

REVIEW PAPER

A systematic review of the effectiveness of advanced practice nurses in long-term care

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Abstract

Aim. To report quantitative evidence of the effectiveness of advanced practice nursing roles, clinical nurse specialists and nurse practitioners, in meeting the healthcare needs of older adults living in long-term care residential settings.

Background. Although studies have examined the effectiveness of advanced practice nurses in this setting, a systematic review of this evidence has not been conducted.

Design. Quantitative systematic review.

Data sources. Twelve electronic databases were searched (1966–2010); leaders in the field were contacted; and personal files, reference lists, pertinent journals, and websites were searched for prospective studies with a comparison group.

Review methods. Studies that met inclusion criteria were reviewed for quality, using a modified version of the Cochrane Effective Practice and Organisation of Care Review Group risk of bias assessment criteria.

Results. Four prospective studies conducted in the USA and reported in 15 papers were included. Long-term care settings with advanced practice nurses had lower rates of depression, urinary incontinence, pressure ulcers, restraint use, and aggressive behaviours; more residents who experienced improvements in meeting personal goals; and family members who expressed more satisfaction with medical services.

Conclusion. Advanced practice nurses are associated with improvements in several measures of health status and behaviours of older adults in long-term care settings and in family satisfaction. Further exploration is needed to determine the effect of advanced practice nurses on health services use; resident satisfaction with care and quality of life; and the skills, quality of care, and job satisfaction of healthcare staff.

Keywords: advanced practice nurses, clinical nurse specialists, long-term care, nurse practitioners, nursing homes, outcome assessment, quantitative systematic review

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Introduction

Worldwide, the population of older adults is increasing. The United Nations reports that by the year 2045, the number of individuals aged 60 years and older will exceed the number of individuals under 15 years of age (United Nations Department of Economic & Social Affairs 2007). The nations experiencing the largest increase in this age group include Europe and North America. By the year 2050, adults 65 years and older will comprise nearly 30% of the European population (Eurostat European Commission 2009) and 20% of the American population (National Center for Health Statistics 2009). In Canada, 25% of the population will consist of adults 65 years and older as early as 2026 (Human Resources & Skills Development Canada 2010). This growing population is expected to place an unprecedented strain on healthcare agencies as younger people live greater distances from their parents (Eurostat European Commission 2009). Eventually, many of these older adults will require increasingly complex care in long-term care (LTC) residential facilities. Healthcare systems are not prepared for these impending demographic changes. In Canada, fewer physicians are providing services in LTC (Frank *et al.* 2006) and in the USA, there are issues associated with the quality of care and the effectiveness of providing managed care in LTC by health maintenance organizations (Kane *et al.* 2004). Nurse practitioners (NPs) and clinical nurse specialists (CNSs), collectively referred to as advanced practice nurses (APNs) (Canadian Nurses Association 2008), have provided services in LTC in the USA since the mid-1960s (Futrell & Melillo 2005).

The NP is defined as a registered nurse who has NP education and licensure to autonomously diagnose, order, and

interpret diagnostic tests and X-rays, prescribe medications and therapeutic interventions, and perform specific procedures as designated by the licensing organization (Canadian Nurses Association 2008). During the 1980s, graduate education became the standard for NPs in the USA and by 1998, there were only 12 postbasic registered nurse certificate programmes to prepare NPs (Keeling & Bigbee 2005). Prior to that, it was common for continuing education programmes to prepare NPs to provide care for underserved populations such as older people and those living in rural areas. While a complete review of the evolution of these roles in the USA is beyond the focus of this article, the evaluation of the geriatric NP training and employment programme offered by the Mountain States Health Corporation (MSHC) between 1976 and 1986 is of germane historical interest. The MSHC programme was mounted as a continuing education programme for nurses employed and sponsored by an LTC facility and the sponsoring facility was required to employ the NP for at least 18 months following programme completion (Radosevich *et al.* 1990). The MSHC programme included 4 months of didactic training followed by 8 months of preceptorship with a physician in the NP student's place of employment (Radosevich *et al.* 1990). By 1982, the MSHC programme had expanded to include 13 western states (Kane *et al.* 1989) and at its conclusion in 1986 had graduated 120 NPs (Buchanan *et al.* 1989). After the programme was well established, several studies were conducted to evaluate the effect of adding these NPs into LTC residential settings. These studies determined that implementation of this pioneering role was extremely challenging (Kane *et al.* 1988), but the addition of MSHC-trained NPs in LTC settings improved quality of care and reduced hospitalizations (Kane *et al.* 1989). There was no impact on residents' functional status, physical condition, or satisfaction (Kane *et al.* 1989, Garrard *et al.* 1990) and cost savings were associated with reduced hospital days (Buchanan *et al.* 1990).

In Canada, NPs first began providing services in LTC residential settings in 2000 in the province of Ontario (Stolee *et al.* 2002). There is growing interest in the potential of the NP role in LTC in other provinces (Donald *et al.* 2011). The NP role in LTC is focused primarily on direct resident care with an emphasis on health promotion, as well as the treatment and management of common acute and chronic health conditions.

In Canadian LTC settings, CNSs have provided care since the early 1990s. For the purpose of this study, the CNS is defined as a graduate-prepared nurse who provides expert care for specialized populations (Canadian Nurses Association 2009). The dimensions of the CNS role vary based on the needs of clients and the setting

and include clinician, consultant, educator, researcher, and leader.

The NP and CNS roles are being introduced into LTC in other countries outside of North America, indicating interest in their potential to improve care for residents amidst the considerable challenges confronting healthcare systems globally (Futrell & Melillo 2005). While several studies have evaluated the effectiveness of APNs in LTC, to the best of our knowledge, a systematic review of this evidence has not been conducted.

The review

Aim

Evaluating the evidence for the effectiveness of advanced practice nurses is important to ascertain the potential benefits and harms and to inform health policy regarding quality and cost-effective models of care delivery. A further aim is to determine the gaps in existing knowledge to inform future research. To address these aims, we asked three research questions:

- Do advanced practice nurses improve the quality of care, quality of life, functional and health status, health services use, and satisfaction of older adults living in long-term care residential settings?
- Do advanced practice nurses improve the quality of life and satisfaction of family members of older adults in long-term care residential settings?
- Do advanced practice nurses improve the skills, quality of care, and job satisfaction of healthcare staff in long-term care residential settings?

Design

A quantitative systematic review was conducted using Cochrane Collaboration systematic review methods to specify inclusion and exclusion criteria, search and retrieve relevant studies, appraise study quality, and synthesize findings (Higgins & Green 2006). Due to the few randomized controlled trials (RCTs) addressing the topic, we also included non-randomized quantitative studies that incorporated a comparison group as recommended by the Cochrane Effective Practice and Organisation of Care Review Group (EPOC) (2002).

Search methods

We searched for published and unpublished studies in all languages dating from 1966–December 2006, later updated to May 2010. The following keywords were used to search

12 electronic databases: nurse practitioner(s) or NP(s); clinical nurse specialist(s) or CNS(s); advanced practice nurse(s) or APN(s); advanced nursing practice or ANP. These keywords were combined with the following terms to identify LTC settings: long-term care, nursing home(s), home-for-the-aged, and Veteran's Administration. The 12 databases included Medline, CINAHL, EMBASE, Proquest Dissertations and Theses, HealthSTAR, ISI Web of Science, Ageline, Social Science Abstract, Abstracts in Social Gerontology, AMED, Conference Papers Index, and the Cochrane Library (including the Effective Practice and Organization of Care Group specialized register and database of studies awaiting assessment, the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials, and the Database of Abstracts of Reviews of Effects). We reviewed reference lists of literature reviews and relevant primary studies, searched our personal files, consulted with research leaders in the fields of advanced practice nursing and LTC, conducted a Google internet search, reviewed websites of relevant APN and LTC organizations, and hand searched the most recent 2 years of *Geriatric Nursing*, *Journal of Advanced Nursing*, *Journal of the American Geriatrics Society*, and *Journal of Gerontological Nursing*.

Inclusion and exclusion criteria

We included RCTs and quasi-randomized, controlled before-after, cohort and other prospective quasi-experimental study designs if the study evaluated NP or CNS roles in LTC, included a comparison group and if the impact of the APN could be separated from the impact of other care providers in studies evaluating, for example, multidisciplinary team-based interventions. While some researchers support the use of the Minimum Data Set (MDS) (Rantz & Connolly 2004) and other large administrative data sets (e.g. Medicare/Medicaid claims and Resident Assessment Instrument) for extraction of outcome data, others are concerned about the potential for inaccuracy and incomplete information in these data sets that were not designed specifically to address the study's research question (DiCenso *et al.* 2005, Parmelee *et al.* 2009). In our review, we excluded studies that relied solely on retrospective and secondary analyses of large administrative data sets because data quality was not under the control of the researchers (Rantz & Connolly 2004).

Studies were included if they used valid process or outcome measures to evaluate services provided by APNs for adults aged 60 years and older living in LTC residential settings, their families or LTC staff. Examples of process measures included staff skill levels, changes in organiza-

tional practices, and adherence to best-practice guidelines. Outcome measures included functional status, health status, quality of life, health services use, and resident and family satisfaction. LTC residential settings included nursing homes, homes-for-the-aged, and Veteran's Administration residential settings. Studies carried out in LTC settings serving residents of varied ages were included if the data for those over 60 years of age were reported separately. Studies were considered to evaluate a CNS role if the APN was educated at the graduate level and the intervention was reflective of the CNS role definition. Studies were considered to evaluate an NP role if the NP was licensed or had completed a postbaccalaureate or graduate NP education programme. Studies that focused on NPs who were educated through continuing education courses were excluded, as these courses are not consistently recognized as equivalent to NP programme courses, and course credit is not transferable in many North American colleges and universities. A list of excluded studies is presented in Table S1.

Search outcome

The search produced 8277 papers, including duplicates. Thirty-eight foreign language papers written in French, German, Dutch, Finnish, Norwegian, Swedish, Russian, Korean, and Japanese were retrieved and interpreters assisted researchers to determine relevance. None of the foreign language papers met the inclusion criteria.

Due to time and budget constraints, the title and abstract review of each article for relevance was done by single trained reviewers rather than by two independent reviewers as recommended by the Cochrane Collaboration (Higgins & Green 2006). The title and abstract review identified 64 potentially relevant papers for which full-text articles were obtained. Each full-text article was independently reviewed

by two members of the research team (FD and ED or AWG) and discrepancies were discussed to achieve consensus. Examples of reasons for excluding papers at this full-text review stage included failure to meet inclusion criteria (e.g. intervention delivered by a registered nurse rather than an APN); evaluation of multidisciplinary team interventions where the contributions of individual team members could not be isolated (Kane *et al.* 1991); and evaluation of a nursing intervention for hospitalized older adults where findings specific to those admitted from LTC settings were not separated out (Krichbaum 2007) (personal contact with author, 19 August, 2010). Four relevant studies described in 15 papers met the inclusion criteria. The study selection process is depicted in Figure 1.

Quality appraisal

Two researchers (FD and ED or AWG) independently reviewed the four relevant studies for methodological quality. The quality assessment tool was developed by the researchers using questions from the EPOC Data Collection Checklist (Blumberg & Deveau 1995) that were adapted based on criteria for appraising health services research studies (DiCenso *et al.* 2005) (Table S2). The quality assessment tool is available from the first author (FD) on request. Study authors were contacted for clarification of methodology when necessary. If authors could not provide the requested clarification, we used a conservative approach and assumed that the quality criterion was not met. Cohen's unweighted kappa (κ) statistic was used to measure inter-rater agreement of the quality assessment process and was 0.78. Disagreements related to quality assessment were resolved through a consensus process involving a third author (AD). The quality appraisals of the four studies are summarized in Table S2.

This review was already underway when the Cochrane Collaboration revised quality assessment processes to focus specifically on evaluation of risk of bias (Higgins & Green 2008). Therefore, we have used a previous version of quality assessment criteria.

Data abstraction

Data were abstracted independently by two researchers (FD and ED or AWG) and disagreements addressed through consensus. One of the four studies, herein referred to as the Minnesota Study, was reported in five papers (Snyder *et al.* 1998a, Ryden *et al.* 1999, 2000, Krichbaum *et al.* 2000, 2005). A study regarding restraint use was reported in five papers (Strumpf *et al.* 1992, Patterson *et al.* 1995, Evans *et al.* 1997, Siegler *et al.* 1997, Capezuti *et al.* 1998) and is

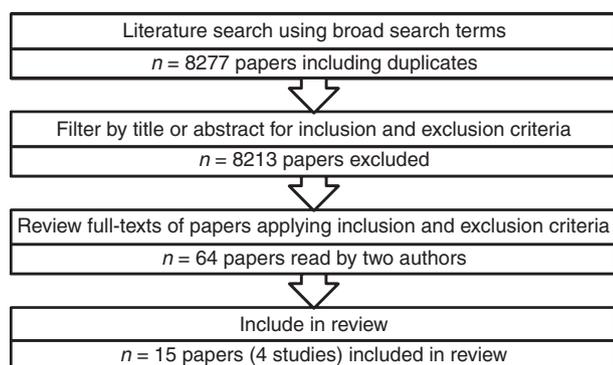


Figure 1 Study selection process.

hereafter referred to as the restraint study. The third study, reported in three papers (Schultz & McGlone 1977, Schultz *et al.* 1977, Schultz 1978) compared effectiveness, goal-attainment, and costs for residents cared for by an NP-physician team compared with physician-only care and will be referred to as the goal-attainment study. Lastly, in two papers, Kane *et al.* (2002a, 2002b) evaluated a demonstration Medicare programme involving NPs, herein referred to as the EverCare study. The four included studies are described briefly in Table 1 and in greater detail in Table S3.

Synthesis

The four studies that met the quality criteria did not test similar outcome measures and therefore, we summarized the findings narratively rather than through statistical pooling using meta-analysis.

Results

The Minnesota study

The Minnesota study used a three-group, quasi-experimental, repeated measures design that included two distinct tiers. In the first tier, Ryden *et al.* (1999) randomly assigned gerontology APNs (hereafter referred to as CNSs based on the role description) and protocols to two nursing homes, while a third facility continued with usual care. The target population included all newly admitted residents at each of the three facilities who were age 65 years or older and expected to stay for at least 6 months. Three cohorts of approximately 150 participants each were followed up for 6 months. Time One pre-intervention data were collected from each nursing home so that each facility could serve as its own control in addition to a comparison group (Krichbaum *et al.* 2005). Two CNSs provided services in both intervention nursing homes to minimize the effect of personality differences on outcomes. The CNSs facilitated application of evidence-based protocols and provided staff education, consultation, and direct care to residents for 6 months postadmission (Krichbaum *et al.* 2000, 2005). The CNS intervention goals were to reduce urinary incontinence, pressure ulcers, depression, and aggressive behaviour. Ryden *et al.* found that the CNS interventions were associated with significantly greater improvement or a reduced rate of decline in urinary incontinence, pressure ulcers, aggressive behaviour, and loss of affect in cognitively impaired residents (Table S3). There were no differences between cohorts of residents with depression in this first study tier.

In the second tier of the Minnesota study, Krichbaum *et al.* (2005) evaluated the effect of adding organizational level (OL) interventions to one of the intervention nursing homes. The OL interventions included: (1) CNS membership on the nursing home's quality assurance committee; (2) CNS provision of formal in-services to certified nursing assistants; and (3) CNS collaboration with staff in problem-solving teams. Residents in the CNS plus OL intervention group had significantly higher morale and less depression than the other two groups (Table S3). The CNS group and the CNS plus OL intervention groups both had equivalent improvements in urinary incontinence. While the three nursing homes were similar, attrition rates associated with discharge and mortality rates were higher in the CNS intervention facilities.

Although the Minnesota study used two administrative data sources, MDS and the Minnesota Case Mix Classification System, the researchers used additional data collection methods. These additional methods helped to assess the accuracy of the administrative data and provided independent measures of effectiveness of the APN intervention. The additional measures included the (1) Mini-Mental Status Exam (Folstein *et al.* 1975), (2) Modification of Incontinence Monitoring Schedule (Ouslander *et al.* 1986), (3) Braden Scale for Pressure Sore Risk (Bergstrom *et al.* 1987), (4) Staging of Pressure Ulcers (Panel for the Prediction & Prevention of Pressure Ulcers in Adults 1992), (5) Geriatric Depression Scale (Yesavage *et al.* 1982), (6) Philadelphia Geriatric Center Morale Scale (Lawton 1975), (7) Apparent Emotion Scale (Snyder *et al.* 1998b), and (8) Ryden Aggression Scale (Ryden *et al.* 1991).

The restraint study

A clinical trial conducted by Evans *et al.* (1997) in the Philadelphia area tested a 6-month educational intervention implemented by CNSs in two nursing homes with a third nursing home acting as the control group. The main description of the intervention and primary results of the clinical trial were reported in three papers (Strumpf *et al.* 1992, Patterson *et al.* 1995, Evans *et al.* 1997). Secondary results were reported in two papers, including rate of falls and fall-related injuries (Capezuti *et al.* 1998) and psychoactive drug use (Siegler *et al.* 1997). The education intervention aimed 'to increase staff awareness of restraint hazards and knowledge about assessing and managing resident behaviours likely to lead to the use of restraints' (Evans *et al.* 1997, p. 675). In addition, one of the two intervention nursing homes also received 12 hours/week of CNS consultation for 6 months to aid in the reduction in

Table 1 Characteristics of studies.

Study and origin	Design and follow up	Sample size	Research focus	Intervention	Outcome measures (italicized) and findings
Minnesota study First tier: Snyder <i>et al.</i> (1998a), Ryden <i>et al.</i> (1999), Krichbaum <i>et al.</i> (2000), Ryden <i>et al.</i> (2000)	First tier RCT 6 months	First tier N = 319 INT n = 166 CTR n = 153	First tier Effectiveness of CNSs to improve resident outcomes	First tier INT: CNSs working with CNAs to implement protocols; CNS consultation CTR: Usual care	First tier: <i>Urinary incontinence</i> INT significantly improved or less declined and more maintained their continence; <i>Pressure ulcers</i> INT more likely to be ulcer free or improved; <i>Depression</i> INT and CTR no difference on GDS and PGCMS, INT who were cognitively impaired were less likely to deteriorate based on the AER; <i>Aggression</i> INT significantly improved and more remained stable; <i>Composite trajectory score</i> mean for INT was significantly higher than for CTR, indicating positive outcomes
Second tier: Krichbaum <i>et al.</i> (2005) Minnesota	Second tier 3 group, quasi-experimental, repeated measures 3 phases of 6 months each	Second tier N = 198 INT1 n = 22 INT2 n = 65 CTR n = 111	Second tier CNS processes used with caregiver staff to achieve successful outcomes for residents	Second tier INT1: CNS OL activities, protocols and consultation INT2: CNS protocols and consultation CTR: Usual care	Second tier: <i>Urinary incontinence</i> INT1 and INT2 had equal improvements that were significantly better than the CTR; <i>Pressure ulcers</i> no significant difference between groups; <i>Depression</i> INT1 had less depression; <i>Aggression</i> no significant difference between groups; <i>Resident morale</i> INT1 had higher morale than INT2 and CTR
Restraint study Evans <i>et al.</i> (1997), Capezuti <i>et al.</i> (1998), Patterson <i>et al.</i> (1995), Siegler <i>et al.</i> (1997), Strumpf <i>et al.</i> (1992) Philadelphia	Clinical trial 12 months	N = 643 Details regarding baseline group sizes not provided	Examining the effects of CNS taught education and consultation interventions on physical restraint use	INT1: CNS education INT2: CNS consultation and CNS education CTR: No education or consultation	<i>Restraint prevalence</i> 56% relative reduction in INT2, 23% relative reduction in INT1, 11% relative reduction in CTR; within group comparison over time INT2 had significant reduction ($\chi^2 = 25.5$, $df = 2$, $P < 0.001$), INT1 had a moderate reduction ($\chi^2 = 5.44$, $df = 2$, $P = 0.066$), CTR reduction was not significant ($P = 0.13$); <i>Restraint intensity</i> INT2 group was 1.26 times more likely to decrease restraint use compared with INT1 and 1.35 times more likely to reduce restraint use compared with CTR; continued physical restraint use more likely in CTR; <i>Fall rate</i> at least 50% greater in CTR home when compared with INT1 and INT2 ($P < 0.01$); <i>Minor injuries</i> CTR group rate of fall-related minor injuries was twice that of INT1 or INT2 ($P = 0.001$); <i>Psychoactive drug use</i> no increase in psychoactive drug use across 3 sites; decreased use of benzodiazepine use across all 3 sites ($P < 0.001$); <i>Mean staff hours</i> no significant change

Table 1 (Continued).

Study and origin	Design and follow up	Sample size	Research focus	Intervention	Outcome measures (italicized) and findings
Goal-attainment study Schultz <i>et al.</i> (1977), Schultz and McGlone (1977), Schultz (1978) Colorado	Cohort, intervention, and CTRs 10 months	N = 60 INT <i>n</i> = 32 CTR <i>n</i> = 28	Testing if the adult health NP/MD team is more effective and efficient in the delivery of primary health care to chronically ill older persons compared with MD-only care	INT: Adult health NP/MD team providing primary care to nursing home residents CTR: traditional MD-only providing primary health care to nursing home residents	<i>Adaptation-related goals</i> differed significantly for the nursing home subgroup in favour of the INT ($P < 0.05$); the overall mean goal-attainment scores did not differ between the INT and CTR; <i>Cost-per-patient</i> the sum of the costs associated with primary-care encounters, non-hospital, hospital, and nursing home care was nearly the same for both the INT and CTR nursing home sub-groups
EverCare study Kane <i>et al.</i> (2002a, 2002b) Colorado, Florida, Georgia, Maryland, Massachusetts	Quasi-experimental with two CTRs 15 months	N = 1301 INT <i>n</i> = 454 CTR1 <i>n</i> = 407 CTR2 <i>n</i> = 440	Comparing the characteristics, levels of unmet need, satisfaction with medical care, and the use of advance directives of residents enrolled in the EverCare programme and those not enrolled	INT: Primary care provided by NP/MD to residents enrolled in EverCare programme CTR1: Residents received usual medical care (EverCare home) CTR2: Residents received usual medical care (non-EverCare home)	<i>Resident satisfaction</i> with medical services did not statistically differ between the INT and two CTRs; <i>Family members</i> of the INT residents were significantly more <i>satisfied</i> with 3 items including: [resident] seen often enough to treat problems, physician/ NP spends enough time with patient and one person in charge Overall, CTR1 was more dissatisfied with medical service than INT, whereas both family member CTRs were more dissatisfied than the INT; <i>Advance directive measures</i> no significant differences between the INT, CTR1, and CTR2 groups

INT, intervention group; CTR, control group; CNS, clinical nurse specialist; CNA, certified nursing assistant; NP, nurse practitioner; RCT, randomized controlled trial; LTC, long-term care; OL, organizational level; GDS, Geriatric Depression Scale; MMSE, Mini-Mental Status Exam; PGCMS, Philadelphia Geriatric Center Morale Scale; AER, Apparent Emotion Rating.

restraint use. Resident status, staffing levels, psychoactive drug use, and fall-related injuries were systematically observed at baseline, immediately after the 6-month intervention, and at 9 and 12 months. The nursing home that received both education and consultation from a CNS had a statistically significant reduction in restraint use compared with the nursing home that received an education-only intervention or the control nursing home (Table S3). Residents in the education and consultation nursing homes were 25–40% less likely than those in the control nursing home to use restraints with no increase in staffing, psychoactive drug use or fall-related injuries.

The goal-attainment study

Three papers (Schultz & McGlone 1977, Schultz *et al.* 1977, Schultz 1978) report on a prospective study that

compared the effectiveness and efficiency of an adult health NP–physician team (intervention) with traditional physician-only (control) care for older patients at a Denver, Colorado clinic. Patients were classified according to three sub-groups: (1) ambulatory; (2) homebound; and (3) nursing home and in each of these sub-groups, they were allocated (not through randomization) to either the NP–physician team (intervention) or the physician-only (control) group. Only the nursing home subgroup is included in this review. Effectiveness of care with the NP focusing on residents' personal health goals was assessed using the goal-attainment scale (Kiresuk & Sherman 1968). Significant differences were found between the control and intervention nursing home subgroups for adaptation-related goals, such as improvement in ambulation; however, there was no difference in disease-related goals (Table S3). With regard to health services use, the mean cost-per-patient was

calculated using the sum of costs associated with the primary care encounter and non-hospital, hospital, and nursing home-associated care (Schultz & McGlone 1977). Average costs-per-patient were nearly the same for the control (US\$5813) and intervention (US\$5893) nursing home sub-groups. Overall, Schultz and McGlone found that nursing home residents achieved greater healthcare goals when cared for by the NP–physician team at about the same cost-per-patient as those with the physician-only approach to care. When hospitalizations did occur, the use of medical consulting physicians and associated costs were lower for residents in the NP–physician treatment group than those in the control. However, the cost analysis methods used in this study do not meet current quality standards for economic studies (Marshall *et al.* 2005).

The EverCare study

EverCare is a managed care programme that employs NPs to provide and co-ordinate primary care for LTC home residents (Kane *et al.* 2002a, 2002b). Kane *et al.* (2002b) conducted a large study, some components of which met our inclusion criteria; the researchers report on a quasi-experimental study to compare the satisfaction with medical services and prevalence of advance directives among randomly selected residents enrolled in EverCare (intervention group) and residents in two control groups across five states (Kane *et al.* 2002a). One control group included residents who had chosen not to enrol in EverCare, but lived in a nursing home with residents who were enrolled and the second control group included residents in nearby nursing homes that did not participate in EverCare. Data were collected using structured interviews and in instances where residents lacked cognitive capacity, their proxies or staff members were approached. Kane *et al.* found that resident satisfaction with medical services did not statistically differ between the intervention and control groups; however, family members of residents enrolled in EverCare were significantly more satisfied. Kane *et al.* did not find any statistically significant differences in the prevalence of advance directives between the residents enrolled in EverCare and either of the control groups. Activities of daily living were also measured, but the relationship between the NP role and these outcomes was unclear.

On the basis of these four studies, we established that APNs improve or reduce decline in some health status indicators including depression (Krichbaum *et al.* 2005), urinary incontinence, pressure ulcers, aggressive behaviour, and loss of affect in cognitively impaired residents (Ryden *et al.* 1999); reduce restraint use with no increase in staffing,

psychoactive drug use, or serious fall-related injuries (Evans *et al.* 1997); improve goal-attainment in areas such as ambulation (Schultz *et al.* 1977); and improve family member satisfaction with medical services (Kane *et al.* 2002a). These four studies did not evaluate the effect of APNs on quality of life. We also established that APNs are effective in staff education and consultation, contributing to improvements in resident outcomes (Evans *et al.* 1997, Krichbaum *et al.* 2000, 2005, Ryden *et al.* 2000).

Discussion

As the number of older adults continues to increase worldwide, so does interest in the role of APNs to address the health needs of this vulnerable population in LTC settings. Evaluating and summarizing evidence on the effectiveness of APNs are important to ascertain the potential benefits and harms, to inform health policy regarding quality and cost-effective models of care delivery and to determine the gaps in existing knowledge to inform future research. With these goals in mind, we conducted a systematic review to determine whether use of APNs resulted in improved health and healthcare outcomes for older adults, family members, and healthcare staff in residential LTC settings. Our review did not include studies that focused on APNs providing care for people in non-residential settings such as their own homes or hospitals.

Strengths of the review were the comprehensive search methods, inclusion of publications in multiple languages, the search for unpublished studies, efforts made to contact authors in the field, and use of two researchers to independently review the studies for relevance and methodological quality. The likelihood that studies were omitted from the review is small but nevertheless possible. We used rigorous criteria for quality appraisal of the studies included in the review. Although RCTs and observational studies with a comparison group were eligible for inclusion, only four studies (two RCTs and two observational studies), described in 15 papers, met the inclusion criteria. All were conducted in the USA.

It was clear from the included studies that APNs make an important contribution to the care of residents in LTC residential settings. In two studies, the APN role under investigation was a CNS. In Canada, the CNS role is defined by five integrated sub-roles that include clinician, educator, researcher, consultant, and leader (Canadian Nurses Association 2009) and in the USA, it is characterized as having influence on patients/populations, nurses/nursing practice, and organizations/health systems (National Association of Clinical Nurse Specialists 2004). The results

of the Minnesota study indicated that CNSs improved or slowed decline in urinary incontinence, pressure ulcers, aggressive behaviour, and loss of affect in cognitively impaired nursing home residents (Snyder *et al.* 1998a, Ryden *et al.* 1999, 2000). During the second tier of the Minnesota study, in addition to these health outcomes at the individual level, Krichbaum *et al.* (2005) found that when CNSs engaged in activities at the OL in a LTC residential setting (i.e. involvement in staff development and in key committees), morale of nursing home residents improved as did resident depression. Likewise, an additional positive impact found by Evans *et al.* (1997) was the reduced use of restraints without a concomitant increase in staffing requirements, psychoactive drug use, or fall-related injuries. The dimensions of the CNS role that contributed to decreased restraint use were education and consultation and the most effective results were achieved when applied in combination.

Two studies investigated the NP role. In contrast to the CNS role, the main focus of the NP role is direct patient care (Hamric *et al.* 2009, Donald *et al.* 2010). Kane *et al.* (2002a, 2002b) determined that family members were highly satisfied with the care provided by the EverCare NPs. Schultz *et al.* (1977) demonstrated that when an NP is added to the primary care team, the nursing home residents achieve more of their own healthcare goals without adding to the cost of care. While Schultz and McGlone (1977) measured costs by comparing the operational use and cost of primary care encounters, as well as costs associated with hospital and nursing home use, an incremental cost-effectiveness ratio and other standards for current cost-effectiveness analysis were not provided (Marshall *et al.* 2005). Therefore, the economic findings should be interpreted with caution.

Only four studies met the criteria for inclusion in this review. One of the reasons for this small number can be attributed to the parameters of our review. As we were interested in examining the effectiveness of APNs, we excluded studies that evaluated multidisciplinary teams because the specific contribution of the APN could not be determined. Consequently, some quality studies were excluded. For example, a study conducted by Kane *et al.* (1991) that evaluated the impact on quality and cost-effectiveness of primary care provided by NPs and PAs in EverCare was excluded for this reason. Similarly, another study demonstrating reduced hospital use and costs was excluded because the primary care intervention was co-delivered by NPs and PAs (Intrator *et al.* 2004). These and similar studies were excluded because the findings could not be attributed solely to the APN.

Our decision to exclude studies that relied on administrative data meant that another of the EverCare studies investigating

the effects of intensive primary care provided by NPs on quality of care was excluded (Kane *et al.* 2004). Using MDS and Medicare datasets, Kane *et al.* found that LTC residents receiving NP-provided primary care had fewer preventable hospitalizations and that the care provided was at least of comparable quality to physician-provided care. Burl *et al.* (1998) completed a retrospective analysis of administrative data sets and concluded that the use of geriatric NP and physician teams reduced costs associated with emergency department and acute care use and overall LTC costs. Using data obtained from a retrospective chart review, Aigner *et al.* (2004) found that residents were seen more often when cared for by an NP/physician team compared with the sole physician model and healthcare use did not differ between the resident cohorts.

Conducting high-quality studies of the effectiveness of APNs in the LTC setting is challenging. Ideally, the APN would be randomly allocated to one of two carefully matched LTC settings; however, it is difficult to persuade a setting not to hire an APN if they have funds that are available or potentially targeted for this purpose. It is extremely challenging to randomize a large number of APNs to comparison groups. Therefore, a reasonable criticism is the small number of APNs being evaluated and the related implications for generalizability of study findings. Rigorous evaluations of interventions delivered by APNs are difficult to conduct due to the possibility of co-interventions and the complexity of interventions. Added to this, staff and residents move between units creating the potential for contamination and making cluster allocation, by unit or care provider, problematic. The availability of data is another challenge, given the cost and time associated with health records searches and the changing application of technology for data input at all levels of healthcare delivery and administration.

Implications for policy and practice

Although there were only four studies that met the inclusion criteria in this systematic review, the improvements in family satisfaction and residents' personal health goals and the benefit of reductions in depression, urinary incontinence, pressure ulcers, restraint use, and aggressive behaviours appear to be greater than the risks and costs associated with the APN intervention. For instance, in an unpublished study from the late 1990s conducted by Campbell *et al.* cited in Woodbury and Houghton (2003), the estimated cost of treating individuals with pressure ulcers in LTC residential settings in Canada was estimated to be an average of CAD \$24,050 per individual for 3 months of treatment and the

prevalence of pressure ulcers among older adults in LTC residential settings was estimated at 28–31%. Importantly, these costs did not take into consideration the burden of pain and suffering or the impact on functioning and quality of life for individuals with pressure ulcers.

While a literature search did not reveal costs of aggression, Evers *et al.* (2001) found that staff members' exposure to physical and psychological aggression was related to emotional exhaustion and depersonalization, two dimensions of staff burnout. Evers *et al.* (2001) state that a negative consequence of emotional exhaustion 'might be substantive job turnover of the caregivers for older people, which threatens the continuity of care' (p. 440) and is associated with increased costs for recruitment and orientation of new staff.

Our systematic review findings suggest that APN care improves the health status and quality of life of older adults residing in LTC settings and that their families are more satisfied with the care residents receive. What is not clear from published studies is the APN 'dose' required to effect change. This is important to consider as not all models of APN implementation in LTC settings embed the APN in the healthcare team on a full-time basis. Nor is it clear what mix of advanced nursing practice competencies, for example, direct care, staff education, and/or consultation, is required to generate particular outcomes.

Implications for research

Although APNs have been providing care in LTC residential settings for over 40 years in North America, there are only a few studies that evaluate the effectiveness of these roles on the satisfaction of LTC residents and their families and none that evaluates the impact of the APN on LTC staff. Therefore, additional studies evaluating the effect of APNs on the quality of life and satisfaction of residents and family members and on improving the skills, quality of care, and job satisfaction of LTC staff are also needed. Similarly, more research is needed to confirm the findings of the Minnesota, restraint, goal-attainment, and EverCare studies, and to further understand the multiple level mechanisms of advanced practice nursing interventions. The studies in this review focused on a few of the many interventions that could potentially be examined. More studies incorporating a wider range of interventions are needed to investigate the impact of an advanced practice nursing role on quality of care, quality of life, functional and health status, health services use, and satisfaction of older adults in LTC residential settings and their families. Appropriate theories specific to the type of study and intervention should be used to guide future

studies and study participants should be followed up for at least 1 year to determine the full effects of advanced practice nursing interventions.

In countries such as Canada, where the introduction of NPs in LTC is recent, it will be important to address the legislative and scope of practice barriers related to NP practice in these settings (Stolee *et al.* 2002, McAiney 2005, Kaasalainen *et al.* 2007, Donald *et al.* 2009). Once these roles are fully implemented and NPs are functioning at their full scope of practice, high-quality intervention studies should be designed to determine the effectiveness of the NP in providing care.

Many of the CNS-focused studies in the literature were either qualitative or programme evaluations with no comparison groups and thus were not included in this review. Notwithstanding the value of such studies, high-quality intervention studies are needed to determine the effectiveness of CNSs in LTC settings. While NP roles typically emphasize one-on-one direct resident and family care, CNS roles emphasize staff consultation, promotion of evidence-based practice, education, and programme implementation affecting the wider population of residents and families (Canadian Nurses Association 2008). Well-designed studies are needed to understand the differences in these roles, as well as the effectiveness of their respective interventions.

Future evaluations of APNs in LTC should include valid measures of resident-, care-, and performance-related outcomes. Examples of resident-related outcomes include morbidity, occurrence of drug interactions, use of drugs not recommended for older adults (such as benzodiazepines), satisfaction of residents and family members, access to care measured through the number and timeliness of primary care visits per resident, and the number of and reasons for interactions with family members. Some examples of care-related outcomes include health service use, emergency department transfers, management of common nursing, and medical problems, such as fall reductions and prevention of pneumonia and gastrointestinal infections. Lastly, important performance-related outcomes that require study include quality of care, time spent by APNs in individual role components, collaboration, adherence to best-practice guidelines, and effect of the APN role on physician and staff recruitment, retention, workload, and job satisfaction.

Limitations

The broad search strategy resulted in a large number of papers for review. Consequently, the title and abstract

What is already known about this topic

- The population of older people is increasing and is expected to place an unprecedented strain on long-term healthcare agencies.
- Advanced practice nurses, i.e. clinical nurse specialists and nurse practitioners, work in some long-term care settings.
- While several studies have evaluated the effectiveness of advanced practice nurses in long-term care, there has not been a systematic review of this evidence.

What this paper adds

- There is evidence that the interventions provided by advanced practice nurses for older adults living in long-term care residential settings result in reductions in depression, urinary incontinence, pressure ulcers, restraint use, and aggressive behaviours; improvements in meeting their personal goals; and improved family satisfaction with medical care.
- Evidence supports the effectiveness of advanced practice nurses in the provision of staff education and consultation to support improvements in resident outcomes.

Implications for practice and/or policy

- Advanced practice nurses improve the health status of older adults living in long-term care settings and family satisfaction with medical care.
- Organizational level interventions by advanced practice nurses are an effective strategy to augment evidence-based protocols, staff education, and consultation.
- Further exploration is needed to determine the effect of advanced practice nurses on health services use; resident satisfaction with care and quality of life; quality of life of family members of residents in long-term care settings; and the skills, quality of care, and job satisfaction of healthcare staff in these settings.

review of each article for relevance was done by single trained reviewers rather than by two independent reviewers. It is possible that a small number of relevant studies may not have been identified.

The inclusion of only four studies and the heterogeneity of outcomes and measures restrict the comparison of results. Therefore, the conclusions drawn are cautious. If we had included studies that used secondary analysis of

large administrative databases and retrospective designs, we may have been able to provide more generalizable findings; however, that approach would have detracted from the rigour of the review.

Conclusion

Very few prospective studies with comparison groups have been conducted to evaluate CNS and/or NP roles in LTC settings; however, those that have been completed indicate that APNs play a positive role in lowering rates of depression, urinary incontinence, pressure ulcers, restraint use, and aggressive behaviours and in improving residents' abilities to meet personal goals and family satisfaction with medical services. While further research is needed to explore broader dimensions of APN roles and to examine important outcomes that have not yet been measured, current evidence supports the use of APNs to address the needs of residents living in LTC. These APN roles stand to make an important contribution in meeting anticipated health service requirements of an ageing population in LTC settings.

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Author contributions

All authors meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/ethical_1author.html)] and have agreed on the final version:

- substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

Supporting Information Online

Additional Supporting Information may be found in the online version of this article:

Table S1. Excluded studies – may be excluded for more than one reason.

Table S2. Quality indicators of included studies ($n = 4$).

Table S3. Description of intervention and evaluation ($n = 4$).

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