

The Effectiveness and Efficiency of Home-Based Nursing Health Promotion for Older People: A Review of the Literature

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Despite the large potential role that community nurses have in providing individualized health promotion to older people, there is a lack of consensus in the literature regarding this role's effectiveness and efficiency. This article presents a literature review and synthesis of 12 randomized controlled trials selected from 344 published studies on preventive home visitation programs for older people. The findings suggest that a diversity of home visiting interventions carried out by nurses can favorably affect health and functional status, mortality rates, use of hospitalization and nursing homes, and costs. Further research is needed that focuses on the outcomes of quality of life, mental health, social support, caregiver burden, the acceptability of intervention, and specific subgroups of clients who benefit most. Findings also indicate the need for a theoretical foundation, increased emphasis on health-promotion strategies, and more research using a more complete economic evaluation to establish efficiency.

Keywords: *health promotion; community health nursing; prevention; aged; home care services; effectiveness; efficiency; review; cost*

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An aging population, technological advances, and budget constraints have led to major health care reforms worldwide. The results are fewer acute-care hospitals, less long-term institutional care, and increasing pressure on community-based services to maintain accessible, high-quality, and comprehensive health care within the confines of economic constraint (Anderson and Hussey 2000; Bergman et al. 1997; United Nations 2002). Rates of institutionalization for older people have decreased and formal community-based care has expanded such that the proportion of older people receiving community care now substantially outweighs the proportion receiving formal services through an institution (Anderson and Hussey 2000). Managers and policy makers alike face questions about the most efficient mix of service strategies in this more community-based and less institutional-oriented system.

Care of older people, and in particular, frail older people poses a central challenge to current health care systems (Johri, Beland, and Bergman 2003). These people are typically older than 75 years of age and have co-occurring health problems that are acute and chronic in nature as well as functional disabilities (Hebert 1997; National Advisory Council on Aging 1999). Their social-support networks are frequently overextended or at risk of breaking down (Johri, Beland, and Bergman 2003). These factors lead to comparatively greater risk for increased morbidity, institutional and general health-service use, and death (Gill and Sharpe 1999). To address both the quality-of-life and cost concerns raised by these data, preventing illness in and promoting the health of older people have become both an economic and social priority (World Health Organization 2003) and a personal preference. Furthermore, the data suggest that older people benefit from interventions specifically designed to promote health (Epp 1986; McWilliam et al. 2000). A recent report by the World Health Organization (2003) for policy makers on the future direction of health-promotion evaluation emphasized the need for evidence about effective and efficient health-promotion strategies. However, there is little information available to inform policy makers about effective and efficient options for providing health promotion.

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During the past two decades, interest has grown in the use of proactive, provider-initiated home visitation programs, which are above and beyond usual care (i.e., not in response to a specific health problem or event such as hospitalization), as a health-promotion strategy (Byles 2000; Elkan et al. 2001; McWilliam et al. 2000). Previous research suggests that community nurses have the potential to play a major role in these programs, which provide individualized health promotion and preventive care to older people by providing health assessment, support, and access to resources through regular home visiting (Alessi et al. 1997; Byles 2000; Elkan et al. 2001). The ultimate goal of these programs is to proactively identify and address factors influencing health and to promote positive health behaviors and autonomy of older people living in the community to prevent or delay institutionalization, reduce health care costs, and improve quality of life (Hendriksen, Lund, and Stromgard 1984, 1989; Stuck et al. 2002).

A number of meta-analyses (Elkan et al. 2001; Rubenstein, Siu, and Wieland 1989; Stuck, Mayer-Oakes, and Rubenstein 1993; Stuck et al. 2002), systematic reviews (Stuck, Mayer-Oakes, and Rubenstein 1993; van Haastregt et al. 2000), and literature reviews (Hirdes, Naus, and Young 1994) have been undertaken of various proactive, provider-initiated home visitation programs. However, although useful in synthesizing the literature, these meta-analyses and reviews have not examined specifically the contribution of community nursing to the outcomes. The home visitation programs included in these meta-analyses and reviews are staffed by different types of providers (i.e., lay community workers, nurses, and geriatricians), thus limiting the ability to identify how the type and quality of nursing involvement contributes to the outcomes of the studies. Only eight randomized controlled trials of preventive home visits undertaken by nurses have been included in any meta-analysis or review, of which six reported some significant effects. Additionally, most of the meta-analyses and reviews have focused only on the effectiveness of preventive home visits. To our knowledge, no published meta-analyses or reviews have examined the efficiency of home-based-nursing health promotion and preventive care.

Because of the large potential role that community nurses have in providing health promotion to older people and the increasing pressure for evidence to demonstrate that this is an efficient use of scarce health care resources, the need for a literature review of the effectiveness and efficiency of home-based-nursing health promotion was identified. The term *effectiveness* refers to the comparative outcomes for older people receiving and not receiving home-based health-promotion and preventive-care services (Drummond et al. 1997). The term *efficiency* refers to whether or not

resources used in this way represent the best value compared to alternative uses. Often, studies that find no difference in the effects of two approaches miss the real effect: reduced use of services with one of the approaches (Browne et al. 2001).

NEW CONTRIBUTION

This review serves several key functions for policy makers, managers, practitioners, and researchers who are interested in home-based-nursing health promotion and preventive care for older people. First, it provides data regarding the effectiveness of home-based health promotion provided by professional nurses. Second, it provides insight into best-practice models for providing home-based-nursing health promotion to older people. Third, it identifies methodological issues that need to be addressed in future studies. Fourth, it provides a foundation for future research to study the potential benefits of home-based-nursing health promotion. Finally, it provides policy makers with data regarding the efficiency of this health-promotion strategy to inform resource-allocation decision making in their local setting. With the increasing demand for health care services for older people, there is increasing pressure for evidence to demonstrate that home-based-nursing health promotion for older people is an efficient use of health care resources in developed countries (Rychetnik and Wise 2004).

CONCEPTUAL FRAMEWORK AND DEFINITIONS

We start by defining the terms *preventive home visitation programs*, *health promotion*, *preventive care*, and *best practice*. There is great variation in the definitions of preventive home visitation programs in the literature. Preventive home visitation programs have been described by various names including *comprehensive geriatric assessment*, *home visit program*, *home-based geriatric health screening program*, *case finding and surveillance*, and *community assessment and intervention* (Rubenstein et al. 1991; Stuck, Mayer-Oakes, and Rubenstein 1993). The existing meta-analyses and reviews have combined trials of in-home preventive programs with trials of home-based care for clients discharged from the hospital (Elkan et al. 2001), trials involving screening and referral only—not direct and ongoing treatment (Stuck, Mayer-Oakes, and Rubenstein 1993), and trials of hospital- and community-based comprehensive geriatric-assessment programs (Rubenstein, Siu, and Wieland 1989). Yet, the data suggest that to be effective, a preventive home visitation program must involve assessment or screening combined with

regular home visits (Elkan et al. 2001; Stuck, Mayer-Oakes, and Rubenstein 1993; Stuck et al. 2002).

Thus, for the purpose of this review, we defined preventive home visitation programs as including (a) home visits to older people living at home in the community, (b) multidimensional assessment of older people's health and functional status, (c) identification of needs and strengths leading to specific recommendations aimed at enhancing health, and (d) multiple follow-up contacts to address these recommendations. For the purpose of this review, we defined health promotion as the process of enabling individuals and communities to increase control of the determinants of health and thereby improve their health (Epp 1986). Preventive care was defined as behavior motivated by a desire to actively avoid illness, detect it early, or maintain functioning within the constraints of illness (Pender, Murdaugh, and Parsons 2002).

Accumulation of empirical evidence alone is insufficient to guide practice. A theoretical approach is needed to provide direction to both the design and evaluation of health-promotion programs to allow for wider application (Bowsher et al. 1993; Green 2000). The Sidani and Sechrest (1999) theory-driven approach to program evaluation will be used to provide a structure for the organization of the literature review, the selection of variables, and the analysis. A theory-driven approach to program evaluation organizes the variables representing the elements of a program into three categories: input, process, and output. Input incorporates variables that relate to the characteristics of the clients receiving the program, the type of staff providing the program services, and the setting in which the program is offered. Process incorporates mediating variables that relate to the actual components of the program and the dosage of the program services provided to understand the processes leading to achievement of the program effects. Output variables reflect the expected outcomes or the criteria indicating effectiveness and/or efficiency of a program and the expected point at which changes in outcome occur. The concern in a theory-driven approach to program evaluation is to understand how and what makes a program work in addition to knowing that it does work (Sidani and Sechrest 1999).

DATA AND METHOD

Because of the heterogeneity of the studies with respect to subject selection, nature of the intervention, length of follow-up, and outcomes measured, a meta-analysis of intervention effects would be inappropriate and may lead to oversimplified conclusions (Cook, Sackett, and Spitzer 1995; Moher and Olkin 1995). Instead, the effectiveness and efficiency of preventive home visits for

older people living in the community were analyzed in a qualitative manner, and the methodological quality of the included trials was summarized.

DATA SOURCES

We searched Medline (1966 to 2003), CINAHL (1982 to 2003), Cochrane Controlled Trials Register (1980 to 2003), Ageline (1978 to 2003), Health Star (1975 to 2003), PsychInfo (1984 to 2003), Sociological Abstracts (1984 to 2003), Cochrane Database of Systematic Reviews (1980 to 2003), and the Social Science Citation Index (1984 to 2003) for reports of primary research. The indexing terms used for article retrieval were *frail elderly, elderly, aged, home, in-home, prevention, home care, home visit, health visit, home health care, home nursing, health promotion, anticipatory care, geriatric assessment, screening, assessment, and randomized controlled trial*. Randomized controlled trials are the most rigorous method of assessing effectiveness (Khan et al. 2001). Articles were limited to age 65 and older and English language. The reference lists of all retrieved articles were reviewed. The authors of all relevant articles were contacted, as were other content experts to identify any additional trials, unpublished literature, secondary analyses of published data, and any long-term follow-up data. Web-site searches included the Internet search engine Google; Cochrane Collaboration; NHS Centre for Reviews and Dissemination, United Kingdom; International Union for Health Promotion; Cochrane Health Promotion and Public Health Field; Health Canada (2000); and International health and research organizations and related links.

STUDY SELECTION

Complete texts of all potentially relevant articles were reviewed using the inclusion and exclusion criteria listed in Table 1. We report here on randomized controlled trials in which the effectiveness and/or efficiency of nursing health promotion was assessed.

APPRAISAL OF STUDY QUALITY AND DATA EXTRACTION

We assessed the methodological quality of the trials that assessed the effectiveness of home-based-nursing health promotion using a modified version of the rating tool developed by Jadad et al. (1996). We rated the studies according to the appropriateness of randomization, extent of bias in data collection, completeness of follow-up (adequate follow-up included data

TABLE 1 Inclusion and Exclusion Criteria

Inclusion Criteria

The study population includes older persons (65 years and older) living in the community (not residing in a hospital, a nursing home, or residential care). The intervention was provided by a registered nurse or equivalent (i.e., health or home visitor) alone or as part of a team.

The intervention was provided in the community.

The intervention involved the pursuit of a wide range of preventive outcomes and was not in response to a patient health problem or event such as hospitalization or a fall.

The intervention involved ongoing home visits or telephone contacts for treatment. The study design was a randomized controlled trial.

At least one of the following patient outcomes was reported: mortality, admission to institutions (i.e., hospital, long-term care), health status, functional status, use of health and social services, and costs.

Exclusion Criteria

The intervention involved only screening and referral or recommendations, not ongoing treatment.

The intervention was aimed exclusively at clients who had been discharged from the hospital.

The intervention was designed exclusively as a substitute for nursing-home or hospital care.

The study analyzed home visits for therapeutic or rehabilitative purposes (i.e., treatment of depression, support for dementia, cardiac rehabilitation, stroke rehabilitation, terminal care, exercise, vaccination, or pharmacy programs).

on ≥ 80 percent of the study participants at the last point of follow-up), and similarity of attrition rates in the comparison groups (acceptable rates were within 2 percent of each other). We assessed the methodological quality of the trials assessing the efficiency of home-based-nursing health promotion using the criteria developed by Drummond et al. (1997). Only studies that included measures of cost were included. We rated the studies according to the clarity of the question, viewpoint of the analysis and competing alternatives, establishment of effectiveness, inclusion of relevant costs and consequences, and completeness of measurement (Drummond et al. 1997). Data were extracted relating to study location, aims and objectives, sample size and characteristics, intervention personnel and strategies, duration of follow-up and mean number of visits, outcomes, and results to capture the input, process, and output variables (Sidani and Sechrest 1999).

RESULTS

The search strategies yielded a total of 344 abstracts, of which 12 were included in the review (Bernabei et al. 1998; Dalby et al. 2000; Gunner-Svensson et al. 1984; Hall et al. 1992; Hebert et al. 2001; Hendriksen, Lund, and Stromgard 1984; Pathy et al. 1992; Stuck et al. 1995; Stuck et al. 2000; van Rossum et al. 1993; Vetter, Jones, and Victor 1984; Zimmer, Groth-Juncker, and McCusker 1985) with data on 13 trials (Vetter, Jones, and Victor [1984] included the results of two trials). The studies by Bula et al. (1999) and Rubenstein et al. (1994) were an elaboration of Stuck et al. (1995), while Martin et al. (2000) was an elaboration of Stuck et al. (2000), and Hendriksen, Lund, and Stromgard (1989) was an elaboration of Hendriksen, Lund, and Stromgard (1984); thus, the original articles were reviewed. Author contacts did not yield any new studies (see Figure 1 for study flow). Descriptive details regarding these twelve studies are displayed in Table 2.

THE METHODOLOGICAL QUALITY OF THE STUDIES

All of the criteria for the twelve trials assessing effectiveness were fulfilled partly or completely. The main shortcomings of the studies were in the areas of randomization, blinding of outcome assessors, and incomplete follow-up data. In addition, several of the studies were underpowered because of small sample sizes (Dalby et al. 2000; Hall et al. 1992; Zimmer et al. 1985). Only 58 percent of the trials reported use of a random process (i.e., random number table) to allocate subjects to groups, and only 17 percent reported allocation concealment. Given the difficulty of blinding subjects and clinicians to group allocation in nursing-intervention studies, it is important that outcome assessors be blinded (DiCenso, Guyatt, and Ciliska 2005). Yet, only 58 percent of the trials reported that the outcome assessors were blind. One-third (33 percent) of the trials reported a loss to follow-up of greater than 20 percent, and none of the trials demonstrated that those subjects lost to follow-up were similar on their characteristics at baseline to those retained. Failure to determine whether or not subjects lost to follow-up are similar with respect to important determinants of outcome could result in an underestimate or overestimate of the true effect. Noteworthy is that one-third (33 percent) of the trials reported a higher (> 2 percent) attrition rate in the control group.

Most of the criteria for the six trials assessing efficiency were fulfilled partly or completely. The main shortcomings of the studies were in the areas of not defining the viewpoint of the evaluation, not providing a comprehensive description of the competing alternatives (i.e., health-promotion intervention

(text continues on page 548)

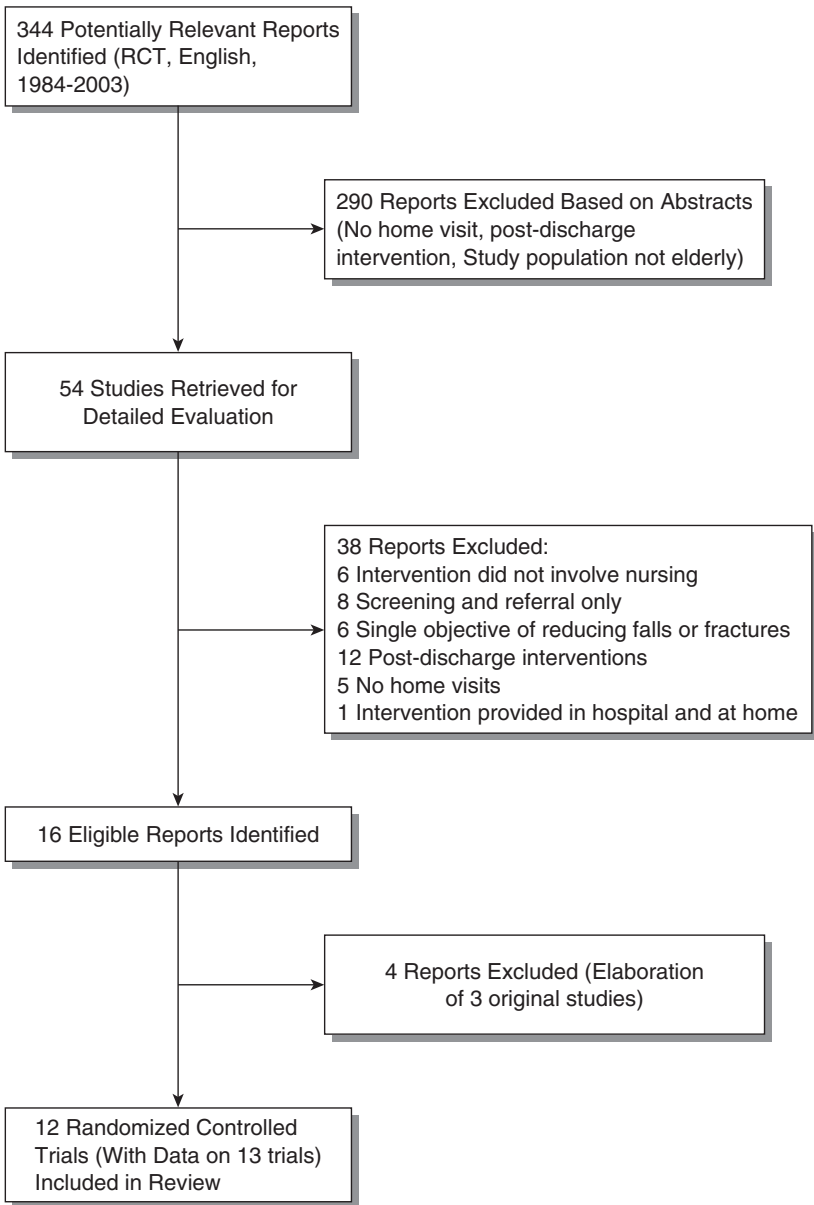


FIGURE 1 Study Flow

TABLE 2 Characteristics of Randomized Controlled Trials That Evaluated Nursing Health Promotion and Preventive Care for Older People

<i>Study and Base of Intervention</i>	<i>Sample Size and Characteristics</i>	<i>Intervention</i>	<i>Providers</i>	<i>Comparator (Characteristics of Standard Care)</i>
Hebert et al. (2001) Quebec City, Quebec, Canada Primary Care	250 75 years Living at home 1 risk factor for functional decline as identified by postal questionnaire (Hebert et al. 1996) Excluded low-risk people from the study	In-home visit at beginning of study Used a standardized instrument to evaluate dimensions of risk-focused on medical or geriatric conditions requiring further treatment or rehab Results sent to family physician with recommendations for interventions In some cases, nurse made a direct referral to community agencies Nurse monitors client's progress and compliance with treatment via telephone	Trained nurse	Usual primary care services covered by national system of health and social insurance

<p>Stuck et al. (2000) Bern, Switzerland Geriatric research unit, department of geriatrics and rehabilitation</p>	<p>Low Risk: 148 High Risk: 11675 years Living in the community No terminal illness</p>	<p>Annual multidimensional geriatric assessments in their homes, including medical history, physical exam, blood samples, hearing, vision, nutrition, oral health, medication use, safety, social support, ease of access to external environment Developed a problem list and discussed with project team's geriatrician In-home follow-up visits to monitor implementation of recommendations, facilitate compliance, identify new problems, provide health education</p>	<p>3 health nurses (registered nurses) with additional degree in public health nursing based on 8-month postgraduate course Nurses had additional training in gerontology and physical assessment</p>	<p>Self-directed use of health and social services</p>
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(continued)

TABLE 2 (continued)

<i>Study and Base of Intervention</i>	<i>Sample Size and Characteristics</i>	<i>Intervention</i>	<i>Providers</i>	<i>Comparator (Characteristics of Standard Care)</i>
Hall et al. (1992) New Westminster, British Columbia, Canada Community care long-term care program	81 65 years Eligible for personal-care at-home program	Initial assessment: Identified goals and developed a personal health plan jointly with client based on his or her needs in the areas of health care, substance use, exercise, nutrition, stress management, emotional functioning, social support and participation, housing, finances, transportation Problem identification and treatment according to a standard protocol Follow-up visits to support clients focused on development of personal health skills in relation to identified problem areas and referral to community resources; also received usual care provided by the LTC program in BC	1 project nurse for all subjects	Usual care provided by a long-term care program Home health services including screening and preadmission assessment, arrangement or purchase of needed services, and review at 3 months and at least yearly thereafter covered by a national system of health and social insurance

Zimmer, Groth- Juncker, and McCusker (1985)	85	Elderly-age not defined Living at home Have significant illness (not defined)	At intake, all patients received 1 home visit by each team member to perform the initial assessment An interdisciplinary care plan was developed that designated 1 team member as the primary care provider with consultative visits by the others as needed. The team provided support to the informal care provider and a 24-hour telephone service	Physician-led intervention team included physician, nurse practitioner (master's prepared), medical social worker experienced in geriatric care	Usual primary care services
Rochester, New York, USA Primary care	Requiring medical care No access to physician for home visit				
Gunner-Svensson et al. (1984)	2055 ≥ 70 years	Introduction to services, advice to elderly person and caregiver, identification of goals, and coordination of plan of care in collaboration with client	Nurses with experience in geriatrics and medicine	Usual primary care services	
Denmark Primary care					

(continued)

TABLE 2 (continued)

<i>Study and Base of Intervention</i>	<i>Sample Size and Characteristics</i>	<i>Intervention</i>	<i>Providers</i>	<i>Comparator (Characteristics of Standard Care)</i>
Pathy et al. (1992) South Wales, UK Primary care	369 65 years Reported at least one problem on a postal questionnaire	Screening by functional- status postal questionnaire followed by direct contact only with subjects with identified problems Provided advice, health education, and referral to GP or community services	Specialized geriatric home visitor working in primary care	No questionnaire sent Self-directed use of health visitors Health-visitor contact with population mainly confined to crisis visiting
Bernabei et al. (1998) Northern Italy Home health agency	100 65 years Recipients of home health services or home assistance programs	Case managers perform initial assessment and every 2 months thereafter Initial physical exam completed by GP Case managers reported the initial assessment to the GEU, which determined the services that patients were eligible for and designed and implemented individualized care plans in collaboration with general practitioners	Case management and care planning by community geriatric evaluation unit Team composition: general practitioners, social worker, several nurses Case managers completed course on case management and comprehensive geriatric assessment	Primary and community care with no case management Community and primary care included GP services, nursing and social services, home aids, meals on wheels

<p>Hendriksen, Lund, and Stromgard (1984) Denmark Primary care</p>	<p>285 ≥ 75 years old, living at home</p>	<p>Problems emerging from home visits were discussed at weekly team meetings Clients were evaluated based on physical and cognitive function, level of depression using established scales, and medication use</p> <p>Interview was conducted using a structured questionnaire to identify the need for social or medical services The health visitor applied for and coordinated the community services, distributing aids and modifications</p>	<p>Home visitor (2 nurses or 1 physician) Nurses (5 to 21 years of experience in home nursing)</p>	<p>Self-directed use of usual social and medical support services in the community</p>
<p>Vetter, Jones, and Victor (1984) Wales, UK Primary care</p>	<p>577 ≥ 70 years old, living at home and part of 2 general-practice lists</p>	<p>Health education and prevention, referral to community services, follow-up of services, communication with other practitioners</p>	<p>Home visitors (registered nurses working in primary care) General practitioners</p>	<p>Crisis visiting of older people</p>

(continued)

TABLE 2 (continued)

<i>Study and Base of Intervention</i>	<i>Sample Size and Characteristics</i>	<i>Intervention</i>	<i>Providers</i>	<i>Comparator (Characteristics of Standard Care)</i>
van Rossum et al. (1993) Netherlands Primary care	292 Patients of GP, 75 to 84 years old, not receiving home care	Discussed health topics in a broad sense and provided information, advice, and referral to other services Standardized checklist: functional state, medications, social contacts, housing conditions	Public health nurses trained for study and already involved in home nursing care	Self-directed use of available health services
Stuck et al. (1995) Santa Monica, California, USA Geriatric Medicine and Gerontology, Department of Medicine	215 ≥75 years old, living at home and without severe cognitive impairment, language problems, terminal illness, or severe functional impairment	Annual comprehensive in-home geriatric assessments by GNP In collaboration with geriatrician, GNP evaluated problems and risk factors for disability Ongoing follow-up included health education, compliance, and assessment and recommendations in areas of functional and health status, mental status, gait and balance, medications, social support, body weight, vision	Gerontological nurse practitioners in collaboration with geriatrician	Usual primary care services

<p>Dalby et al. (2000) Hamilton, Ontario, Canada Primary care</p>	<p>73 Patients of two GPs, ≥ 70 years old, living at home, reported functional impairment, admission to hospital, or bereavement on a postal questionnaire</p>	<p>Nurse used functional-consequences theory of gerontologic nursing (Miller 1995) Comprehensive assessment, development of care plan, follow-up visits, and phone calls to provide vaccinations, monitor, promote health, and provide support Assisted clients in identifying need for and accessing of community services</p>	<p>Primary care nurse affiliated with a general family-practice unit</p>	<p>Usual primary care services covered by national system of health and social insurance</p>
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vs. usual care), the lack of use of sensitivity analysis, and the lack of inclusion of all the important and relevant costs and consequences for each alternative. In addition, because of small sample sizes, several of the studies were underpowered to detect differences in cost. The conventional way of allowing for uncertainty in economic analysis is to conduct a sensitivity analysis, in which estimates for key variables are altered to assess their effect on the results (Drummond et al. 1997).

INPUT: WHICH POPULATIONS ARE MOST LIKELY TO BENEFIT?

Selection of the target population can be an important factor in determining the effectiveness and efficiency of a health care intervention (Tugwell et al. 1985; van Haastregt et al. 2000). Yet, only four studies conducted a subgroup analysis to identify what clients with what characteristics benefit most from which approach to treatment (Bula et al. 1999; Gunner-Svensson et al. 1984; Stuck et al. 2000; van Rossum et al. 1993). In addition, these characteristics generally were limited to age and level of risk for functional decline.

There is a general lack of consensus among the studies regarding the effectiveness of in-home preventive programs for older persons at high risk versus low risk of functional decline. In a separate subgroup analysis, van Rossum et al. (1993) reported that preventive home visits were most effective for those individuals identified as being in poor health at baseline. Conversely, other studies suggest that there is limited evidence for the effectiveness of in-home preventive programs for individuals at high risk for functional decline (Bula et al. 1999; Stuck et al. 2000). Stuck et al. (2000) found that those individuals in the high-risk group receiving the intervention were higher users of nursing homes than those in the usual care group. Furthermore, disability was reduced among people at low risk at baseline but not among participants at high risk. Similarly, Bula et al. (1999), in a subgroup analysis of the study by Stuck et al. (1995), reported that preventive home visits were most effective for individuals who were not limited in basic activities of daily living at baseline. One explanation for these findings is that a preventive intervention works best at early and reversible stages in the continuum from health to disability; more disabled and frail clients require a more intensive intervention such as institutional care (Rubenstein and Stuck 2001). Consequently, older people at higher risk would benefit most from a more intensive intervention that includes systematic follow-up and coordination as well as more frequent intervention (Bula et al. 1999; Rubenstein and Stuck 2001).

The age of the study population varied with five studies including people 75 years and older (Hebert et al. 2001; Hendriksen, Lund, and Stromgard

1984; Stuck et al. 1995; Stuck et al. 2000; van Rossum et al. 1993), three with people 70 and older (Dalby et al. 2000; Gunner-Svensson et al. 1984; Vetter, Jones, and Victor 1984), and three including those 65 and older (Bernabei et al. 1998; Hall et al. 1992; Pathy et al. 1992). One study did not specify the age of the elderly persons included in the study (Zimmer, Groth-Juncker, and McCusker 1985). In a subgroup analysis, Gunner-Svensson et al. (1984) reported that a preventive intervention was most effective for women who were 80 years and older.

INPUT: WHAT IS THE CONTEXT OF THE INTERVENTION?

Seven studies were conducted in Western Europe: the United Kingdom (Pathy et al. 1992; Vetter, Jones, and Victor 1984), Denmark (Gunner-Svensson et al. 1984; Hendriksen, Lund, and Stromgard 1984), the Netherlands (van Rossum et al. 1993), Switzerland (Stuck et al. 2000), and Italy (Bernabei et al. 1998). Only two studies were conducted in the United States (Stuck et al. 1995; Zimmer, Groth-Juncker, and McCusker 1985) and three studies were conducted in Canada (Dalby et al. 2000; Hall et al. 1992; Hebert et al. 2001). In eight studies, the sample was selected from and the intervention was based in a primary care setting (Dalby et al. 2000; Gunner-Svensson et al. 1984; Hebert et al. 2001; Hendriksen, Lund, and Stromgard 1984; Pathy et al. 1992; van Rossum et al. 1993; Vetter, Jones, and Victor 1984; Zimmer, Groth-Juncker, and McCusker 1985). In the other four studies, the intervention was based in a home care setting in which clients were receiving community support services (Bernabei et al. 1998; Hall et al. 1992) and in a geriatric clinic (Stuck et al. 1995; Stuck et al. 2000).

INPUT: WHAT ARE THE CHARACTERISTICS OF THE PROVIDER?

The type of provider varied, as did the skills and training of the provider and the level of continuity of care. In eight studies, the study intervention was provided by a nurse only (Dalby et al. 2000; Gunner-Svensson et al. 1984; Hall et al. 1992; Hebert et al. 2001; Pathy et al. 1992; Stuck et al. 2000; van Rossum et al. 1993; Vetter, Jones, and Victor 1984). In the other four studies, the intervention was provided by nurses in collaboration with other health care professionals such as geriatricians or general practitioners (Bernabei et al. 1998; Hendriksen, Lund, and Stromgard 1984; Stuck et al. 1995; Zimmer, Groth-Juncker, and McCusker 1985). In general, the skills and training of the nurses involved in the intervention were described poorly.

Several of the studies did not provide any description of the type of nursing personnel (Bernabei et al. 1998; Dalby et al. 2000; Gunner-Svensson et al. 1984; Hall et al. 1992; Hebert et al. 2001). For others, the type of nursing personnel was diverse and included home or health visitors (Hendriksen, Lund, and Stromgard 1984; Pathy et al. 1992; Vetter, Jones, and Victor 1984), nurse practitioners (Stuck et al. 1995; Zimmer, Groth-Juncker, and McCusker 1985), and public health nurses (Stuck et al. 2000; van Rossum et al. 1993). However, home visiting in which the nurses received formal training in gerontology seemed to be more effective than that in which the nurses did not receive specific training. In addition, there is evidence from a single study that the skill level of the nurses influenced the effectiveness of the intervention (Stuck et al. 2000).

The importance of the nurse-client relationship and continuity of care for beneficial nursing care is documented extensively in the literature (McNaughton 2000; Trojan and Yonge 1993). Four studies used one project nurse for all study participants (Dalby et al. 2000; Hall et al. 1992; Hebert et al. 2001; Pathy et al. 1992). In other studies, more than one nurse provided the study intervention, but continuity of provider was assured (Hendriksen, Lund, and Stromgard 1984; van Rossum et al. 1993; Vetter, Jones, and Victor 1984). Continuity of care is unknown for the remaining trials that used more than one nurse for the intervention (Bernabei et al. 1998; Gunner-Svensson et al. 1984; Stuck et al. 1995; Stuck et al. 2000; Zimmer, Groth-Juncker, and McCusker 1985).

PROCESS: COMPONENT AND DOSAGE RECEIVED

Which program components are most effective? The study interventions were similar in that they involved a diversity of in-home services. These include health education on nutrition, exercise, stress management, substance abuse, emotional and social functions, instrumental activities of daily living, and accessing health care (Hall et al. 1992; van Rossum et al. 1993); supportive physical and psychosocial nursing care (Gunner-Svensson et al. 1984; Hendriksen, Lund, and Stromgard 1984; Vetter, Jones, and Victor 1984); functional assessment and follow-up (Pathy et al. 1992); at-home screening and treatment (Dalby et al. 2000; Hebert et al. 2001) including treatment for depression (Bernabei et al. 1998) and for physical disabilities (Stuck et al. 1995; Stuck et al. 2000); and integrated and interdisciplinary case management (Bernabei et al. 1998; Zimmer, Groth-Juncker, and McCusker 1985). Descriptions of the content of the study intervention and the comparator (standard care) were often inadequate. Therefore, it is difficult to determine what the nurses did that made the difference. However, interventions in

which the nurse assumed a more intensive role in identifying problems and carrying out the plan of care seemed to be more effective than those in which the emphasis was on a single problem and the provision of information or emotional support.

With the exception of one study (Dalby et al. 2000), the studies lacked a theoretical foundation for measuring the effectiveness and efficiency of home-based-nursing health promotion. Dalby et al. (2000) used a functional-consequences theory of gerontological nursing (Miller 1995) to guide the study intervention. However, no rationale was provided for the selection of this theoretical approach, and the extent to which outcomes were linked to the specific components of the intervention was not addressed. The study interventions also differed in terms of the focus of the intervention on health promotion and preventive care. In eight studies, the intervention was focused on preventive care (Stachtchenko and Jenicek 1990). In these studies, the goal of the intervention was on early identification and management of health problems to prevent or reduce the risk of further disability and death (Bernabei et al. 1998; Dalby et al. 2000; Hebert et al. 2001; Hendriksen, Lund, and Stromgard 1984; Pathy et al. 1992; Stuck et al. 1995; Stuck et al. 2000; Vetter, Jones, and Victor 1984; Zimmer, Groth-Juncker, and McCusker 1985). In other studies, the intervention included health-promotion strategies and involved goals such as autonomy, empowerment, and independent decision making. This was achieved through the development of personal health skills (Hall et al. 1992), health education (van Rossum et al. 1993; Vetter, Jones, and Victor 1984), and mutual goal setting in collaboration with the client (Gunner-Svensson et al. 1984; Hall et al. 1992).

With the exception of two studies (Hebert et al. 2001; Vetter, Jones, and Victor 1984), subject views and compliance with and acceptability of the intervention were not reported. For example, the only indicator of compliance in the trials is the lost-to-follow-up rate. The level of subject compliance with the intervention is an important factor that can influence the effectiveness of a community intervention (Tugwell et al. 1985; van Haastregt et al. 2000). A low compliance can influence the effectiveness of the intervention negatively and/or reflect an inability to tailor the intervention to the clients' individual needs (van Haastregt et al. 2000). With the exception of one study (Hebert et al. 2001), none of the studies reported on whether or not the study intervention was implemented according to plan. This refers to whether or not the health care providers complied with the study intervention. Health-provider compliance is another important factor that can influence the effectiveness of a community intervention (Tugwell et al. 1985; van Haastregt et al. 2000). The lack of information regarding the theoretical approach and subject and health care-provider compliance to the intervention makes it

difficult to assess if the programs were adequate in terms of design or delivery. Rejection of the effectiveness of a program when the program itself was inadequate in terms of design or delivery is a Type III error (Green 2000).

What is the visit intensity and duration? Visit frequency varied from 1.9 to 14.1 visits for the total follow-up period and was not reported in two studies (Dalby et al. 2000; Zimmer, Groth-Juncker, and McCusker 1985). The annual frequency of visits ranged from one to six visits per year with a mean of two visits per year with the exception of two trials (Gunner-Svensson et al. 1984; Vetter, Jones, and Victor 1984) that only included one visit per year. The studies also differed in terms of how visit frequency was determined. In several studies, visit frequency was based on the needs of individual subjects (Gunner-Svensson et al. 1984; Hall et al. 1992; Hendriksen, Lund, and Stromgard 1984; Pathy et al. 1992; van Rossum et al. 1993; Vetter Jones, and Victor 1984), whereas other studies had a set visit frequency with some flexibility to meet the needs of individual clients (Bernabei et al. 1998; Hebert et al. 2001; Stuck et al. 1995; Stuck et al. 2000). In general, visit duration was described poorly. In the three trials that reported visit duration, the average length of each home visit ranged from 0.5 to 2 hours (Hendriksen, Lund, and Stromgard 1984; Stuck et al. 2000; van Rossum et al. 1993).

OUTPUT: EFFECTIVENESS

Measures of effectiveness included mortality, health and functional status, and caregiver outcomes. With the exception of two studies (Vetter, Jones, and Victor 1984 in Powys [United Kingdom] and Hebert et al. 2001), at least one (significant) favorable effect of the in-home preventive intervention was reported. None of the trials reported a negative effect. The outcomes and results of the included studies measuring effectiveness are summarized in Table 3.

Effects on mortality. In four of the eleven studies investigating the effects of the intervention on mortality, the intervention group showed a significantly lower mortality rate in comparison to the control group (Hall et al. 1992; Hendriksen, Lund, and Stromgard 1984; Pathy et al. 1992; Vetter, Jones, and Victor 1984 in Gwent).

Effects on health and functional status. Six studies looked at psychosocial factors such as level of depression (Bernabei et al. 1998; Stuck et al. 2000; van Rossum et al. 1993; Vetter, Jones, and Victor 1984), psychological status (Hall et al. 1992), anxiety (Vetter, Jones, and Victor 1984), loneliness (van Rossum

(text continues on page 556)

TABLE 3 Outcomes and Results of Randomized Controlled Trials That Evaluated Nursing Health Promotion and Preventive Care for Older People

Study	Duration of Follow-up (months)	Mean Number of Follow-Up Visits	Outcomes							
			Hospital Admission and Hospital Stay Mortality	Health Status	Functional Status	Use of Other Health and Social Services	Use of Nursing Homes	Caregiver Outcomes	Economic Evaluation	
Hebert et al. (2001)	12	0 (telephone contacts only)	No difference	No difference	No difference	No difference	No difference	No difference		
Stuck et al. (2000)	36	8.5 ± 2.9 ~ 4 visits per year	No difference	Improved vaccination coverage for low-risk subjects	Increased independence in ADLs for low-risk subjects at 3 years	Higher use of primary health care at 2 years for low-risk subjects	Higher use of nursing homes at 3 years in high-risk group	Net cost savings at three years related to lower use of nursing homes		
Hall et al. (1992)	36	4 to 12 hours per year × 3 years	Reduced mortality	No difference	No difference	Lower use of hospitals		Lower use of nursing homes		
Zimmer, Groth-Juncker, and McCusker (1985)	6	Not reported	Lower use of hospitals		No difference			Lower use of nursing homes	Higher satisfaction with care	No difference

(continued)

TABLE 3 (continued)

Study	Duration of Follow-up (months)	Mean Number of Follow-Up Visits	Outcomes								
			Mortality	Hospital Admission and Hospital Stay	Health Status	Functional Status	Use of Other Health and Social Services	Use of Nursing Homes	Caregiver Outcomes	Economic Evaluation	
Gunner-Svensson et al. (1984)	48	5 ~ 1 to 2 visits per year	No difference						Lower use of nursing homes for females ≥ 80 years		
Pathy et al. (1992)	36	9 3 visits per year	Reduced mortality	Lower use of hospitals for subjects aged 65 to 74	Increased perception of own health	No difference	No difference	Lower use of physician specialist increased use of CIP	No difference		
Bernabei et al. (1998)	12	6	No difference	Lower risk of use of hospitals	Improved cognitive status and decreased level of depression	Improved functional status	Improved functional status	No difference	Lower risk of use of nursing home		Net cost savings related to lower use of nursing homes and hospitals

Hendriksen, Lund, and Stromgard (1984)	36	12 4 visits per year	Reduced mortality	Lower use of hospitals	Increased use of home health care services Lower use of emergency services	No difference	Cost savings related to lower use of nursing- home, hospital, and emergency services
Vetter, Jones, and Victor (1984)	24	2.9 (urban) 1.9 (rural)	Reduced mortality	No difference	No difference	Increased use of home health services	Cost
van Rossum et al. (1993)	36	124 visits per year	No difference	No difference	Increased use of home health services	No difference	Cost savings related to lower use of nursing homes and hospitals
Stuck et al. (1995)	36	10.9 ± 3.2 ~ 4 to 5 visits per year	No difference	No difference	Increased use of physicians, services promoting socialization	Increased independent use in ADLs	The cost of the inter- ven- tion for each year of disability- free life gained is \$6,000
Dalby et al. (2000)	14	Not reported	No difference	No difference	No difference	Improved vaccination coverage	No difference

et al. 1993), and perceived social support (Hebert et al. 2001). Only one study demonstrated favorable effects by reducing the level of depression (Bernabei et al. 1998).

Four out of eight studies that examined functional status clearly showed that clients of in-home preventive programs are more likely than controls to experience and retain functional gains (Bernabei et al. 1998; Pathy et al. 1992; Stuck et al. 1995; Stuck et al. 2000). In these studies, the intervention group showed a major improvement in at least one measure of physical functioning (basic or instrumental; Bernabei et al. 1998; Stuck et al. 1995; Stuck et al. 2000), self-rated health (Pathy et al. 1992), or cognitive status (Bernabei et al. 1998).

Effects on caregivers. Only one study examined the effect of the intervention on caregivers (Zimmer, Groth-Juncker, and McCusker 1985). In this study, caregivers in the intervention group expressed a significantly higher level of satisfaction with care than those in the usual care group. This study is also unique in terms of its focus on both the client and caregiver as the recipient of care.

OUTPUT: EFFICIENCY

Measures of the use and/or costs of service provision included hospital admission and hospital stay, use of nursing homes, and use of other health and social services. The outcomes and results of the included studies are summarized in Table 3.

Hospital admission and hospital stay. Nine studies investigated the impact of the intervention on hospital admission and/or hospital stay. In five of these, the intervention group showed either a significantly lower number of admissions to a hospital or a lower number of days spent in a hospital compared to the control group (Bernabei et al. 1998; Hall et al. 1992; Hendriksen, Lund, and Stromgard 1984; Pathy et al. 1992; Zimmer, Groth-Juncker, and McCusker 1985). Pathy et al. (1992) found a reduction in hospital stay for younger subjects only (aged 65 to 74 years).

Use of nursing homes. Eleven studies investigated the impact of the intervention on use of nursing homes. In five of these, the intervention group had a significantly lower use of nursing homes compared to the control group (Bernabei et al. 1998; Gunner-Svensson et al. 1984; Hall et al. 1992; Stuck et al. 1995; Zimmer, Groth-Juncker, and McCusker 1985). Hall et al. (1992)

looked at the combined outcome of mortality and institutionalization and found that more intervention clients were alive and living outside an institution compared to controls at both the two- and three-year follow-up.

Use of other health and social services. Nine studies investigated the impact of the intervention on use of other health and social services. Six of these studies showed a higher use of services such as primary health care providers (Pathy et al. 1992; Stuck et al. 1995; Stuck et al. 2000), community health services (Hendriksen, Lund, and Stromgard 1984; van Rossum et al. 1993; Vetter, Jones, and Victor 1984), and services promoting socialization (Stuck et al. 1995) compared to the control group.

Economic evaluation. Although nine studies evaluated the impact of a home-based-nursing health-promotion intervention on use of services, only six of these studies included a full or partial economic evaluation (i.e., costs only; Bernabei et al. 1998; Hendriksen, Lund, and Stromgard 1984; Stuck et al. 1995; Stuck et al. 2000; van Rossum et al. 1993; Zimmer, Groth-Juncker, and McCusker 1985). Stuck et al. (1995) was the only study to conduct a full economic evaluation using a cost-effectiveness analysis. In a cost-effectiveness analysis, the consequences of a program are measured in the most appropriate effects or physical units, such as years of life gained (Drummond et al. 1997). This study reported that the cost of the intervention for each year of disability-free life gained was about US\$6,000, based on the number of permanent-stay nursing-home days avoided (Stuck et al. 1995). The other five studies conducted a partial economic evaluation using a cost analysis (Bernabei et al. 1998; Hendriksen, Lund, and Stromgard 1984; Stuck et al. 2000; van Rossum et al. 1993; Zimmer, Groth-Juncker, and McCusker 1985). In a cost analysis, the costs of a service are set against estimated savings owing to reductions in use of other services as a consequence (Drummond et al. 1997; Elkan et al. 2000). Three of these studies showed cost savings because of the prevention of nursing-home admissions (Bernabei et al. 1998; Stuck et al. 2000) and hospital admissions (Bernabei et al. 1998; Hendriksen, Lund, and Stromgard 1984).

OUTPUT: DURATION OF FOLLOW-UP

Duration of follow-up varied from six to forty-eight months, with eight trials following patients for twenty-four months or longer. With one exception (Hebert et al. 2001), none of the studies provided rationale for the duration of follow-up.

DISCUSSION

Knowledge development about the effectiveness and efficiency of home-based-nursing health promotion for older people has progressed slowly but steadily in that twelve randomized controlled trials were published during the past two decades and were included in this literature review. The evidence suggests that a diversity of home visiting interventions carried out by nurses can have favorable affects on many outcomes for older people. In terms of effectiveness, favorable and significant effects of the intervention were observed in four out of the eleven trials measuring mortality, four out of the eight trials measuring functional status, and one out of the four trials measuring level of depression. In terms of efficiency, favorable and significant effects of the intervention were observed in five out of the nine trials measuring hospital admissions, five out of the ten trials measuring use of nursing homes, and six out of the nine trials measuring use of other health and social services. Only one out of the twelve trials conducted a full economic evaluation using a cost-effectiveness analysis. Five other studies conducted a partial economic evaluation using a cost analysis. Three of these trials reported cost savings because of preventing, delaying, or reducing the use of hospitalization and nursing homes.

The findings from this review support and extend the literature in terms of defining the features of successful interventions. Key recommendations include (a) completion of an initial and ongoing assessment combined with regular home visits or telephone contacts (Elkan et al. 2001, Stuck et al. 2002); (b) ongoing involvement in the identification of problems and carrying out a plan of care to address these problems; (c) a flexible, client-centered, and interdisciplinary approach to care delivery (McWilliam et al. 2000); (d) provision of care by nurses with formal training in gerontology; (e) referral to and coordination of community services (Rubenstein et al. 1991); and (f) continuity of nursing-care provider (McWilliam et al. 1997; McNaughton 2000).

Despite the positive findings, conflicting results and limitations in the design of the interventions and measures of effectiveness and efficiency limit the usefulness of the study findings for policy decisions. The conflicting findings likely are related to the diversity of program components, target populations, types of outcomes measured, types of comparators, types and range of costs included, and contexts among the studies. Methodological shortcomings also may have contributed to the heterogeneity of the findings. The findings of our review are generally consistent with the results of a recent systematic review of preventive home visiting programs (van Haastregt et al. 2000). That review, which included six of the trials used in this review, found no clear evidence in favor of preventive home visits.

ISSUES RELATED TO THE DESIGN OF THE INTERVENTION AND MEASURING EFFECTIVENESS

The criteria for assessing the effectiveness of interventions largely depend on the goals of the intervention (Pender, Murdaugh, and Parsons 2002). Although the majority of the interventions were multifaceted, the content of the interventions and the corresponding criteria for measuring effectiveness were limited in a number of ways in relation to the needs of older people, which may have limited the strength of the current evidence for effectiveness.

First, only one of the trials included screening for depression as a component of the intervention (Hebert et al. 2001), and only one trial included depression as an outcome measure of effectiveness (Bernabei et al. 1998). Yet, depression occurs in 15 to 20 percent of community-based seniors requiring clinical attention and 37 percent of seniors in primary care settings (Registered Nurses Association of Ontario 1999). Depression is a widely underrecognized and undertreated medical illness (National Institute of Mental Health 2003). Unrecognized, untreated, and undertreated mood disorders such as depression increase the risk of functional decline (Stuck et al. 1999), suicide, and the use of expensive health care resources such as hospitalization (Stuck et al. 1999; National Institute of Mental Health 2003). These findings highlight the importance of including depression screening and management as a component of a nursing health-promotion program for older people as a means of decreasing morbidity, enhancing quality of life, and promoting the appropriate use of health services.

Second, only three trials addressed the impact of the intervention on perceived social support (Hebert et al. 2001) and level of social contacts (van Rossum et al. 1993; Vetter, Jones, and Victor 1984). Yet, the role of social support in buffering the effects of stress is well documented, and studies have shown an association between low social support and higher rates of depression (Steffens et al. 1996) and functional decline in community-dwelling older people (Stuck et al. 1999). These findings point to the importance of including social support as a component of a nursing health-promotion intervention as a means of enhancing the health of older people.

Third, only one trial included caregiver support as part of the intervention (Zimmer, Groth-Juncker, and McCusker 1985), and none of the trials evaluated the impact of a nursing health-promotion intervention on caregiver outcomes such as health and quality of life, level of burden related to caregiving, and use of health services. Yet, it is estimated that by choice, 80 percent or more of all the care for community-dwelling, functionally impaired older people is provided entirely from informal care providers (Clark 1996). While many caregivers find caregiving rewarding, it is often at the expense

of their own health and well-being (Cox 1993). Without adequate supports in place to enable caregivers to fulfill their roles, the cost of formal health care will rise substantially, particularly related to institutionalization and potential health issues in the caregiver (Roberts et al. 1999). These data strongly suggest that support for family caregivers of older persons should be considered an integral component of a nursing health-promotion intervention for older people.

Fourth, none of the studies included quality of life or self-esteem or the acceptability of the intervention as measures of effectiveness. Because many recommendations to reduce risk factors and enhance health involve changing behavior, it is important to consult with individuals regarding the acceptability of the intervention, what characteristics they are willing to modify, and what changes they are prepared to make (McInnes and Askie 2004).

Fifth, it is noteworthy that the majority of the studies concentrated on preventive-care strategies rather than on health promotion. Yet, the data suggest that a flexible combination of approaches is needed to enhance health and well-being and contribute to maximizing seniors' independence (Hodgson, Abbasi, and Clarkson 1996). Functional disabilities and illnesses in older people often are managed as acute medical problems, not as ongoing life challenges that require continuous attention to health promotion and disease prevention (McWilliam et al. 2000). These data suggest the need for interventions that include a combination of preventive-care and health-promotion strategies. In addition, new or different tools for the measurement of health are required to determine the full outcomes of health promotion (McWilliam et al. 1996).

Finally, several limitations in the study methodology constrain the usefulness of the study results. Methodological issues of randomization and follow-up of study participants can be improved on, as can blinding of the outcome assessors in future studies. Thus, well-designed studies focusing on these outcomes, design features, and methodological issues could contribute significantly to maximizing the effectiveness of home-based-nursing health promotion.

ISSUES RELATED TO MEASURING EFFICIENCY

The economic evaluations that have been completed demonstrate the potential for home-based-nursing health promotion to produce net cost savings (in particular, hospital and nursing-home savings). Despite these positive findings, the evidence for the efficiency of home-based-nursing health promotion is limited in a number of ways, which constrains the usefulness of the results for policy decisions (Drummond et al. 1997). First, the scope of the studies is limited. This relates to the viewpoints adopted, the types of

interventions, and the form of economic evaluation used (Elkan and Kendrick 2004). Although the viewpoint was not stated explicitly, the studies are similar in that all were conducted from a restricted perspective of government savings whereby only the community care (Bernabei et al. 1998; van Rossum et al. 1993), hospital, and long-term-care institutional savings were estimated (Bernabei et al. 1998; Hendriksen, Lund, and Stromgard 1984; Elkan et al. 2000; Stuck et al. 1995; Stuck et al. 2000; Zimmer, Groth-Juncker, and McCusker 1985; van Rossum et al. 1993) rather than an economic evaluation undertaken from the perspective of society. Economists argue that the effect of a home-based service on society as a whole should be considered when making decisions about the use of that service (Gold et al. 1996). Future studies are needed that explicitly specify the viewpoint for the analysis, since an item may be a cost from one point of view but not a cost from another. Differences in the types of interventions (i.e., goals, content, type of provider) limit assessment of the relative cost-effectiveness of this health-promotion strategy across studies. The emphasis on limited economic evaluations (in particular, cost analyses) rather than full cost-effectiveness, cost-benefit, or cost-utility evaluations further constrains the usefulness of the results for policy decisions (Drummond et al. 1997).

Second, the generalizability of the findings regarding efficiency is limited. This concerns the relevance of the results beyond the specific setting in which the studies were carried out (Birch and Gafni 2003). The cost-effectiveness of an intervention depends largely on the system of care within which it is introduced. Each study is situated within a particular health care system whose social, organizational, and financing characteristics interact with design features in ways that may enhance or constrain the effectiveness or efficiency of the intervention (Birch and Gafni 2003; Drummond et al. 1997). For example, seven out of the twelve studies were conducted in Western Europe, so only limited conclusions can be drawn for the cost-effectiveness of such a service in other settings. The generalizability of the findings also is limited by the inadequate descriptions of the competing alternatives. A full description of the competing alternatives is needed to judge the applicability to other settings (Drummond et al. 1997).

Third, the comparability of the studies is limited. This represents the extent to which results from the different studies can be compared. This is because of the differences that exist in the range of costs and outcomes, which limits an assessment of the relative cost-effectiveness of services across studies. Overall, the cost and outcomes are not described and related explicitly to the perspective of the evaluation. In addition, all six studies focused mainly on costs rather than on the relationship between costs and key outcomes of the intervention, such as functional health status and quality

of life. For example, costs induced by the intervention could be desirable if they lead to an improved quality of life for the recipients. Future economic analyses need to include all important relevant costs and consequences for each alternative being compared.

Finally, it is possible that the cost savings were often the result of an analysis of mean costs without a probabilistic sensitivity analysis. In the absence of a probabilistic assessment, any evidence of cost savings could be from the effects of a small number of patients. Economic evaluations should examine the robustness of the results, using sensitivity or statistical analyses to confirm the validity of the results (Briggs 2001; Briggs, O'Brien, and Blackhouse 2002). Thus, well-designed studies with a more complete economic evaluation could contribute significantly to maximizing the efficiency of home-based-nursing health promotion.

ISSUES RELATED TO THE THEORETICAL FOUNDATION

The existing research on the effectiveness and efficiency of home-based-nursing health promotion lacks an underlying theoretical foundation. As a result, it is difficult to assess the appropriateness of the intervention to the outcomes being measured or to formulate hypotheses regarding why or how a particular intervention should be expected to result in a particular outcome (Elkan et al. 2000). The literature suggests that effective and efficient interventions need to address the whole person rather than focusing on a single problem, since older people often have coexisting physical, emotional, and social problems interrelated with one another and with external factors (Gill and Sharpe 1999). For example, depression often coexists with other chronic illnesses, and untreated depression is a risk factor for functional decline and the use of expensive health services (Browne et al. 1993; Stuck et al. 1999). Hence, future research should consider use of a theoretical framework that assesses the interplay between behavioral, biological, social, and environmental determinants on health rather than a single influence.

An adapted version of the model of vulnerability (Rogers 1997) offers such a theoretical perspective to guide future research in this area. Vulnerability is a net result of an interaction between the person's personal resources (cognitive, emotional, intellectual, behavioral) and his or her environmental supports (social, material, cultural), both of which, along with biological characteristics (age, gender, genetic endowment), are determinants of health. Within an individual, personal resources and environmental supports intersect, as shown in Figure 2, and can be synergistic and cumulative (Browne et al. 2001). The base of the triangle represents the degree of vulnerability (Rogers 1997), and

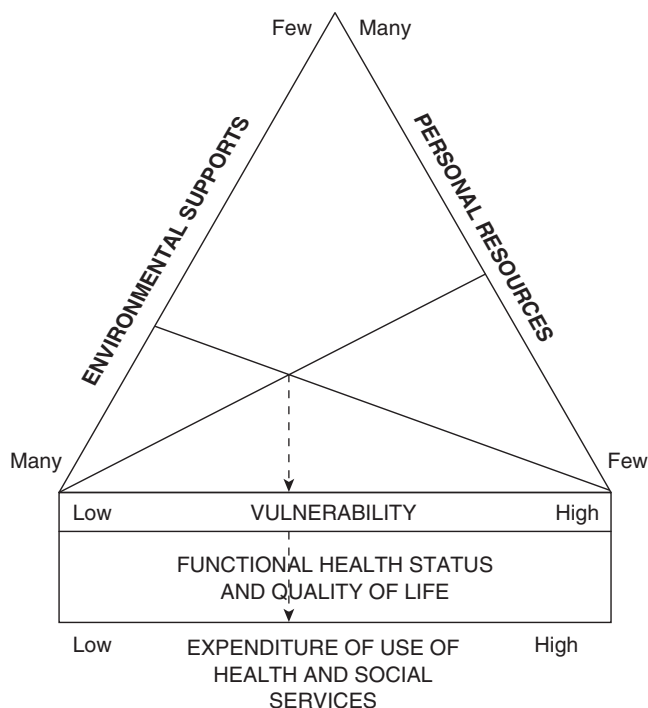


FIGURE 2 Model of Vulnerability

Source: Adapted from "Vulnerability, health and health care" by Ada Rogers, in the *Journal of Advanced Nursing*, Vol. 26, 65-72. ©1997. Reprinted with permission.

thus, also the person's health status and quality of life. Based on published evidence (Browne et al. 1999), expenditure of use of health services increases proportionately with the level of vulnerability. Proactive nursing health-promotion interventions, either targeted at the individual or the environment, can identify and strengthen resources, thereby reducing vulnerability, enhancing quality of life, and reducing the use of health services.

GAPS IN THE EVIDENCE

While these results provide important information to assist in the development of best-practice models and planning for future research, a number of unanswered questions remain. First, we do not yet know why and how the program is expected to help. In other words, it is hard to know if it is the

differing content, the differing intensity or duration of the visits, or the differing training and skills of the providers that makes the difference. One of the challenges of evaluating health-promotion interventions in a community setting is the difficulty of isolating the contribution of single elements of the intervention to any observed change in outcome (Holder et al. 1997; Koelen, Vaandrager, and Colomer 2001). In a meta-analysis of 17 controlled trials, Stuck et al. (2002) noted that factors associated with effects on mortality (mean age < 80 years) differed from those predicting effects on functional status (comprehensive geriatric assessment [CGA] and follow-up) and nursing-home admissions (> 5 follow-up visits). These findings suggest that different program features and processes of care may be important for different outcomes. Future research is needed that uses a theoretical framework and provides descriptive and contextual details about the study intervention and measures of process to enable their replication and provide information about why an intervention was or was not found to be effective (Green and Tones 1999).

Second, we do not yet know the optimal context for delivering nursing health promotion. For instance, under whose auspices should this service be offered and how would it fit into the existing system? For example, eight studies compared a nursing health-promotion intervention with usual care provided by a primary care setting. In the other four studies, the intervention was compared to usual care provided by a home care setting and a geriatric clinic.

Third, we do not yet know the visit duration or intensity or the specific subgroups of older people who could benefit most. Future studies with planned subgroup analyses are needed to determine if certain subgroups of older people benefit more, and if so, what characteristics define these subgroups to inform the development of targeted and individualized interventions.

Finally, and most importantly, we do not yet know where or how the nursing role makes a difference in client outcomes. Only eight studies were found in which the intervention was provided by a nurse alone; however, descriptions of the content of the nursing intervention were generally inadequate. Well-designed intervention studies clearly are needed to address these unanswered questions to identify the relative contribution of each of these variables to favorable client outcomes.

REFERENCES

- Alessi, C. A., H. U. Aronow, J. C. Beck, C. J. Bula, R. Fanello, M. Gold, R. Madison, L. Z. Rubenstein, F. Segal-Gidan, A. E. Stuck, and K. E. Yuhus. 1997. The process of care in preventive in-home comprehensive geriatric assessment. *Journal of the American Geriatrics Society* 45:1044-50.

- Anderson, G. F., and P. S. Hussey. 2000. Population aging: A comparison among industrialized countries. *Health Affairs* 19:191–203.
- Bergman, H., F. Beland, P. Lebel, A. Contandriopoulos, P. Tousignant, Y. Brunelle, T. Kaufman, E. Leibovich, P. Rodriguez, and M. Clarfield. 1997. Caring for Canada's frail elderly population: Fragmentation or integration? *Canadian Medical Association Journal* 157 (8): 1116–20.
- Bernabei, R., F. Landi, G. Gambassi, A. Sgadari, G. Zuccala, V. Mor, D. Rubin, and P. Carbonin. 1998. Randomized trial of impact of model of integrated care and case management for older people living in the community. *British Medical Journal* 316:1348–51.
- Birch, A., and A. Gafni. 2003. Economics and the evaluation of health care programmes: Generalizability of methods and implications for generalizability of results. *Health Policy* 64:207–19.
- Bowsher, J., M. Bramlett, I. M. Burnside, and S. H. Gueldner. 1993. Methodological considerations in the study of frail elderly people. *Journal of Advanced Nursing* 18 (6): 873–79.
- Briggs, A. H. 2001. Handling uncertainty in economic evaluation and presenting the results. In *Economic evaluation in health care*, edited by M. Drummond and A. McGuire, 173–214. London, UK: Office of Health Economics.
- Briggs, A. H., B. J. O'Brien, and G. Blackhouse. 2002. Thinking outside the box: Recent advances in the analysis and presentation of uncertainty in cost-effectiveness studies. *Annual Review of Public Health* 23:377–401.
- Browne, G., J. Roberts, C. Byrne, A. Gafni, R. Weir, and B. Majumdar. 2001. The costs and effects of addressing the needs of vulnerable populations: Results of 10 years of research. *Canadian Journal of Nursing Research* 33 (1): 65–76.
- Browne, G., J. Roberts, A. Gafni, C. Byrne, R. Weir, B. Majumdar, and S. Watt. 1999. Economic evaluations of community-based care: Lessons from twelve studies in Ontario. *Journal of Evaluation in Clinical Practice* 5 (3): 1–19.
- Browne, G., J. Roberts, R. Weir, A. Gafni, S. Watt, and C. Byrne. 1993. The cost of poor adjustment to chronic illness: Lessons from 3 studies. *Health and Social Care* 2:85–93.
- Bula, C. J., A. C. Berod, A. E. Stuck, C. A. Alessi, H. U. Aronow, B. Santos-Eggimann, L. Z. Rubenstein, and J. C. Beck. 1999. Effectiveness of preventive in-home geriatric assessment in well functioning, community-dwelling older people: Secondary analysis of a randomized trial. *Journal of the American Geriatrics Society* 47 (4): 389–95.
- Byles, J. E. 2000. A thorough going over: Evidence for health assessments for older persons. *Australian and New Zealand Journal of Public Health* 24 (2): 117–23.
- Clark, R. 1996. Home and community-based care: The U.S. example. *Canadian Journal on Aging* 15 (1): 91–102.
- Cook, D. J., D. L. Sackett, and W. O. Spitzer. 1995. Methodological guidelines for systematic reviews of randomized control trials in health care from the Potsdam consultation on meta-analysis. *Journal of Clinical Epidemiology* 48 (1): 167–71.
- Cox, C. 1993. *The frail elderly: Problems, needs and community responses*. Westport, CT: Auburn House.

- Dalby, D. M., J. W. Sellors, F. D. Fraser, C. Fraser, C. van Ineveld, and M. Howard. 2000. Effect of preventive home visits by a nurse on the outcomes of frail elderly people in the community: A randomized controlled trial. *Canadian Medical Association Journal* 162 (4): 497–500.
- DiCenso, A., G. Guyatt, and D. Ciliska. 2005. *Evidence-based nursing: A guide to clinical practice*. St. Louis, MO: Mosby.
- Drummond, M. F., B. O'Brien, G. L. Stoddart, and G. W. Torrance. 1997. *Methods for the economic evaluation of health care programmes*. 2d ed. Toronto, Canada: Oxford University Press.
- Elkan, R., and D. Kendrick. 2004. *What is the effectiveness of home visiting or home-based support for older people?* World Health Organization Regional Office for Europe. Retrieved June 2003 from the http://www.euro.who.int/HEN/Syntheses/homesupport/20040614_4.
- Elkan, R., D. Kendrick, M. Dewey, M. Hewitt, J. Robinson, M. Blair, D. Williams, and K. Brummell. 2001. Effectiveness of home-based support for older people: Systematic review and meta-analysis. *British Medical Journal* 323:1–8.
- Elkan, R., D. Kendrick, M. Hewitt, J. J. A. Robinson, K. Tolley, M. Blair, M. Dewey, D. Williams, and K. Brummell. 2000. The effectiveness of domiciliary health visiting: A systematic review of international studies and selective review of the British literature. *Health Technology Assessment* 4 (13): 1–339.
- Epp, J. 1986. *Achieving health for all: A framework for health promotion*. Ottawa, Ontario: Health and Welfare Canada.
- Gill, D., and M. Sharpe. 1999. Frequent consulters in general practice: A systematic review of studies of prevalence, associations, and outcome. *Journal of Psychosomatic Research* 47:115–30.
- Gold, M. R., J. E. Siegel, L. B. Russell, and M. C. Weinstein. 1996. *Cost-effectiveness in health and medicine*. Oxford, UK: Oxford University Press.
- Green, J. 2000. The role of theory in evidence-based health promotion practice. *Health Education Research* 15 (2): 125–29.
- Green, J., and K. Tones. 1999. Towards a secure evidence base for health promotion. *Journal of Public Health Medicine* 21 (2): 133–39.
- Gunner-Svensson, F., J. Ipsen, J. Olsen, and B. Waldstrom. 1984. Prevention of relocation of the aged in nursing homes. *Scandinavian Journal Primary Health Care* 2:49–56.
- Hall, N., P. De Beck, D. Johnson, K. Mackinnon, G. Gutman, and N. Glick. 1992. Randomized trial of a health promotion program for frail elders. *Canadian Journal on Aging* 11 (1): 72–91.
- Hebert, R. 1997. Functional decline in old age. *Canadian Medical Association Journal* 157 (8): 1037–45.
- Hebert, R., G. Bravo, N. Korner-Bitensky, and L. Voyer. 1996. Predictive validity of a postal questionnaire for screening community dwelling elderly individuals at risk of functional decline. *Age and Ageing* 25:159–67.
- Hebert, R., L. Robichaud, P. M. Roy, G. Bravo, and L. Voyer. 2001. Efficacy of a nurse-led multidimensional preventive programme for older people at risk of functional decline: A randomized controlled trial. *Age and Ageing* 30:147–53.

- Hendriksen, C., E. Lund, and E. Stromgard. 1984. Consequences of assessment and intervention among elderly people: A three year randomised controlled trial. *British Medical Journal* 289:1522-24.
- . 1989. Hospitalization of elderly people: A 3-year controlled trial. *Journal of the American Geriatrics Society* 37 (2): 117-22.
- Hirdes, J. P., P. J. Naus, and J. E. Young. 1994. The use of preventive home visits among frail elderly persons: Evidence from three European countries. *Canadian Journal on Aging* 13 (4): 499-509.
- Hodgson, R., T. Abbasi, and J. Clarkson. 1996. Effective mental health promotion: A literature review. *Health Education Journal* 55:55-74.
- Holder, H. D., A. J. Treno, R. F. Saltz, and J. W. Grube. 1997. Summing up: Recommendations and experiences for evaluation of community-level prevention programs. *Evaluation Review* 21 (2): 268-77.
- Jadad, A. R., R. A. Moore, D. Carroll, C. Jenkinson, D. J. Reynolds, D. J. Gavaghan, and H. J. McQuay. 1996. Assessing the quality of reports of randomized clinical trials: Is blinding necessary? *Controlled Clinical Trials* 17 (1): 1-12.
- Johri, M., F. Beland, and H. Bergman. 2003. International experiments in integrated care for the elderly: A synthesis of the evidence. *International Journal of Geriatric Psychology* 18:222-35.
- Khan, K. S., G. ter Riet, J. Popay, J. Nixon, and J. Kleijnen. 2001. *Undertaking systematic reviews of research on effectiveness*. 2d ed. University of York, NHS Centre for Reviews and Dissemination. Retrieved September 2004 from <http://www.york.ac.uk/inst/crd/report4.htm>
- Koelen, M. A., L. Vaandrager, and C. Colomer. 2001. Health promotion research: Dilemmas and challenges. *Journal of Epidemiology and Community Health* 55:257-62.
- Martin, S., A. E. Stuck, C. E. Minder, and J. C. Beck. 2000. Health service utilization of elderly Swiss: Evidence from panel data. *Health Economics* 9:533-45.
- McInnes, E., and L. Askie. 2004. Evidence review on older people's views and experiences of falls prevention strategies. *Worldviews on Evidence-Based Nursing* 1 (1): 20-37.
- McNaughton, D. B. 2000. A synthesis of qualitative home visiting research. *Public Health Nursing* 17 (6): 405-14.
- McWilliam, C. L., W. L. Diehl-Jones, J. Jutai, and S. Tadrissi. 2000. Care delivery approaches and seniors' independence. *Canadian Journal on Aging* 19 (supp. 1): 101-24.
- McWilliam, C. L., M. Stewart, J. B. Brown, K. Desai, and P. Coderre. 1996. Creating health with chronic illness. *Advances in Nursing Science* 18 (3): 1-15.
- McWilliam, C. L., M. Stewart, J. B. Brown, S. McNair, K. Desai, M. L. Patterson, N. Del Maestro, and B. J. Pittman. 1997. Creating empowering meaning: An interactive process of promoting health with chronically ill older Canadians. *Health Promotion International* 12 (2): 111-23.
- Miller, C. 1995. *Nursing care of older adults: Theory and practice*. Philadelphia: J. B. Lippincott.
- Moher, D., and I. Olkin. 1995. Meta-analysis of randomized controlled trials: A concern for standards. *Journal of the American Medical Association* 274 (24): 1962-64.

- National Advisory Council on Aging. 1999. Positions, recommendations and policy statements on caregiving. Retrieved March 20, 2000, from http://www.naca.ca/position/21_recommendations/21_recomm_index_e.htm.
- National Institute of Mental Health. 2003. *Older adults: Depression and suicide facts*. Retrieved April 2003 from <http://www.nimh.nih.gov/publicat/elderlydepsuicide.cfm>.
- Pathy, M. S. J., A. Bayer, K. Harding, and A. Dibble. 1992. Randomized trial of case finding and surveillance of elderly people at home. *The Lancet* 340 (8824): 890-93.
- Pender, N., C. L. Murdaugh, and M. Parsons. 2002. *Health promotion in nursing practice*. 4th ed. Upper Saddle River, NJ: Pearson Education.
- Registered Nurses Association of Ontario. 1999. Reclaiming a vision: Making long-term care community services work. 1-22. Retrieved February 2002 from http://www2.rnao.org/policy/Reclaiming_a_vision_report.asp.
- Roberts, J., G. Browne, C. Milne, L. Spooner, A. Gafni, M. Drummond-Young, J. LeGris, S. Watt, K. LeClair, and L. Beaumont. 1999. Problem solving counselling for caregivers of the cognitively impaired: Effective for whom? *Nursing Research* 48 (3): 162-72.
- Rogers, A. C. 1997. Vulnerability, health and health care. *Journal of Advanced Nursing* 26: 65-72.
- Rubenstein, L. Z., H. U. Aronow, M. Schloe, A. Steiner, C. A. Alessi, K. E. Yuhas, M. Gold, M. Kemp, K. Raube, R. Nisenbaum, A. Stuck, and J. C. Beck. 1994. A home-based geriatric assessment, follow-up and health promotion program: Design, methods, and baseline findings from a 3-year randomized controlled trial. *Aging Clinical Experimental Research* 6:105-20.
- Rubenstein, L. Z., A. L. Siu, and D. Wieland. 1989. Comprehensive geriatric assessment: Toward understanding its efficacy. *Aging* 1 (2): 87-98.
- Rubenstein, L. Z., and A. E. Stuck. 2001. Preventive home visits for older people: Defining criteria for success. *Age and Ageing* 30:107-9.
- Rubenstein, L. Z., A. E. Stuck, A. L. Siu, and D. Wieland. 1991. Impacts of geriatric evaluation and management programs on defined outcomes: Overview of the evidence. *Journal of the American Geriatrics Society* 39:8S-16S.
- Rychetnik, L., and M. Wise. 2004. Advocating evidence-based health promotion: Reflections and a way forward. *Health Promotion International* 19 (2): 247-57.
- Sidani, S., and L. Sechrest. 1999. Putting program theory into operation. *American Journal of Evaluation* 20 (2): 227-38.
- Stachtchenko, S., and M. Jenicek. 1990. Conceptual differences between prevention and health promotion: Research implications for community health programs. *Canadian Journal of Public Health* 81 (1): 53-59.
- Steffens, D., J. Hays, L. K. George, K. R. R. Krishnan, and D. G. Blazer. 1996. Sociodemographic and clinical correlates of number of previous depressive episodes in the depressed elderly. *Journal of Affective Disorders* 39 (2): 99-106.
- Stuck, A. E., H. U. Aronow, A. Steiner, C. A. Alessi, C. J. Bula, M. N. Gold, K. E. Yuhas, R. Nisenbaum, L. Z. Rubenstein, and J. C. Beck. 1995. A trial of annual in-home comprehensive geriatric assessments for elderly people living in the community. *The New England Journal of Medicine* 333 (18): 1184-89.

- Stuck, A. E., M. Egger, A. Hammer, C. E. Minder, and J. C. Beck. 2002. Home visits to prevent nursing home admission and functional decline in elderly people: Systematic review and meta-regression analysis. *Journal of the American Medical Association* 287 (8): 1022–28.
- Stuck, A. E., A. Mayer-Oakes, and L. Z. Rubenstein. 1993. Geriatric in-home preventive programs: Facts and challenges. *Facts and Research in Gerontology* 7:357–65.
- Stuck, A. E., C. E. Minder, I. Peter-Wuest, G. Gillman, C. Egli, A. Kesselring, R. E. Leu, and J. C. Beck. 2000. A randomized trial of in-home visits for disability prevention of community-dwelling older people at low and high risk for nursing home admission. *Archives of Internal Medicine* 160 (7): 977–86.
- Stuck, A. E., A. L. Siu, D. Wieland, and L. Z. Rubenstein. 1993. Comprehensive geriatric assessment: A meta-analysis of controlled trials. *The Lancet* 342 (8878): 1032–36.
- Stuck, A. E., J. M. Walthert, T. Nikolaus, C. J. Bula, C. Hohman, and J. C. Beck. 1999. Risk factors for functional status decline in community-living elderly people: A systematic literature review. *Social Science and Medicine* 48:445–69.
- Trojan, L., and O. Yonge. 1993. Developing trusting, caring relationships: Home care nurses and elderly clients. *Journal of Advanced Nursing* 18:1903–10.
- Tugwell, P., K. J. Bennett, D. L. Sackett, and R. B. Haynes. 1985. The measurement iterative loop: A framework for the critical appraisal of need, benefits and costs of health interventions. *Journal of Chronic Disease* 38 (4): 339–51.
- United Nations. 2002. World Population Ageing: 1950–2050. Population Division, Department of Economic and Social Affairs, United Nations. Retrieved June 1, 2001, from <http://www.un.org/esa/population/publications/worldageing19502050/>.
- van Haastregt, J. C. M., M. Diederiks, E. van Rossum, L. P. de Witte, P. M. Voorhoeve, and F. J. M. Crebolder. 2000. Effects of a programme of multifactorial home visits on falls and mobility impairments in elderly people at risk: A randomized controlled trial. *British Medical Journal* 321 (7267): 994–98.
- van Rossum, E., C. M. A. Frederiks, H. Philipsen, K. Portengen, J. Wiskerke, and P. Knipschild. 1993. Effects of preventive home visits to elderly people. *British Medical Journal* 307:27–32.
- Vetter, N. J., D. A. Jones, and C. R. Victor. 1984. Effect of health visitors working with elderly patients in general practice: A randomized controlled trial. *British Medical Journal* 288:369–72.
- World Health Organization. 2003. *Health promotion evaluation: Recommendations to policy-makers*. World Health Organization, Regional Office for Europe. Retrieved June 2004 from <http://www.who.dk/document/e60706.pdf>.
- Zimmer, J. G., A. Groth-Juncker, and J. McCusker. 1985. A randomized controlled study of a home health care team. *American Journal of Public Health* 75 (2): 134–41.