The Cluster-Randomized BRIGHT Trial: Proactive Case Finding for Community-Dwelling Older Adults

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ABSTRACT

PURPOSE People are now living longer, but disability may affect the quality of those additional years of life. We undertook a trial to assess whether case finding reduces disability among older primary care patients.

METHODS We conducted a cluster-randomized trial of the Brief Risk Identification Geriatric Health Tool (BRIGHT) among 60 primary care practices in New Zealand, assigning them to an intervention or control group. Intervention practices sent a BRIGHT screening tool to older adults every birthday; those with a score of 3 or higher were referred to regional geriatric services for assessment and, if needed, service provision. Control practices provided usual care. Main outcomes, assessed in blinded fashion, were residential care placement and hospitalization, and secondary outcomes were disability, assessed with Nottingham Extended Activities of Daily Living Scale (NEADL), and quality of life, assessed with the World Health Organization Quality of Life scale, abbreviated version (WHOQOL-BREF).

RESULTS All 8,308 community-dwelling patients aged 75 years and older were approached; 3,893 (47%) participated, of whom 3,010 (77%) completed the trial. Their mean age was 80.3 (SD 4.5) years, and 55% were women. Overall, 88% of the intervention group returned a BRIGHT tool; 549 patients were referred. After 36 months, patients in the intervention group were more likely than those in the control group to have been placed in residential care: 8.4% vs 6.2% (hazard ratio = 1.32; 95% CI, 1.04-1.68; P = .02). Intervention patients had smaller declines in mean scores for physical health-related quality of life (1.6 vs 2.9 points, P = .007) and psychological health-related quality of life (1.1 vs 2.4 points, P = .005). Hospitalization, disability, and use of services did not differ between groups, however.

CONCLUSIONS Our case-finding strategy was effective in increasing identification of older adults with disability, but there was little evidence of improved outcomes. Further research could trial stronger primary care integration strategies.

INTRODUCTION

As the proportion of older adults in the population rises, the increasing burden of disability challenges health systems. Ways of increasing disability-free life tantalize researchers and health planners alike. Intensive geriatric assessment and management are effective in community settings1; however, the exact application and success of preventive interventions differ depending on the health system,2 and failures, such as increased placement in residential care as a result of case management,3,4 challenge decisions to widely implement preventive visits for older adults. The most effective way to intervene is not known.

After using preventive visits for 10 years, the United Kingdom concluded that there was no impact of systematic assessment.5,6 Germany, Italy, France, the Netherlands, Australia, and Denmark7 continue to offer publicly funded proactive assessment for older adults. In the United States, managed care organizations offer geriatric assessment to improve out-

Conflicts of interest: None of the authors have financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years, and none have other relationships or activities that could appear to have influenced the submitted work.

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comes, and there are growing moves toward systematically identifying particular groups with high levels of health care use for additional attention.

We undertook a trial in New Zealand to clarify the effectiveness of a first step in the proactive process: population-level screening to identify unaddressed disability in the context of organized primary health care. New Zealand has publicly available community geriatric and support services, similar to those available in managed care in the United States and in public insurance–based health care in Europe; however, in New Zealand, entry to the geriatric care system is not systematized.

New Zealand has an integrated primary health care system whereby 98% of all older adults are enrolled with a general practice; the system is supported by publicly funded community services and geriatrics specialist multidisciplinary teams coordinated from secondary care. Aging-related residential care is available after standardized assessment and is publicly subsidized on a means-tested basis. Practice-based quality improvement processes are common and accepted in general practices, meaning practice-based interventions are feasible.

To identify older adults with disability and prevent its progression, we developed a 2-step case-finding process, similar to that of other trials. The first step of the process consisted of a validated self-completed questionnaire, the Brief Risk Identification Geriatric Health Tool (BRIGHT). This trial aimed to assess the impact of using this first step to improve case finding on hospitalizations, residential care placement, functional decline, and quality of life for community-dwelling older adults.

METHODS

We used a pragmatic cluster-randomized trial to test the hypothesis that case finding using the BRIGHT tool would improve disability-related outcomes. As primary care was the preferred setting for intervention, a cluster design was necessary to avoid contamination.

Participants and Recruitment

Detailed eligibility criteria are reported elsewhere. All community-dwelling patients of participating primary care practices aged 75 years and older were eligible. Those living in residential care or receiving palliative care and those who were terminally ill were not eligible.

All primary care practices in 3 regions were approached personally in random order. Patient participants were recruited by invitation letter from the primary care physician sent to all eligible patients. We performed telephone follow-up with all nonrespondents. The New Zealand Multiregional Ethics Committee approved the trial, and written informed consent was obtained.

Measures

Trained telephone interviewers conducted interviews, and trained nurses interviewed patients at home if they were unable to communicate by telephone. Interrater reliability was assessed by dual interviews. At baseline, patients’ age, sex, marital status, living arrangement, and educational level were established by self-report, as were patient and spouse occupations. Health status was estimated from total number of medications used per day, hospitalizations in the last year, and presence of diagnoses from a menu list. Smoking status was ascertained as pack-year history, and falls in the past year by recall. Cognition was assessed using the abbreviated mental test score (AMTS). At baseline and at 18 months and 36 months of follow-up, we assessed depression with the 15-item Geriatric Depression Scale; receipt of home help services, home help, and personal care, and satisfaction with primary care using 3 questions pertaining to patients’ last consultation: care and concern, involvement in decision making about care, and time spent with the primary care physician.

Outcomes

The trial’s primary outcomes were residential care placement and hospitalizations ascertained from institutional and primary care records matching the National Health Identification number. At the end of the trial, we assessed both hospitalizations overall and ambulatory care–sensitive hospitalizations (thought to be sensitive to primary care intervention), classified by standard Ministry of Health procedures.

For secondary outcomes, disability was assessed with the Nottingham Extended Activities of Daily Living Scale (NEADL); possible scores range from 0 to 22, with a low score indicating more assistance in daily tasks and a high score indicating more independence. We assessed functional ability from 2 domains—Basic Mobility (MCID 4.2) and Daily Activity (activities of daily living and instrumental activities of daily living, MCID 3.7) of the Activity Measure for Post-Acute Care (AM-PAC) scale; for these domains, a low score indicates worse function. Quality of life was assessed with the World Health Organization Quality of Life scale, abbreviated version (WHOQOL-BREF), a sensitive measure thought to be more responsive to change than the 12-item Short Form Healthy Survey; a higher score indicates better quality of life, and a change of 3 to 5 points is considered clinically relevant. The AMTS, NEADL, and WHOQOL-BREF were validated for telephone use.

We also assessed physical function in a subgroup of patients having a greater level of disability. If the answer to either of 2 questions on the NEADL, “Do
you get in and out of the car?” and “Do you take hot
drinks from one room to another?” was “no” or “I need
help with this,” the patient was asked to accept a home
visit to establish physical function using the Short
Physical Performance Battery and grip strength using
a standard hand grip dynamometer.

During all baseline telephone interviews and home
assessments, if the patient was found to be critically
ill, the researchers contacted the usual physician. This
procedure was used only twice.

Randomization and Blinding
After recruitment, clusters of participants and practices
were block-randomized (by area) to an intervention
group or control group by a distant statistician not
involved in recruitment using a computer generated
randomization schedule. Only the intervention trainer/
project manager (C.M.) knew the group allocation. All
other research staff were blinded to practice and par-
ticipant allocation until completion of the trial. Patients
were informed that the trial was testing a practice-
based strategy to promote healthy aging. Practices
were not blinded, and geriatrics personnel receiving
the referrals for BRIGHT participants from practices
were partially blinded. The referrers were instructed
not to mention the trial in the referral but did not
always follow that instruction.

Study Groups
One researcher (C.M.) trained the practices in interven-
tion processes. Every year for 3 years, patients in inter-
vention practices were sent a birthday card from their
general practitioner (the first step in our intervention)
containing the BRIGHT questionnaire (Supplemental
Appendix 1), an 11-item questionnaire asking about
health and activities of daily living. If their score was
less than 3, no further action was taken. A score of 3 or
higher was the validated trigger level for the second
step, a referral by the practice nurse to regional publicly
funded geriatrics assessment and rehabilitation services.
For the intervention period, practices were provided
funding for 1 day per month of a practice nurse’s salary
to complete the BRIGHT recall process, and regional
geriatrics services were bulk funded to provide addi-
tional assessment services to trial participants.

The control group received usual care, which
included referrals to the geriatrics community team when
considered necessary by the primary health care team.

The publicly funded assessment and rehabilitation
services had several components: triage of referred
patients, a multidisciplinary team (physiotherapist,
occupational therapist, gerontology nurse, geriatrician,
and social worker) to complete a comprehensive assess-
ment if needed, then coordination of support services
and/or rehabilitative services through direct funding,
and geriatric medical expertise (part of the team) as
required. Geriatrics teams gave feedback to primary
care practices about health care and support services
decisions, and primary care maintained responsibility
for overall medical care of the participants. These ser-
VICES were available to both groups, but the interven-
tion group was systematically screened and all eligible
patients were referred.

Sample Size
To show that a reduction of 15% in the hospitalization
rate of 61.7 per 100 to 52.4 per 100 was not due to
chance alone, 622 patients per group were required,
for a total of 1,244 patients. These patients were gath-
ered in clusters from primary care practices. The aver-
age cluster size was estimated at 96, assuming an 80%
response rate (achieved in other trials by this team) and
an 80% completion rate (also achieved in previous tri-
als) for the average 3-physician practice. Adjusting the
sample size for an intraclass correlation coefficient of
0.0238, based on hospitalization reported in the Medi-
cal Research Council trial, a design effect of 3.261
was estimated using the Donner equation. Inflating the
sample size of 1,244 by 3.61, we needed 4,057
patients from 42 practices.

Analyses
We compared main outcomes between the groups
using mixed effects regression models. We computed
both patient hospitalizations per year of the trial and
the rate of hospitalizations per person-year for each
group. Hospitalization was a binary dependent vari-
able: a patient was or was not hospitalized during the
3 years of follow-up. Propensity to be hospitalized fre-
fently was controlled for by putting number of hos-
pitalizations in the year before the study in the model
as a fixed effect covariate. Number of hospitalizations
in the 3 years of follow-up was a Poisson dependent
variable. Primary care practices nested within regions
were added to the random effect component in these
mixed effects models (those hospitalized and hospital-
ization rate) to adjust for clustering. We compared
ambulatory care–sensitive hospitalizations using the
same methods. Time from randomization to residen-
tial care placement was compared using Cox propor-
tional hazards models.

For secondary outcomes, we analyzed the depen-
dent variables of quality of life (WHOQOL-BREF
scores), function (NEADL scores), and functional
ability (AM-PAC scores) in separate generalized linear
regression models with repeated measures adjusting
for clustering by practice and region. Satisfaction with
general practitioner care, use of emergency depart-
ments, and use of geriatric services were compared using regression techniques. Intraclass correlation coefficients were calculated for hospitalization, residential care placement, quality of life, depression, and function.

**RESULTS**

**Participants**

All 8,308 community-dwelling participants aged 75 years or older in participating practices were approached (Figure 1). A total of 3,893 (46.8%) participated, of

| Control group | Intervention group |
|---------------|-------------------|
| 29 practices and 1,844 participants: | 31 practices and 2,049 participants: |
| 7 (0.4%) died | 15 (0.7%) died |
| 12 (0.7%) placed in residential care | 13 (0.6%) placed in residential care |
| 4 (0.2%) lost to follow-up (moved) | 8 (0.4%) lost to follow-up (moved) |
| 11 (0.6%) in poor health | 18 (0.9%) in poor health |
| 63 (3.4%) no longer wished to be involved | 53 (2.6%) no longer wished to be involved |
| 1,747 (94.7%) completed baseline | 1,942 (94.8%) completed baseline |

**18-month follow-up**

- Control group: 60 (3.4%) died
  - 33 (1.9%) placed in residential care
  - 9 (0.5%) lost to follow-up (moved)
  - 13 (0.7%) in poor health
  - 13 (0.7%) no longer wished to be involved
  - 1,619 (92.7%) completed 18 months

- Intervention group: 65 (3.3%) died
  - 44 (2.3%) placed in residential care
  - 15 (0.8%) lost to follow-up (moved)
  - 15 (0.8%) in poor health
  - 16 (0.8%) no longer wished to be involved
  - 1,787 (92.3%) completed 18 months

**36-month follow-up**

- Control group: 95 (5.9%) died
  - 36 (2.2%) placed in residential care
  - 12 (0.7%) lost to follow-up (moved)
  - 8 (0.5%) could not be contacted at time
  - 10 (0.6%) in poor health
  - 30 (1.9%) no longer wished to be involved
  - 1,428 (88.2%) completed 36 months

- Intervention group: 82 (4.6%) died
  - 71 (4.0%) placed in residential care
  - 14 (0.8%) lost to follow-up (moved)
  - 22 (1.2%) could not be contacted at time
  - 13 (0.7%) in poor health
  - 32 (1.8%) no longer wished to be involved
  - 1,553 (86.9%) completed 36 months

**Analysis**

- 3,010 participants analyzed for quality of life
- 3,893 participants analyzed for residential placement and death

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Note: Referral for assessment and services was triggered by a Brief Risk Identification Geriatric Health Tool (BRIGHT) score of 3 or higher.
whom 77% completed 36 months of follow-up during 2010-2012. The age distribution matched that of the general population, women were underrepresented (54% vs 60% for census area).14

The intervention and control groups were evenly matched on the characteristics assessed (Table 1). All 148 participants offered a home visit for additional disability assessment accepted. Intraclass correlation coefficients by practice for NEADL scores, AM-PAC scores, WHOQOL-BREF physical, psychological, and social scores, Geriatric Depression Scale, and hospitalization in the last year were all less than 0.003 (negligible); the value for the WHOQOL-BREF environmental score was 0.002 (95% CI, 0.001-0.003).

**Main and Secondary Outcomes**

Residential care placement was more common for patients in the intervention group than for those in the control group: 173 (8.4%) compared with 115 (6.2%) (hazard ratio = 1.32, 95% CI, 1.04-1.68; \( P = .02 \)). There was no difference between groups in the overall proportions of patients hospitalized, which ranged from 6% to 10% during the trial, or the rate of ambulatory care–sensitive hospitalization (\( P = .88 \)). The rate of hospitalizations was 0.15 to 0.25 hospitalizations per person-year overall, with no significant difference between the groups (\( P = .68 \)) (Figure 2).

There was no significant difference between groups in the change in functional status assessed from NEADL scores (\( P = .13 \)) (Table 2). The

![Table 1. Baseline Patient Characteristics](image)

### Table 1. Baseline Patient Characteristics

| Characteristic                        | Intervention Mean (SD) or No. (%) | Control Mean (SD) or No. (%) | \( P \) Value | Total Mean (SD) or No. (%) |
|---------------------------------------|-----------------------------------|-----------------------------|--------------|---------------------------|
| Demographics                          |                                   |                             |              |                           |
| Age, mean (SD), y                     | 80.4 (4.6)                        | 80.3 (4.5)                  | .53          | 80.3 (4.6)                |
| Sex, female, No. (%)                  | 1,101 (56)                        | 951 (54)                    | .21          | 2,052 (55)               |
| Married, No. (%)                      | 1,038 (53)                        | 945 (54)                    | .66          | 1,983 (53)               |
| Living alone, No. (%)                 | 824 (42)                          | 724 (41)                    | .57          | 1,548 (41)               |
| Education, No. (%)                    |                                  |                             | .64          |                           |
| Primary school                        | 270 (14)                          | 251 (15)                    | .52          | 521 (14)                 |
| Secondary school                      | 882 (47)                          | 763 (45)                    | .66          | 1,645 (46)               |
| Tertiary qualification                | 739 (39)                          | 693 (41)                    | .88          | 1,432 (40)               |
| Main lifetime occupation, No. (%)     | 158 (8)                           | 152 (9)                     | .52          | 310 (8)                  |
| Clinical characteristics              |                                   |                             | .32          |                           |
| Total medications, mean (SD)          | 4.29 (3.24)                       | 4.10 (3.11)                 | .01          | 4.20 (3.18)              |
| Hospitalized in last 12 mo, No. (%)   | 158 (8)                           | 152 (9)                     | .52          | 310 (8)                  |
| Diagnoses, No. (%)                    |                                   |                             | .22          |                           |
| Hypertension                          | 1,054 (57)                        | 930 (55)                    | .97          | 1,984 (56)               |
| Myocardial infarction                 | 497 (27)                          | 459 (28)                    | .97          | 956 (27)                 |
| Cerebrovascular accident              | 213 (12)                          | 172 (11)                    | .18          | 385 (11)                 |
| COPD                                  | 126 (7)                           | 124 (7)                     | .65          | 250 (7)                  |
| Total No., mean (SD)                  | 0.46 (0.66)                       | 0.46 (0.62)                 | .72          | 0.45 (0.64)              |
| Smoking, No. (%)                      | 905 (46)                          | 804 (46)                    | .72          | 1,709 (46)               |
| Never smoker                          | 1,002 (51)                        | 896 (51)                    | .88          | 1,898 (51)               |
| Past smoker                           | 54 (3)                            | 59 (3)                      | .52          | 113 (3)                  |
| Current smoker                        | 622 (32)                          | 576 (33)                    | .47          | 1,198 (32)               |
| Fell in last 12 mo, No. (%)           | 589 (30)                          | 445 (25)                    | .01          | 1,034 (28)               |
| Support services, No. (%)             | 99 (17)                           | 89 (9)                      | <.001        | 137 (13)                 |
| Any home help                         | 92 (5)                            | 49 (3)                      | .002         | 141 (4)                  |
| Home help more than once a week       | 83 (92)                           | 46 (94)                     | .72          | 129 (93)                 |
| Any personal care                     | 9.31 (1.02)                       | 9.4 (0.89)                  | <.001        | 9.35 (0.96)              |
| Cognition, AMTS score, mean (SD)      | 184 (9)                           | 159 (8)                     | .66          | 342 (9)                  |
| Depression, GDS-15 score ≥5, No. (%)  |                                   |                             | .88          |                           |
| Sex, female, No. (%)                  | 148                               | 30 (57)                     | .63          | 88 (59)                  |
| Age, mean (SD), y                     | 80.0 (5.2)                        | 81.5 (5.5)                  | .12          | 8.5 (5.3)                |
| SPPB score, mean (SD)                 | 5.6 (3.2)                         | 6.0 (3.4)                   | .60          | 5.7 (3.3)                |
| Grip strength, mean (SD), kg          | 23.0 (9.4)                        | 24.0 (11.2)                 | .09          | 23.3 (10.0)              |

AMTS = Abbreviated Mental Test Score (higher score indicates better cognition; score of ≥7 is considered normal); COPD = chronic obstructive pulmonary disease; GDS-15 = 15-item Geriatric Depression Scale (higher score indicates more depressive symptoms; score of ≥5 is considered moderate depressive symptoms); SPPB = Short Physical Performance Battery for physical function (measures physical performance, a combination of balance, gait speed, and chair stands; scores range from 0 to 12; a higher score indicates better function).

1 Total with complete data included in analysis.

2 Ascertained by the question “Have you ever been told by a doctor that you have or have had: high blood pressure, asthma, diabetes, arthritis/rheumatism, epilepsy, Parkinson’s disease, osteoporosis, heart attack or angina, stroke, chronic bronchitis or emphysema, hip fracture, knee replacement, hip replacement, depression, or mental illness?”

3 Excluding hypertension.
AM-PAC physical and movement domain showed a slower decline in the intervention group \( (P = .03) \). On the WHOQOL-BREF, mean physical health scores fell on average by 2.9 points in the control group and 1.6 points in the intervention group \( (P = .007) \) and mean psychological health scores fell by 2.4 and 1.1 points, respectively \( (P = .005) \). Changes in the environmental and social domains of the WHOQOL-BREF did not differ between groups. There were trends toward less depression in the intervention group over time \( (P = .06) \) and larger proportions of patients in the intervention group rating their primary care as “very good” or “excellent” in showing care and concern \( (P = .06) \).

Intraclass correlation coefficients for the change in WHOQOL-BREF scores, NEADL scores, AM-PAC scores, hospitalization, and residential care placement were all less than .001. The primary care practice attended was significantly related to change in WHOQOL-BREF physical scores \( (P = .002) \), but not hospitalization \( (P = .11) \).

Examining physical function in the prespecified subgroup with established disability, the intervention group had preservation of gait speed. This benefit was not, however, accompanied by benefit in terms of hospitalizations, quality of life, and AM-PAC scores in the subgroup (data not shown).

Figure 2. Ambulatory care–sensitive hospitalizations and overall hospitalizations, by study group.

ACS = ambulatory care sensitive (hospitalizations resulting from diseases sensitive to good primary health care setting).

Notes: Hospitalizations were ascertained by matching encrypted National Health Identification (NHI) number, a unique identifier, with centrally held records of all hospital admissions from the New Zealand Ministry of Health \( (P = .82) \) at the end of the trial. International Classification of Diseases codes can be found and are used frequently in New Zealand \( (P = .68) \). There was no significant difference between groups in the percentage of patients with an ACS hospitalization \( (P = .82) \), binomial mixed model regression, controlled for prior hospitalization and clustering) and rate of ACS hospitalizations \( (P = .88) \), Poisson mixed model regression, controlled for number of prior hospitalizations and clustering) and rate of any hospitalization \( (P = .88) \), binomial mixed model regression, controlled for prior hospitalization and clustering) and rate of any hospitalization \( (P = .88) \), Poisson mixed model regression, controlled for number of prior hospitalizations and clustering).
**Table 2. Individual-Level Outcomes: 60 Practices and 3,893 Older Adults**

| Outcome | Time point, mo | Intervention Mean (SD) or No. (%) | Control Mean (SD) or No. (%) | P Valueb |
|---------|----------------|-----------------------------------|-----------------------------|----------|
| Function, NEADL score, mean (SD) | 0 | 19.6 (2.4) | 19.8 (2.1) | .13 |
| | 18 | 19.4 (2.8) | 19.4 (2.7) |  |
| | 36 | 19.4 (3.0) | 19.3 (3.0) |  |
| WHOQOL-BREF scores, mean (SD) |  |  |  |  |
| Physical | 0 | 70.4 (16.4) | 71.4 (16.3) | .007 |
| | 18 | 70.3 (16.8) | 70.5 (17.0) |  |
| | 36 | 70.5 (15.8) | 70.0 (15.7) |  |
| Psychological | 0 | 73.0 (11.8) | 73.7 (12.0) | .005 |
| | 18 | 72.5 (12.5) | 72.9 (12.4) |  |
| | 36 | 72.7 (12.5) | 72.1 (12.2) |  |
| Social | 0 | 79.0 (13.4) | 79.6 (13.3) | .13 |
| | 18 | 79.6 (13.0) | 79.3 (13.3) |  |
| | 36 | 79.3 (11.9) | 79.3 (12.2) |  |
| Environmentalc | 0 | 80.2 (11.2) | 80.3 (11.4) | .20 |
| | 18 | 80.7 (11.5) | 80.2 (11.8) |  |
| | 36 | 80.6 (10.7) | 80.3 (11.0) |  |
| AM-PAC scores, mean (SD) |  |  |  |  |
| Physical and movement | 0 | 64.7 (6.7) | 65.1 (6.9) | .03 |
| | 18 | 64.1 (7.1) | 64.2 (7.1) |  |
| | 36 | 62.9 (6.9) | 62.8 (9.7) |  |
| Personal care instrumental | 0 | 60.5 (8.6) | 60.8 (8.9) | .42 |
| | 18 | 59.8 (8.8) | 59.6 (9.1) |  |
| | 36 | 60.6 (9.4) | 60.6 (9.3) |  |
| Depression, GDS-15 score, mean (SD) | 0 | 1.8 (1.8) | 1.7 (1.9) | .053 |
| | 18 | 1.9 (2.0) | 2.0 (2.1) |  |
| | 36 | 2.0 (2.1) | 2.1 (2.1) |  |
| Satisfaction with your last consultation with the primary care physician, No. (%) |  |  |  |  |
| "Involves you,"d very good/excellent | 0 | 1,294 (85.8) | 1,217 (86.0) | .21 |
| | 18 | 1,317 (82.6) | 1,182 (78.2) |  |
| | 36 | 1,225 (76.2) | 1,126 (74.1) |  |
| "Time spent,"e very good/excellent | 0 | 1,232 (79.2) | 1,199 (81.4) | .11 |
| | 18 | 1,209 (75.5) | 1,105 (72.6) |  |
| | 36 | 1,119 (69.4) | 1,026 (67.0) |  |
| "Care and concern,"f very good/excellent | 0 | 1,350 (85.9) | 1,262 (85.7) | .16 |
| | 18 | 1,332 (83.3) | 1,184 (77.9) |  |
| | 36 | 1,260 (78.2) | 1,149 (75.3) |  |

AM-PAC = Activity Measure for Post-Acute Care (measures functional ability, a higher score indicates better function); GDS-15 = 15-item Geriatric Depression Scale (higher score indicates more depressive symptoms and a score of ≥5 is considered moderate depressive symptoms); NEADL = Nottingham Extended Activities of Daily Living Scale (score ranges from 0 to 22; higher score indicates greater independence); SPPB = Short Physical Performance Battery (measures physical performance, a combination of balance, gait speed, and chair stands; scores range from 0 to 12; a higher score indicates better function); WHOQOL-BREF = abbreviated version of the World Health Organization Quality of Life Scale (scores range from 1 to 100; a higher score means better QOL).

a Total with complete data included in analysis.
b Result of generalized regression models with repeated measures adjusted for clustering by practice and region, and applies to the change over the 3 time points.
c Domain of the WHOQOL-BREF (maximum score is 100; higher score indicates better quality of life).
d Ascertained by asking “[How satisfied are you with] how much the doctor involves you in decisions about your care?”
e Ascertained by asking “[How satisfied are you with] the amount of time your doctor spends with you?”
f Ascertained by asking “[How satisfied are you with] the doctor’s care and concern for you?”

**Intervention Process Tracking**

The majority (88%) of the intervention group received, completed, and returned the BRIGHT tool to practices. Figure 1 shows trigger and referral rates for the entire trial population.

We used Ministry of Health data to establish use of the geriatric assessment and rehabilitation services by all participants. Details of the initial assessment outcome were available for 1 center. In that center, 127 BRIGHT intervention patient referrals were
made to the geriatric team between 2009 and end of 2011. Among these patients, 119 had an assessment, 2 went into care, 4 declined care, 1 could not be contacted, and 1 had no reason for nonassessment. Of those assessed, 85 (67% of all referred from primary care) were considered to need no further action. Of the remainder, 13 (10% of total) were referred for increased community services—10 (8%) for home occupational therapy, physiotherapy, or the acute community response team for multidisciplinary assessment; 2 to the district nursing service; and 4 to specialist services for pain or vertigo or to the primary care physician for review—and the remaining 5 were given advice about community social services.

There was no significant difference between groups in geriatric services received, including a variety of assessments (international residential assessment instrument [interRAI] Home Care Assessments, physiotherapist, gerontology nursing, and geriatric medical assessment) (Figure 3), emergency department use (Figure 4), and nongeriatric outpatient hospital use (data not shown). Self-reported use of home help and personal care did not differ between the groups over the 36 months of follow-up overall, but the intensity differed, with the control group receiving more intensive services. During the trial, all regional geriatric services were reformed to some degree, causing some disruption to the timing of patient assessment.

No adverse events were reported among study participants.

**DISCUSSION**

Our case-finding intervention was successful in identifying older adults in need, the first step in our 2-step process aiming to reduce disability, but identification...
Figure 3. Use of geriatric assessment and rehabilitation community services.

Notes: There was no significant difference between intervention and control groups over time in the percentages of patients who had a geriatric assessment and/or rehabilitation community services used, including comprehensive assessment, physiotherapy, occupational therapy, social work, gerontology nursing, and case management by group. Shown for the intervention group are patients for whom Brief Risk Identification Geriatric Health Tool (BRIGHT) scores triggered referral once (darkest section of bar), had triggered previously (dark section of bar), and did not trigger during the 3 years (lighter section of intervention bars). Lightest bar is the control group.

Figure 4. Use of emergency departments.

Notes: There was no significant difference between intervention and control groups over time in emergency department use during the trial ($P = .27$). Shown for the intervention group are patients for whom Brief Risk Identification Geriatric Health Tool (BRIGHT) scores triggered referral once (darkest section of bar), had triggered previously (dark section of bar), and did not trigger during the 3 years (lighter section of intervention bars). Lightest bar is the control group.
did not reduce use of acute hospital services, and use of residential care increased. It is possible that participants admitted to residential care benefitted. There was a small, significant benefit in terms of health-related quality of life and function as measured by the AM-PAC, however, it may not be clinically relevant.

Either the second step of integrated geriatric health care was not effective (ie, more older adults were sent but outcomes did not improve), or control patients had adequate access to the same care, meaning there was no need for the screening. The observed increase in residential care supports the former, in that persons with unmet need were identified and placed in 24-hour care. Other trials have found that preventive strategies have increased residential care placement and hospitalization, suggesting that residential care may be underused in some contexts. Researchers and health planners in other systems considering screening to systematically identify those in need should carefully consider the entirety of the response. Identification without appropriate action may not lead to a desirable result.

Comparing our results with those of similar trials in which interventions were effective, there is a clear difference relative to the trial of Pathy et al., which tested a successful 2-step process in Canada in which the second step was enhanced primary care. Our trial did not enhance the service response, and there was no change in rehabilitative or other service use, findings consistent with other research wherein comprehensive geriatric assessment resulted in recognizing need but not an increase in supports. New Zealand has high residential care use, and potentially, institutionalization was the easiest response to unmet need. The Netherlands has also found more intensive, tailored, additional service models to be unsuccessful despite being well received. Both countries have integrated publicly funded accessible services for older people. Our control group also had access to these services and was engaged with primary care. It may not have been possible to improve on usual care by a systematic identification process alone.

Other interventions have improved outcomes for older people in the United States. Both Guided Care and Geriatric Resources for Assessment and Care of Elders (GRACE) added expert nurses in the context of new multidisciplinary access for older people. The expert in these interventions was empowered to access all rehabilitative processes, ensuring delivery. The interventions clearly increased services and provided new expertise.

Our result may be relevant to other health systems wherein similar groups of reasonably well older people are cared for in integrated systems, such as the US health maintenance organization population. In contrast, new trials of screening or case finding may be successful in other populations having poorly organized or less coordinated primary health care. In such systems, researchers should attempt to differentiate whether primary care itself is being created, or services and therapies are more effectively reaching an identifiable target group of older adults in need.

An ideal strategy for New Zealand, where publicly accessible multidisciplinary care is already available, may entail real integration of such care into primary care with a bolstered workforce to emphasize skills and knowledge to empower older adults, as well as expert medical assessment and knowledge of rehabilitation and multimorbidity management. Together with community-accessible activity areas and social integration, increased focus on age-friendly communities, not just within the health system, may be needed to reduce disability in older people. Further trials should compare substantially changed ways of working with older people with a true usual care group and carefully evaluate the changes in services and social integration.

The generalizability of our findings may be limited by the less than 50% response rate at the patient level and the high educational and occupational level of the enrolled patients. These factors may have led to underestimation of the effect of the intervention as it would be expected that more unmet need may be found in lower socioeconomic status groups and less engaged groups. This trial should be interpreted in the context of the New Zealand system.

In conclusion, our case-finding strategy was effective in increasing identification of people with disability, but there was little evidence of response from the health system apart from residential care placement (which may have been needed). Further research should trial enhancement of primary care in integrated systems.

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Key words: population screening; older adults; disability; practice-based research; primary care; early medical intervention

Submitted January 21, 2014; submitted, revised, July 1, 2014; accepted July 9, 2014.

Funding support: The trial was funded by program grant 06-068 and program grant extension 09-068 from the Health Research Council of New Zealand. C.M. and S.A.M. had financial support for their research program grant extension 09-068 from the Health Research Council of New Zealand, a government research funding source, for the submitted work.

Previous presentations: A presentation of similar content was made to the North American Primary Care Research Group Scientific Meeting in New Orleans, Louisiana, in December 2012, and at the General Practice Conference of New Zealand, in Auckland, New Zealand, September 2012.
Acknowledgments: We acknowledge the willing participation of the practices and older adults. Thank you to Stuart Parker and Janet Blom for commenting on the manuscript before submission. Elizabeth Robinson completed the randomization schedule and informed C.M. of practice allocation. We acknowledge Sue Vernall and Sue Gifford for supporting the practices in the intervention and assisting in recruitment; Jenny Bush, Jenny Schrader, and Penny McPhail, who completed blinded assessments and recruitment; and Angela Robinson for supporting the project.

Supplementary materials: Available at http://www.AnnFamMed.org/content/12/6/514/suppl/DC1/

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