001
Social problems							
Burdened by informal care giving	30.52	24.28–36.75	30.99	19.96–42.01	30.28	22.63–37.93	0.916
Concerned about informal caregiver	21.30	18.51–24.09	17.58	11.71–23.44	22.22	19.06–25.39	0.192
Loneliness	19.29	17.39–21.19	8.79	6.41–11.17	24.42	21.90–26.94	<0.001
Avoidance of activities due to fear of falling	10.24	8.33–12.14	4.27	2.07–6.47	13.25	10.64–15.87	<0.001
Absence of social network	8.17	6.85–9.49	7.25	5.05–9.45	8.61	6.96–10.26	0.344
Unsatisfied with daily routines	4.12	3.18–5.07	1.45	0.45–2.45	5.41	4.10–6.73	<0.001
Financial problems	2.68	1.90–3.45	2.37	1.09–3.64	2.82	1.86–3.79	0.586
Lifestyle problems							
Insufficient physical activity	38.58	36.28–40.87	31.06	27.21–34.91	42.15	39.31–44.98	<0.001
Excessive alcohol use	18.70	13.62–23.77	17.86	9.50–26.22	19.18	12.72–25.64	0.805
Smoking	13.71	12.07–15.35	11.70	9.00–14.40	14.67	12.62–16.73	0.096
Problems medication use							
Discrepancy registered and actual medication use	86.29	84.54–88.04	83.83	80.61–87.04	87.56	85.50–89.63	0.047
Polypharmacy (≥5 medications)	48.95	46.48–51.42	47.52	43.15–51.90	49.63	46.63–52.63	<0.001

BMI, body mass index; BP, blood pressure.

number of detected problems decreased ($P < 0.001$). The same pattern of findings is found among both randomly selected and purposefully selected older people, indicating that the findings were not influenced by any significant differences in sociodemographic characteristics between the two groups.

Purposefully selected older people

Per selection criterion, Table 4 compares the number of detected problems among older people selected based on that criterion to older people selected based on one of the other criteria.

The number of detected problems was significantly lower among older people whose last contact with the general practice was >6 months ago, compared with those selected based on one of the other criteria (mean rank 293.77 versus 379.25, $P = 0.001$). Older people with ≥2 chronic conditions experienced significantly more problems compared with older people selected based on one of the other criteria (mean rank 454.68 versus 365.92, $P < 0.05$). Finally, the number of detected problems was significantly higher among older people who used ≥5 medications than among those selected based on one of the other criteria (mean rank 446.40 versus 366.09, $P < 0.05$).

Table 3. Detected problems among randomly selected and purposefully selected older people by age, gender, living status and level of education

	All (n = 1742)		Randomly selected older people (n = 562)		Purposefully selected older people (n = 1180)	
	n	Mean rank (IQR)	n	Mean rank (IQR)	n	Mean rank (IQR)
All	–	–	560	738.97 (4.00–7.00)	1180	932.92 (5.00–9.00)
Gender						
Men	601	770.85 (4.00–8.00)	240	263.70 (3.25–7.00)	361	518.46 (4.00–8.00)
Women	1139	923.08 (5.00–9.00)	320	293.10 (4.00–8.00)	819	622.25 (5.00–9.00)
P[a]	–	<0.001	–	0.032	–	<0.001
Age						
75–79	584	800.44 (4.00–8.00)	258	263.18 (3.00–7.00)	326	561.37 (4.00–9.00)
80–84	664	848.19 (4.00–8.00)	192	277.90 (4.00–7.00)	472	566.45 (4.25–8.75)
≥85	490	980.68 (5.00–9.00)	110	325.67 (4.00–9.00)	380	642.26 (5.00–9.00)
P[b]	–	<0.001	–	0.003	–	<0.001
Living status						
Alone	1027	898.69 (5.00–9.00)	287	285.75 (4.00–8.00)	740	605.48 (5.00–9.00)
With others	680	786.50 (4.00–8.00)	259	259.92 (3.00–7.00)	421	537.97 (4.00–9.00)
P[a]	–	<0.001	–	0.055	–	0.001
Level of education[c]						
Low	672	933.76 (5.00–9.00)	188	296.38 (4.00–8.00)	484	629.15 (5.00–9.00)
Middle	863	822.41 (4.00–8.00)	302	271.32 (4.00–7.00)	561	556.39 (5.00–9.00)
High	165	658.33 (3.00–7.00)	59	225.70 (3.00–6.00)	106	437.07 (3.00–8.00)
P[b]	–	<0.001	–	0.009	–	<0.001

IQR, interquartile range.

[a]Based on Mann–Whitney *U*-test.

[b]Based on Kruskal–Wallis test with df = 2. Significant at $P < 0.0167$ after Bonferroni correction for multiple comparisons.

[c]Low: no education or primary education; middle: secondary education or lower to middle professional education; high: higher professional education.

Table 4. Detected problems per individual selection criterion applied by GPs among purposefully selected older people (n = 739)

Selection criteria applied by GPs	Yes, selected based on criterion[a]		No, selected based on one of the other criteria		P[b]
	n	Mean rank (IQR)	n	Mean rank (IQR)	
Last visit to general practice >6 months ago	80	293.77 (3.25–7.75)	659	379.25 (5.00–9.00)	0.001
Partner or child(ren) deceased within past 12 months	12	396.17 (5.00–9.75)	727	369.57 (5.00–9.00)	0.667
Psychological, cognitive or social functioning unknown to GP	229	364.05 (4.00–9.00)	510	372.67 (5.00–9.00)	0.610
Has ≥2 chronic conditions	34	454.68 (5.75–9.00)	705	365.92 (4.50–9.00)	0.017
Uses ≥5 medications	36	446.40 (5.00–9.00)	703	366.09 (4.00–9.00)	0.027
Living status: living alone	348	374.36 (5.00–9.00)	391	366.12 (4.00–9.00)	0.599

IQR, interquartile range.

[a]Older people selected by GPs based on more than one of the presented selection criteria (n = 309) and older people selected by GPs for a different reason ('other'; n = 132) are excluded in these analyses.

[b]Based on Mann–Whitney *U*-test.

Discussion

This study reports on a large sample of 1742 community-dwelling older people in the south of the Netherlands who were selected randomly versus purposefully for a comprehensive geriatric assessment by a PN during a home visit. Overall, the findings imply that purposefully selecting older people for a home visit results in more detected problems, compared with randomly selecting older people.

This finding supports those who advocate the need to target preventive home visits to appropriate subpopulations that are most likely to benefit from it (15). From a cost-benefit perspective, targeting individuals at high risk is most appealing

to general practices in order to make effective use of limited resources (i.e. time of the PN). Furthermore, it is in line with the GPs' usual approach to care delivery as GPs may not be motivated to intervene in situations without a specific request for help. On the other hand, any problems disclosed among randomly selected older people may deserve the GP's attention depending on the older person's needs and therefore they are not negligible. The more population-based approach of randomly selecting older people may also ultimately result in benefits to the older population as a whole, which characterizes a public health perspective to prevention among older people (16). Random selection of older people is applied in an ongoing quasi-experimental controlled trial on the effects of the [G]OLD home visitation programme on patient outcomes (12) and results will become available in due course. In the large Medical Research Council trial in UK general practices, targeted assessment had no additional benefit in terms of mortality, admission to hospital or institution or quality of life compared to a broad, universal assessment among older people (17). Although we found statistically significant differences between randomly selected and purposefully selected older people in the prevalence of individual problems and total number of detected problems, the differences are relatively small. Thus, the question arises whether these differences are clinically relevant enough to opt for purposeful selection of older people in favour of random selection.

In selecting older people who benefit most from comprehensive geriatric assessment in terms of detected problems, besides sociodemographic characteristics (being female, older age, living alone and a lower educational level), two selection criteria applied by GPs proved useful as well: having ≥2 chronic conditions and using ≥5 medications (polypharmacy). Interestingly, we found that significantly fewer problems were detected among older people who had not been in contact with the general practice for >6 months. This suggests that these are the more healthy older people without a need to consult their GP and that they do not represent a group of older people with multiple problems who refuse or avoid seeking care/help. Finally, although more problems were detected among older people living alone, when applied by GPs as a selection criterion, it did not lead to significantly more problems being detected. Of all older people living alone, GPs selected only a subset in which they expected problems to be found. Moreover, it is unclear to what extent GPs can accurately estimate which older people are most likely to benefit from a comprehensive geriatric assessment.

Unfortunately, we were not able to determine the yield of the comprehensive geriatric assessment in terms of *newly* detected problems previously unknown to the GP or relevant problems that require new or ongoing care according to the GP and in agreement with the older person's needs and wishes. Nevertheless, previous studies (18,19) support the ability of the comprehensive geriatric assessment to disclose unknown problems in general practice among random samples of older people. Moreover, the randomly selected older people included in this study may not represent a truly random sample of all older people aged 75 years and older within general practices/the community. The recruitment procedure can have introduced volunteer bias, in that the healthier older people are more likely to participate in the trial (20). Consequently, the differences between randomly and purposefully selected older people may be smaller than observed in this study.

Conclusion

Despite more problems being detected among purposefully selected older people, the small differences do not overtly support purposeful selection over random selection of older people for a comprehensive geriatric assessment. From a public health perspective, it seems equally important to approach randomly selected older people. Recent studies demonstrated that preventive home visits including a comprehensive geriatric assessment are feasible in general practice and acceptable to older patients (14,18). Yet, some GPs may prefer a less time-consuming way of obtaining a complete overview of older people's health and well-being. In that case, this study suggests that GPs should at least prioritize older people based on whether they have ≥2 chronic conditions, use ≥5 medications, are female, are of an older age group, live alone and have a lower educational level.

Supplementary material

Supplementary material is available at *Family Practice* online.

References

1. Rechel B, Doyle Y, Grundy E, McKee M. *How Can Health Systems Respond to Population Ageing?* Copenhagen, Denmark: World Health Organization, 2009.
2. Beswick AD, Rees K, Dieppe P *et al*. Complex interventions to improve physical function and maintain independent living in elderly people: a systematic review and meta-analysis. *Lancet* 2008; **371**: 725–35.
3. Daniels R, van Rossum E, de Witte L, Kempen GI, van den Heuvel W. Interventions to prevent disability in frail community-dwelling elderly: a systematic review. *BMC Health Serv Res* 2008; **8**: 278.
4. Huss A, Stuck AE, Rubenstein LZ, Egger M, Clough-Gorr KM. Multidimensional preventive home visit programs for community-dwelling older adults: a systematic review and meta-analysis of randomized controlled trials. *J Gerontol A Biol Sci Med Sci* 2008; **63**: 298–307.
5. Elsawy B, Higgins KE. The geriatric assessment. *Am Fam Physician* 2011; **83**: 48–56.
6. Boeckxstaens P, De Graaf P. Primary care and care for older persons: position paper of the European Forum for Primary Care. *Qual Prim Care* 2011; **19**: 369–89.
7. Dutch College of General Practitioners. *NHG-Standpunt Toekomstvisie Huisartsenzorg. Huisartsgeneeskunde voor ouderen [Statement of the NHG, Future of General Practitioner Care. General practice medicine for older people]*. Utrecht, The Netherlands: NHG, 2007.
8. Vass M, Avlund K, Hendriksen C, Philipson L, Riis P. Preventive home visits to older people in Denmark–why, how, by whom, and when? *Z Gerontol Geriatr* 2007; **40**: 209–16.
9. Iliffe S, Orrell M. Identifying unmet health needs in older people: comprehensive screening is not the answer. *Br J Gen Pract* 2006; **56**: 404–6.
10. Stuck AE, Minder CE, Peter-Wüest I *et al*. A randomized trial of in-home visits for disability prevention in community-dwelling older people at low and high risk for nursing home admission. *Arch Intern Med* 2000; **160**: 977–86.
11. Elkan R, Kendrick D, Dewey M *et al*. Effectiveness of home based support for older people: systematic review and meta-analysis. *BMJ* 2001; **323**: 719–25.
12. Stijnen MMN, Duimel-Peeters IGP, Jansen MWJ, Vrijhoef HJM. Early detection of health problems in potentially frail community-dwelling older people by general practices - project [G]OLD: design of a longitudinal, quasi-experimental study. *BMC Geriatr* 2013; **13**: 7.
13. Puts MT, Lips P, Deeg DJ. Static and dynamic measures of frailty predicted decline in performance-based and self-reported physical functioning. *J Clin Epidemiol* 2005; **58**: 1188–98.
14. Stijnen MMN, Jansen MWJ, Vrijhoef HJM, Duimel-Peeters IGP. Development of a home visitation programme for the early detection of health problems in potentially frail community-dwelling older people by general practices. *Eur J Ageing* 2013; **10**: 49–60.
15. Rubenstein LZ, Stuck AE. Preventive home visits for older people: defining criteria for success. *Age Ageing* 2001; **30**: 107–9.
16. Rose G. Sick individuals and sick populations. *Int J Epidemiol* 1985; **14**: 32–8.
17. Fletcher AE, Price GM, Ng ES *et al*. Population-based multidimensional assessment of older people in UK general practice: a cluster-randomised factorial trial. *Lancet* 2004; **364**: 1667–77.
18. Lucchetti G, Granero AL. Use of comprehensive geriatric assessment in general practice: results from the 'Senta Pua' project in Brazil. *Eur J Gen Pract* 2011; **17**: 20–7.
19. Piccoliori G, Gerolimon E, Abholz HH. Geriatric assessment in general practice using a screening instrument: is it worth the effort? Results of a South Tyrol Study. *Age Ageing* 2008; **37**: 647–52.
20. van Heuvelen MJ, Hochstenbach JB, Brouwer WH *et al*. Differences between participants and non-participants in an RCT on physical activity and psychological interventions for older persons. *Aging Clin Exp Res* 2005; **17**: 236–45.