J Wound Ostomy Continence Nurs. 2020;47(4):365-380.
Published by Lippincott Williams & Wilkins

CE 1.5 ANCC Contact Hours

The Effects of Education About Urinary Incontinence on Nurses' and Nursing Assistants' Knowledge, Attitudes, Continence Care Practices, and Patient Outcomes

A Systematic Review

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ABSTRACT

The aims of this systematic review were to describe, critique, and summarize research about the effects of education about urinary incontinence on nurses' and nursing assistants' knowledge and attitudes toward urinary incontinence, their continence care practices, and patient outcomes. We searched key electronic databases (PsycINFO, MEDLINE, CINAHL, Web of Science, and Cochrane Library) for full-text primary research articles written in the English language and published between January 1990 and October 2018. Studies were included if they described a controlled or uncontrolled trial of an education program for nurses or nursing assistants about urinary incontinence and evaluated the effects of the program on either knowledge, attitudes, practice, or patient outcomes. Data were extracted about the aim, design, sample and setting, trial methods, intervention, outcomes of interest, and findings. Quality appraisal was conducted using a mixed-methods appraisal tool. Results are presented in tabular format and reported descriptively. Nineteen studies met inclusion criteria; most were set in the United States or the UK. All trials that evaluated the effects on knowledge reported improvements; however, the effects of education on attitudes were mixed as were the effects of education on continence care practices. Eleven of the 19 studies reported the statistical effect of education on patient outcomes. Uncontrolled trials reported improvements in nursing home residents' and community-dwelling patients' continence status, but this effect was not observed in a large controlled trial. Similarly, 2 studies set in inpatient rehabilitation found no significant differences in patient continence outcomes following an educational intervention targeted to nurses.

KEY WORDS: Education, Incontinence, Knowledge, Nurses, Nursing assistants, Patient outcomes, Practice, Systematic review.

INTRODUCTION

Urinary incontinence (UI) is a prevalent, costly condition with personal and social impacts. It affects people of all ages and can occur at any stage of life.[1] Globally, UI is underreported, underdiagnosed, and undertreated.[1] This health inequity may partially relate to gaps in healthcare providers' knowledge about UI, and/or gaps in education. Nurses and nursing assistants (NAs) represent the largest group of healthcare providers in most countries and are likely to care for people with UI and continence care needs on a regular basis.

According to Paterson,[2] all RNs should be equipped with knowledge and understanding about the physiological, psychological, and social aspects of incontinence (urinary and fecal) and be aware of strategies to prevent incontinence and promote continence. Based on 2 studies about education for nurses, it is doubtful that RNs are educationally prepared to address the care needs of people with UI or to promote continence.[3,4] A survey of 294 (81%) undergraduate education programs for healthcare practitioners in the UK found that the mean number of hours of education on incontinence in courses on adult nursing was 7.3 hours (SD = 4.8).[3] A similar picture emerged from of a survey of undergraduate and graduate nursing students from 46 states in the United States, wherein the average education content about incontinence in nursing school curricula in 1994 was 2.14 hours (SD = 1.72).[4]

We hypothesized that gaps in nurses' and NAs' knowledge about UI may contribute to poor assessment and management. This hypothesis is supported by research identifying inaccurate beliefs about UI as a normal part of aging and not treatable.[5-9] It follows that this belief could negatively affect care providers' clinical decision-making, limit the choices they present to patients with incontinence, and negatively impact the quality and effectiveness of care they provide. Similarly, negative attitudes about UI or toward people with UI may lead to poor care delivery or lack of follow-up care.[10] If nurses or NAs harbor inaccurate beliefs about UI or misinterpret patients' efforts to self-manage and conceal this condition, caregiving interactions are likely to be characterized by tension between caregiver and patient.[11,12]

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The authors declare no conflicts of interest.

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DOI: 10.1097/WON.0000000000000651

Education about UI should improve nurses' and NAs' knowledge about, and attitudes toward, UI that translates into effective continence care. According to a systematic review of the effect of education for staff about interventions for UI and fecal incontinence (FI),[13] current evidence is limited to 1 controlled trial[13] and 1 uncontrolled trial.[14] There is need to build on the findings of this systematic review[13] to identify and appraise the complete body of research about the effect of education about UI on nurses' and NAs' knowledge, attitudes, practices, and patient outcomes. The purpose of this systematic review is to describe, critique, and summarize research about the effects of education about UI on nurses' and NAs' knowledge about UI, attitudes toward UI, continence care practices, and patient outcomes.

METHODS

We completed a systematic review using PRISMA guidelines.[15] Eligible studies were identified through searching PsycINFO, MEDLINE, CINAHL, Web of Science, and Cochrane databases using the following terms: "Nurses or Nursing Aides," "education," "training program," "treatment outcome," "staff development," "staff training," "education program," "workshop," "education package," "intervention," "coursework," "coach," and "coaching , incontinence, urinary incontinence, bladder incontinence." Other publications were identified from the reference lists of relevant publications and from a search of gray literature. The searches were undertaken by E.C. with advice and support from a professional healthcare librarian. The studies were limited to publications between January 1990 and October 2018. Searches were restricted to English-language articles and human studies.

Studies were included if they were randomized controlled trials (RCTs) or nonrandomized or quasirandomized trials with a UI educational intervention that reported pre- and postquantitative data about the effects of education programs designed to evaluate or improve nurses' and/or NAs' knowledge, attitudes toward, and practices about caring for people with UI. We also sought research evaluating the effect of educating on pertinent continence outcomes.

Knowledge was operationally defined as the comprehension and understanding of acquired facts or information about the causes and management of UI, typically requiring a "yes/no" or levels of agreement response. Attitude was operationally defined as an emotional reaction or predisposition about caring for a person with UI. Practice was operationally defined as continence care practices, including practices to prevent and manage UI, and adhere to best practice recommendations. Patient outcomes of interest were knowledge, frequency or severity of UI, presence or absence of UI, and health-related quality of life.

One reviewer (J.O.) extracted data from all the trials and a second reviewer (E.C.) conducted random reliability checks. Data were extracted on the aim of the trial, study design, sample and setting, methods, nature of the intervention, and findings. The Mixed Methods Appraisal Tool was used to evaluate the quality of included studies.[16] Each item was rated as "yes" if it clearly met criteria, "no" if it did not, "unclear" if it could not be determined from the available information, and "*not applicable*" if the specific quality question did not apply to the study design.

LITERATURE SEARCH

The initial search returned 4249 studies and 79 duplicate elements were excluded. Of the remaining 4170 publications, 4069 were excluded based on title search, leaving 101 publications that were read in full. This process resulted in elimination of 82 studies. The main reason for excluding studies was because the study did not meet the design criteria and/or lacked pre- and postevaluative data about the review outcomes of interest. The results of our literature search are summarized in the Figure.

RESULTS

We reviewed 19 trials in depth that met inclusion/exclusion criteria. Most trials were conducted in nursing homes in the United States. Collectively, these studied enrolled 1301 participants (911 nurses, 235 NAs, and 155 unclear). Nursing assistants were included with nurses in 9 trials,[17-25] all of which were conducted in nursing homes. In most cases, participants' qualifications were not reported; however, we identified 5 different cohorts, as described in Table 1.

Most trials evaluated one or more outcomes of interest (knowledge, attitudes, practice, and patient outcomes); none addressed all outcomes. Most of the data collection instruments had face or content validity, as indicated in Table 2. Methods to evaluate patient outcomes varied from relying on patients or staff to rate patients' continence status[22,24,26-28] to objectively checking patients' continence status (ie, wet checks or pad weights).[19,20,23,25] Five trials reported the reliability and/or validity of the associated data collection instruments.[19,24,26,27,29]

All 19 trials contained descriptive information about the topics that were addressed in the education intervention, as shown in Table 3. The theoretical basis for the education intervention was described in 3 trials using a diffusion of innovation,[20] translation science,[32] and group problem-solving approaches theoretical framework.[14] The nature of the intervention varied in terms of the duration, delivery mode, educational content, expected learning outcomes, assessment methods, and extent to which the teaching methods accommodated different cultural, literacy, and contextual learning needs, as indicated in Table 4.

Study Quality

Studies differed considerably in terms of their design; 7 trials included a control or comparison group.[17,19,24,26,29,30,34] Sample sizes also varied (range 4-176 nurses and 21-64 NAs). Only one trial included a power calculation in order to ensure a sample size sufficient to detect a statistically significant difference in the outcomes of interest. The methodological quality of the studies varied from 25% to 75% for uncontrolled trials, as detailed in Table 5, and 25% to 100% for controlled trials, as indicated in Table 6. Results were not able to be pooled due to methodological heterogeneity; therefore, results were reported descriptively.

EFFECT OF EDUCATION ON KNOWLEDGE

Ten trials evaluated nurses'/NA's pre-/posteducation knowledge about UI: 3 of which were RCTs[17,30,34] and 7 were nonrandomized trials,[14,18,20-22,31,33] as indicated in Table 7. Considered collectively, findings indicated that nurses and NAs had limited ability to determine UI type and factors that require assessment, interpret clinical data to make a diagnosis, and identify patients who may be suitable for active interventions. All researchers who evaluated the effects of UI education on knowledge reported postintervention improvements, which was statistically significant for some studies and for some items on knowledge questionnaires. For example, Mathis and colleauges[21] reported statistically significant improvements in

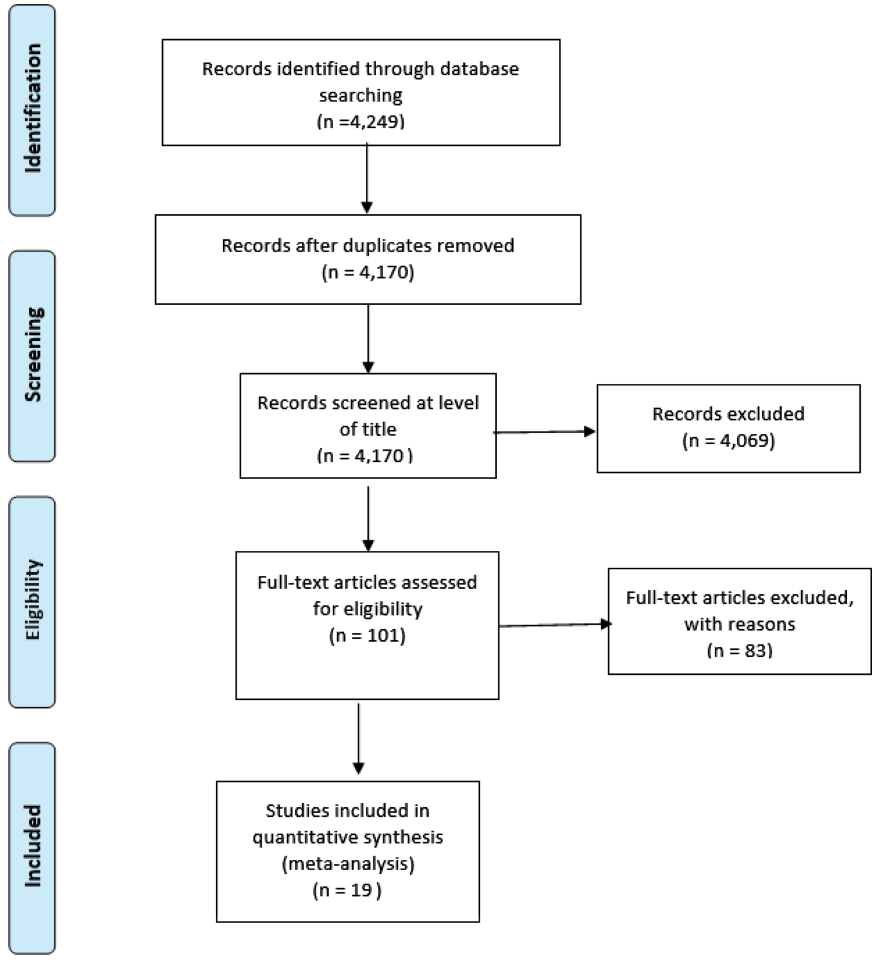

Figure. PRISMA flow diagram.

participants' abilities to identify stress, functional and overflow UI. Campbell and colleauges[17] reported a slight but significant difference by group and time, $F(2,135) = 3.39$, $P < .05$, in knowledge scores, favoring the intervention group in a quasiexperimental trial with repeated measures and a control group in a nursing home setting. Bignell and Getliffe[30] found statistically significant improvements in community and district nurses' knowledge about antimuscarinic drugs as a possible treatment for UI in phase 3 ($P = .001$), the need for a physiotherapy referral ($P = .033$), and modifying caffeine intake ($P = .037$). Mention of absorbent products was also significantly reduced ($P = .049$). The following section details the findings according to the different settings in which they were conducted.

Care Setting

Of the 7 trials that described the effect of education on nurses' and NAs' knowledge in nursing homes, 6 uncontrolled trials reported statistically significant improvements in knowledge for some items on the knowledge questionnaire.[14,18,20-22] However, in the only controlled trial in this setting,[17] there were no significant differences between groups at 12 weeks.

Two trials were identified that reported the effects of education on community or primary care nurses' knowledge:

TABLE 1.
Description of Sample

Level of Practice		Role Titles	Education
1	A nonnursing workforce	Nursing Aides, Nursing Assistants, Certified Nursing Assistants, Home Health Aides, Health Care Assistants, Care Aides, Nursing Auxiliaries	Not reported
2	A basic level of nursing practice	Enrolled Nurses or Licensed Practice Nurses (LPNs) typically a diploma level of trial	Diploma
3	A graduate level of nursing practice	Registered Nurses or Registered General Nurses	Bachelor's degree or baccalaureate
4	An advanced level of nursing practice	Advanced Practice Nurses, Nurse Practitioners, or Clinical Nurse Specialists, Nurse Continence Advisors	Master's prepared or other postgraduate qualification
5	Nurses working in managerial or administrative roles	Directors of Nursing, Associate Directors of Nursing, MDS coordinators	Not reported

Abbreviation: MDS, Minimum Data Set.

TABLE 2.
Data Collection Instruments and Their Reliability and Validity

Trial	Domain	Name of Scale	Description	Validity/Reliability
Bignell and Getliffe[30]	Knowledge	A questionnaire adapted from Cheater, 1990, and Penney, 1999	The questionnaire included 3 patient vignettes	The questionnaire was deemed by academic and clinical continence specialists to have a high degree of content validity. It was piloted on 10 nurses from another trust prior to distribution. No changes were made.
	Practice	Audit of patients' notes	The records of all new patients receiving a continence assessment during a 3-mo period were audited to identify assessment details, utilization of resources, and referrals	No information about reliability and validity provided
Campbell et al[17]	Knowledge	The Urinary Incontinence (UI) Knowledge Test	The instrument consisted of 30 multiple-choice items. Each included a question about the causes, effect, and treatment of UI in the nursing homes. The 30 questions were randomly reordered to reduce test-taker familiarity on repeated applications	These instruments were piloted in a nonproject nursing home after the nursing staff had participated in the education program. Modifications were made on the basis of this experience. Further revisions were made following a review for content validity by the coinvestigators, project clinical nurse specialists, and other content specialists, and a review by an expert in test construction. The Cronbach α ranged from 0.75 to 0.89 across the 4 data points. The test-retest reliability between the pretest and first postintervention test was 0.69
	Attitude	The Incontinence Stress Questionnaire-Staff Reaction (ISQ-SR)	The instrument consisted of 30 statements reflecting how a person might feel about caring for UI patients	Authors cited prior published work measuring internal consistency and test-retest reliability
Cheater et al[26]	Practice	An audit of patients' records	An audit of patients records against a list of evidence-linked review criteria for the assessment and management of UI in primary care	The criterion to assess nurses' performance was developed with reference to literature and submitted to review by experts
	Patient outcomes	A modified version of the Medical Research Council Leicester Incontinence Trial questionnaire	At baseline the questionnaire prompted patients to provide information about their characteristics, urinary symptoms in the previous month, the impact of symptoms on quality of life, help with coping, the use of continence products, and health service resources. Postintervention, it included 3 additional questions on patients' understanding and ability to cope with their urinary symptoms, in comparison to 6 mo earlier	The questionnaire was piloted and demonstrated good face and content validity and internal consistency
Collette et al[14]	Knowledge		Consisted of 11 open-ended questions regarding types of UI, factors affecting UI, and appropriate interventions. Each question was assigned a 5-point value	Authors constructed the questionnaire with reference to the literature. Temporal reliability tested in first study phase ($r = 0.69$)
	Attitude	The Semantic Differential Scale	The instrument was designed to measure nurses' stereotypical attitudes. It consists of 5 concepts and 10 sets of bipolar adjectives	The instrument was tested in the first phase of the trial. Temporal stability of the tool tested in first study phase ($r = 0.52$)
	Practice	Case studies	Each case dealt with the problem of incontinence. Participants were required to demonstrate knowledge in 3 areas: understanding the problem, diagnosing the problem, and planning the appropriate intervention	Cases were developed by an expert. Temporal stability tested in the first study phase ($r = 0.65$)
De Gagne et al[31]	Knowledge	The UI Knowledge Scale (UIKS) and The Urinary Incontinence Attitude Scale (UIAS)	The UIKS consisted of 30 items with dichotomous choices (1 = correct; 0 = false or do not know). Higher scores indicate more knowledge about UI. The UIAS consists of 15 items and a 4-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree). Higher average scores indicate more positive attitudes toward UI care and its management. The items used to assess UI attitudes in the study were: • UI is hard to talk about because it is an embarrassing problem. • UI is shameful. • UI is not serious enough to warrant treatment. • UI can be treated with medications. • Any urinary problem should be reported when health problems are assessed.	Authors cite prior work measuring the instrument's internal consistency

(*Continues*)

TABLE 2.
Data Collection Instruments and Their Reliability and Validity (*Continued*)

Trial	Domain	Name of Scale	Description	Validity/Reliability
Ehlman et al[18]	Knowledge	The Staff Satisfaction and Incontinence Knowledge Survey	5 items with dichotomous (true/false) response options: • Bladder disorders are a normal part of aging • Urinary incontinence is seen in at least 50% of nursing home residents • Performing a bladder scan is an invasive procedure • Portable bedside ultrasound is only used when initially assessing a newly admitted • Decreasing daily fluid intake can prevent episodes of UI	Authors constructed questionnaire with reference to the literature and advice from a clinical nurse specialist in gerontology
Frasure[32]	Practice	The Research Utilization Survey (Kenny 2002)	A 41-item survey to measure nurses' attitudes toward research utilization	Authors cited prior work evaluating the instrument's internal consistency, content, and construct validity
Kohler et al[19]	Patient outcomes	Pad weights QualiDem instrument	UI severity was assessed by weighing residents' pads over 3 d The QualiDem consisted of 9 subscales and 37 items describing observable behavior. Scores are calculated separately for each subscale. Higher scores indicate a higher quality of life.	Authors cited prior work evaluating the instrument's interrater reliability and validity
Lekan-Rutledge[20]	Knowledge		A 19-item multiple-choice questionnaire for RNs and LPNs and an 11-item questionnaire for CNAs	The author constructed the questionnaire with reference to the literature; it was reviewed by a panel of gerontologic nurse specialists
	Practice		Staff adherence was evaluated with reference to documentation of toileting episodes, UI episodes, and quality assurance nursing rounds	No information about reliability and validity
	Patient outcomes	Wet checks	Residents' continence status was checked every 2 h from 0800 to 2200 h. Residents' continence was assessed using the Minimum Data Set Resident Assessment Protocol from the Omnibus Budget Reconciliation Act of 1987 and clinical practice guidelines	No information about reliability and validity
Mathis et al[21]	Knowledge		A researcher constructed a 38-item questionnaire: demographic questions and questions on staff knowledge and attitudes about UI, and treatment and assessment of UI	Authors constructed the questionnaire with reference to the literature as well as expert opinion obtained from a gerontology clinical nurse specialist
Rahman et al[22]	Knowledge		Participants completed a 10-item multiple-choice pre- and posttraining quiz to test their knowledge of UI. They also rated the instructional value of the intervention	No information about reliability and validity
	Practice Patient outcomes		Supervisors reported the number of residents assessed and the number who received prompted voiding and the number who received prompted voiding who were continent	No information about reliability and validity
Remsburg et al[23]	Practice		Staff were asked to rate their compliance with the intervention, which were compared with independent and unobtrusive observations of their practice.	No information about reliability and validity
	Patient outcomes		Staff conducted 2 hourly wet checks for each resident for 5 d from 8 AM to 8 PM for 12 wk to assess the frequency of UI	No information about reliability and validity
Rigby[33]	Knowledge		15 multiple-choice (forced response) questions	The author constructed the questionnaire—reviewed by professional colleagues and a group of students for face/content validity

(*Continues*)

TABLE 2.
Data Collection Instruments and Their Reliability and Validity (*Continued*)

Trial	Domain	Name of Scale	Description	Validity/Reliability
Sackley et al[24]	Knowledge		10 questions related to continence with responses scored out of a total of 14. Higher scores indicated greater knowledge. Items included: • What would make you think someone had an infection in their urine? • If someone has arthritis, and uses a Zimmer frame, and is slow to get to the toilet, what would help them access the toilet quicker? • How often do you change a day bag on a catheter?	Authors constructed the questionnaire. No information about reliability and validity
	Patient outcomes		Pre- and postcontinence status was assessed by asking, "Do you ever leak any urine when you don't mean to?"	Reportedly used in prior research to diagnose stress, urge and mixed incontinence with reasonable accuracy in community-dwelling adults
Sampselle et al[27]	Practice		The nurse scientist advisory team developed and refined data collection forms that aimed to assist clinicians conduct UI screening, basic evaluation, and follow up.	Data collection instruments were pilot tested at 4 sites and further refined
	Patient outcomes		• Leakage in a typical week • Number of days of leakage in past week • Average volume of urine loss • Night-time frequency • Cost of self-management • Bother score • Percentage of avoiding activities	
Skelly and Kenny[28]	Patient outcomes	A modified version of the Wyman Incontinence Impact Questionnaire (Wyman 1987)	A questionnaire with a 7-point scale for patients to rate their knowledge of and control over their incontinence, how well they were accepting and coping with their incontinence, and their quality of life relating to bladder control and the extent to which 9 different daily activities were inhibited by incontinence. The NCAs were also asked to rate their patients' change in continence status from admission to discharge.	No information about reliability and validity
Thomas et al[29]	Practice		An audit of intervention documentation (ie, the number of appropriate patient allocations and the management of catheterization)	No information about reliability and validity
	Patient outcomes	The ICIQ-UI Short Form, the I-QOL, the European QOL-5 Dimensions (EQ-5D), the LUSQ, the ISI, and the ADL Barthel Index	The ICIQ-UI Short Form was used to evaluate the presence or absence of UI at 6, 12- and 52-wk poststroke. • Patients' I-QOL and the European QOL-5 Dimensions (EQ-5D) were used to evaluate quality of life • The LUSQ and the ISI were used to evaluate the frequency and severity of incontinence • The ADL Barthel Index was used to evaluate activities of daily living	Reliability and validity of all instruments described/reported
Vinsnes et al[25]	Patient outcomes		• Pad weight amount, mL • Pad change frequency • Bladder scanning, mL • Total fluid intake (day and night) • Daily fluid intake • Nightly fluid intake	No information about reliability and validity
Williams et al[34]	Knowledge	The Urinary Knowledge Score (UKS) and the Fecal Knowledge Score (FKS)	Two questionnaires were developed. Each correct response to a question scored 1, with a total of 57 possible scores relating to UI and a total of 27 on questions relating to FI	Authors constructed the questionnaire with reference to the literature and advice from an expert advisory group and a pilot trial. Face validity and content validity were upheld. The reliability of coding was checked on a random sample of 10% of questionnaires (71 = 36). Agreement did not fall below 91% for the 133 items checked

Abbreviations: CNA, certified nursing assistant; FI, fecal incontinence; LPN, licensed practice nurse; NCA, nurse continence advisor; UI, urinary incontinence.

TABLE 3.
Topics Addressed in Education Programs

- The epidemiology of UI
- The definition of UI and FI
- Stereotypes of aging
- Age-related bladder and bowel changes
- Skin changes with age
- Sensory changes with age
- Musculoskeletal changes with age
- Neurological changes with age
- Normal and abnormal bladder and bowel function
- The anatomy and physiology of UI
- Medical causes of UI
- Types of UI
- The socioeconomic impact
- Quality of life issues (ie, the personal consequences of UI, including the experience of being incontinent)
- Diagnostic issues including the use of a bladder scanner
- Treatment standards
- Incontinence equipment
- Male catheterization
- Intermittent catheterization
- Care routines influencing bladder function
- Toileting assistance programs, including staff roles and responsibilities
- Managing incontinence in people with dementia and challenging behaviors
- Urinary catheterization

Abbreviations: FI, fecal incontinence; UI, urinary incontinence.

1 controlled trial[30] and 1 nonrandomized clinical trial.[31] Both reported statistically significant improvements in participants' knowledge of UI.

Only one trial that met inclusion criteria occurred in the acute/subacute care setting. Williams and colleagues[34] reported improved knowledge scores among 117 hospital-based RNs in the UK after disseminating a clinical handbook about continence care and compared to a control group.

One uncontrolled trial reported improved knowledge following a workshop about male catheterization and general continence care in a sample of 130 UK nurses.[33] The practice setting was not reported.

EFFECT OF EDUCATION ON ATTITUDES

Two trials were retrieved that provided quantitative data about the effect of education on nurses' or NAs' emotional reaction or predisposition about caring for a person with UI: 1 was a nonrandomized trial[14] and 1 was an RCT.[17] Campbell and colleagues[17] reported positive attitudes at baseline, at the end of a 12-week educational program about prompted voiding and again 12 weeks later. Collette and associates[14] reported significantly improved attitudes immediately after an educational intervention (increase of 5.83%; $P = .017$), but they noted this improvement was not sustained 9 weeks after the completion of the program (decrease of 3.04%; $P = .014$).

Considered collectively, findings were mixed. De Gagne and coworkers[31] also reported that they evaluated nurses' attitudes about UI; however, closer scrutiny revealed that the items measured beliefs rather than attitudes as defined in this systematic review.

EFFECT OF EDUCATION ON CONTINENCE PRACTICES

Eight trials reported pre-/postdata about the effect of education on nurses'/NAs' UI continence care practices: 3 of which were controlled,[26,29,30] as shown in Table 8. Five nonrandomized studies reported posteducation improvements in continence care practices,[14,20,22,27,32] but this was not borne out in the 3 controlled trials. These findings are discussed based on care setting.

Care Setting

Three studies were conducted in nursing homes, and none were randomized.[14,20,22] Results from all 3 indicated improvements in continence care practices, including an increased ability to plan effective interventions,[14] more frequent continence assessments,[22] and adoption of policies and procedures to embed a continence program into practice.[20]

Three trials were set in the community.[26,27,30] They quantitatively evaluated nurses' adherence to recommendations to screen/assess and manage UI in community-dwelling people with UI; 2 were RCTs[26,30] and 1 was a nonrandomized trial.[27] Again, findings were mixed. Sampselle and colleagues[27] reported an increase in the frequency of nurses' identification of UI following a 3-year project to improve the initial evaluation and treatment of UI of women attending ambulatory clinics in the United States. Bignell and Getliffe[30] also reported positive improvements in the intervention group's continence care practices. Specifically, they found a significant reduction in the number of prescriptions for absorbent pads, as well as an increase in UI monitoring, testing patients' urine, and in treatment planning. By contrast, Cheater and associates[26] found that nurses' adherence to assessing and managing UI at 6 months did not differ significantly between a comparison group (education materials alone) or 1 of the 3 experimental groups: (1) an audit and feedback group, (2) an education outreach group, and (3) an audit and feedback with education outreach.

Two studies with pre-/postdata about the effect of education on nurses'/NAs' UI continence care practices were conducted in the acute/subacute care setting: 1 was a before-after study and[32] trial and 1 was an RCT.[29] The before-after trial was set in a neuroscience inpatient unit for patients following stroke located in the United States.[32] The researcher reported that nurses' adoption of an evidence-based bladder protocol about prompted voiding increased 2-fold: the mean adoption rate preintervention was 18.1% and 33.4% postintervention. The RCT was conducted in 12 stroke services in the UK.[29] It was designed as a 3-arm, parallel, open, exploratory, pragmatic, cluster RCT. The aim was to determine the effects of implementing a "systematic voiding program" (SVP) compared to SVP combined with facilitation (SVP + F) versus usual care (UC) for the management of UI after stroke in secondary care. The SVP intervention comprised bladder training and pelvic floor muscle training for patients who were cognitively able and prompted voiding for patients with cognitive impairments. Participants receiving SVP + F received support from at least one specialist practitioner whose role was to help staff work together, provide the necessary information and training, maintain motivation, and give feedback and practical help when needed. Participants in both intervention groups had access to online training in bladder scanning as well as face-to-face and web-based theoretical and practical education about the SVP.

Staff adherence was one of several outcomes of interest. The researchers found both groups had similar, but low rates of documentation of patients' voiding times (38.9% in the SVP group and 31.9% in the SVP + F group). Rates of adherence to toileting patients within 30 minutes of their scheduled time were also comparable (54.8% of occasions in the SVP group and 56.0% of occasions in the SVP + F group). Similarly, staff adherence to the requirement to document when they prompted patients to the toilet was comparable (57.9%

TABLE 4.
The Educational Intervention

Authors	Description of the Intervention
Bignell and Getliffe[30]	(i) 14 × ½-d workshops for small groups of nurses on UI etiology, assessment, and management (ii) A 1-d conference on treatments for and management of incontinence with invited experts (iii) 3 meetings in each locality of discussing the implementation of a new guideline (iv) Outreach sessions with small groups of nurses who were unable to attend formal sessions (v) Nurses were asked to identify possible causes of UI described in 3 vignettes and the action that they would take (vii) Clinical support from the project leader was provided for 4 mo
Campbell et al[17]	A 4-h education program, focusing on the definition, prevalence, and impact of UI; normal process of elimination and age-related changes; the types and causes of UI; and information about the research protocol to implement a toileting assistance program. Education was supplemented with project staff who reinforced the research protocol. Facilities were reimbursed for staff time spent in the education program.
Cheater et al[26]	Nurses allocated to the education outreach arm received mailed personal feedback on their self-reported barriers to optimum UI care obtained from self-completion postal questionnaires at baseline. They also received aggregated, anonymous feedback on reported barriers from other target in their locality and a copy of the resource pack. They received personal or aggregated feedback on performance. Nurses also received a minimum of 1 and a maximum of 3 outreach visits by a trained 'link nurse' and a minimum of 1 follow-up telephone call approximately 4-6 weeks after the final visit. Link nurses were available to be contacted by telephone between visits. Link nurses were required to attend 2 half-day workshops on the principles of EO involving a mix of learning approaches: lecture with discussion, video presentation, observed role-play with individual and peer feedback, written materials, and self-trial. The techniques of motivational interviewing were emphasized to help link nurses resolve ambivalence and support the target nurses to change. The role-play scenarios were based on discussions with continence nurse specialists in the trial sites.
Collette et al[14]	1 × 3-h education session over a 3-week period. Pedagogy described—group problem-solving strategies. (i) Knowledge—the epidemiology of incontinence, socioeconomic impact; consequences of incontinence problems on the individual and his or her significant others; the anatomy and physiology of incontinence; and interventions. (ii) Skills—focused on care interventions directed at the individual with incontinence problems, as well as how to help the client deal with problematic situations. (iii) Attitudes—focused on positive attitudes with respect to incontinence-related problems and to individuals suffering from problems of incontinence.
De Gagne et al[31]	Thee online education modules: Module 1 addressed understanding of UI. Module 2 addressed principles of self-management. Module 3 addressed education of UI self-management. The course consisted of 3 h of recorded video lectures, and supplementary materials, such as supporting literature, useful websites, video clips, and documents related to UI.
Ehlman et al[18]	Nine competency-based education staff in-services were held over a 2-wk period. They addressed evidence-based practice related to UI, the mechanics of using the scanner, demonstration of the scanner, and hands-on practice time for staff—supplemented with a video. The bladder ultrasound scanner was placed in each skilled nursing facility 2 wk after the initial in-service. Refresher in-services were held 12 wk later and were augmented with education resources such as cue cards, handouts and posters, personal consults, feedback, and an incentives program to increase the use of the scanner.
Frasure[32]	A 3-wk intervention to teach and encourage nurses to adopt prompted voiding for patients with stroke. The intervention, which was mainly education, was theoretically informed and involved using 4 translation strategies: (i) education materials, (ii) education meetings, (iii) reminders and audit, and (iv) feedback.
Kohler et al[19]	One session of 4-h duration addressing dementia symptoms, interacting with people with dementia and challenging behaviors, and incontinence education (ie, risk factors, assessment treatment options, optimal care, anatomy, physiology, incontinence types, prevalence and psychosocial impact). In addition, a total of 6 case conferences were conducted on the wards, each lasting 1 h.
Lekan-Rutledge[20]	12 h of education over 2 d combined with on-the-job coaching. The education for RN/LPN focused on medical causes and types of UI, assessment, treatment and management, and roles and responsibilities in implementing prompted voiding. The education for CNAs focused on care routines influencing bladder function (ie, fluid intake, bowel function, mobility assistance and positive reinforcement, and their roles and responsibilities in the prompted voiding program). Role-play demonstrations were included.
Mathis et al[21]	A 6-wk education intervention termed the Bladder Buzz Program on the types and treatment of UI and attitudes toward UI. The program included two 45-min staff sessions (including case trials targeting knowledge of types, treatment, and assessment of UI and specific examples of how to give residents a voice in UI care) and 6 wk of education on UI. The program included posting new education content on UI in staff areas each week.
Rahman et al[22]	A distance education and coaching course designed to teach nursing home staff the skills to assess and implement evidence-based continence care for incontinent nursing home residents. The education course featured 6 instructional teleconferences, with the first 5 held monthly and a follow-up session held 2 mo later. An expert in nursing home incontinence management presented teleconference lectures, each 40-min long. Interactive teleconferences were conducted by telephone, with PowerPoint slides e-mailed in advance to participating facilities. At each participating nursing home, 1 nurse supervisor—the project liaison who received individual coaching, agreed to attend all teleconferences, oversee implementation assignments, and act as the facility's champion for the new intervention. Additional staff members were encouraged to attend the teleconferences using a speaker telephone. Nurses received 13 continuing education credit hours for their participation. The course was designed to give participants time between training sessions to implement each step, using a standardized assessment or implementation tool to guide new continence care practices. Education was augmented with standardized, validated assessment and implementation forms for staff to complete.
Remsburg et al[23]	In-service classes were convened by the research team. The content was on UI, its causes, prompted voiding, and the behavioral intervention. Written instructions and sample forms were posted in the nursing lounge and research assistants were available 3 h/wk to answer questions about the trial. The research team met with nurse managers and administrators to exchange information and discuss issues such as staff compliance. The DON and nursing unit managers were given information on a biweekly basis about residents' actual continence status and staff compliance. They were asked to provide verbal feedback to staff about their performance.

(*Continues*)

TABLE 4.
The Educational Intervention (*Continued*)

Authors	Description of the Intervention
Rigby[33]	Two separate workshops on male catheterization and general continence care for RNs and ENs. No further information about educational content.
Sackley et al[24]	Separate 2-h workshops on continence care and mobility care, delivered by specialist nurses from the local Primary Care Trust (PCT) Continence Team and the mobility training by a qualified physiotherapist and occupational therapist.
Sampselle et al[27]	"29 site coordinators attended a 6-hour training which was delivered by a nurse scientist advisory team member who developed the protocol and project procedures. In the first segment of the training program, presentations were made about the significance, prevalence, and impact of UI in women's lives and known direct risks and contributing factors for the condition. In the second segment, the rationale for and conduct of the evidence-based protocol were discussed, including the basis for determining which women were good candidates for the behavioral intervention versus those for whom preliminary treatment for contributing factors such as urinary tract infection or referral was more appropriate" (Sampselle et al[27(p102)].
Skelly and Kenny[28]	A 3-mo program for 37 NCAs consisted of 75 h each of self-directed education and small-group problem-based learning. This was combined with 75 h each of supervised clinical practice and independent practice.
Thomas et al[29]	An education program of both theory and practice (developed by the research team and the research program's two dedicated PPC groups) enabling them to implement the program. Training was largely web-based to facilitate easy access and flexibility, but face-to-face sessions were offered to cover the practical aspects of intervention delivery and recording.
Vinsnes et al[25]	All direct care staff received 45 min of education every other week for 14 wk on the following UI topics: anatomy and physiology, epidemiology, diagnostic issues, treatment standards, incontinence equipment, intermittent catheterization, and quality-of-life issues. The primary investigator/project leader provided each of the education sessions. Along with the education program, the staff received regular coaching about caring for elders with UI. The project leader regularly met with the unit coordinator as well as the staff on the unit. Four staff members received individual coaching from the unit coordinator. They were responsible for working along with the direct care staff at each 4 subunits. These 4 staff members also participated in a 1-d training program at an outpatient clinic for urology and gynecology, a hospital unit for patients with stroke, or a counselling center for patients with UI. The unit coordinator was the cornerstone in implementation and follow-up. Buy-in and support by the head of the unit allowed for scheduled staff times to attend the education sessions and for sufficient staffing to allow for data collection during the 2 periods of data collection.
Williams et al[34]	Nurses in the experimental group received a handbook about UI and FI. In addition, a more detailed book was provided as a reference for each ward involved in the trial as part of the experimental group. The book was left for nurses' use on the ward.

Abbreviations: CNA, certified nursing assistant; DON, director of nursing; EO, executive order; EN, enrolled nurse; FI, fecal incontinence; LPN, licensed practice nurse; NCA, nurse continence advisor; UI, urinary incontinence.

of occasions in the SVP group and 65.9% of occasions in the SVP + F group). Although patients' catheters were removed in a timelier manner in the SVP + F group, there were no statistically significant differences between the 2 groups.

EFFECT ON PATIENT OUTCOMES

Eleven trials reported the statistical effect of UI education on patient outcomes: 4 were RCTs[19,24,26,29] and 7 were nonrandomized studies (Table 9).[20,22,23,25,27,28,32] Six studies were conducted in the nursing home setting, 4 of which were nonrandomized studies[20,22,23,25] and 2 were RCT.[19,24] Data from the uncontrolled trials were mixed. Lekan-Rutledge[20] reported a reduction in UI rates among nursing home residents 3 and 6 months after a prompted voiding toileting assistance program that included staff education, staff management, and quality monitoring; however, these differences were not statistically significant. Similarly, Rahman and colleagues[22] reported that residents were more continent after nursing home staff had attended a distance coaching course to facilitate the adoption of evidence-based protocols for UI management; outcomes were based on supervisors' opinions. Whilst nursing home residents in the trial by Vinsnes and coworkers[25] experienced a significant reduction in the severity of UI (ie, a reduction in the

TABLE 5.
Quality Assessment of Controlled Trials

Controlled Trial (With or Without Randomization)	Clear Quantitative Research Questions (or Objectives)	The Collected Data Address the Research Question (Objective)	A Clear Description of the Randomization (or Appropriate Sequence Generation)	Is There a Clear Description of the Allocation Concealment (or Blinding)	Complete Outcome Data (≥80%)	Low Withdrawal/Dropout (<20%)	MMAT Score
Bignell and Getliffe[30]	Yes	Yes	No	No	Unclear	Unclear	50%
(Campbell et al[17])	Yes	Yes	No	No	No—high dropout	No—44% dropout	25%
Cheater et al[26]	Yes	Yes	Yes	Yes	Yes	Yes	100%
Kohler et al[19]	Yes	Yes	Yes	No	Yes	Unclear	100%
Sackley et al[24]	Yes	No (n = 34)	Yes	Yes	Unclear	Unclear	50%
Thomas et al[29]	Yes	Yes	Yes	Yes	Yes	Yes	100%
Williams et al[34]	Yes	Yes	No	No	No	No—50% dropout	25%

Abbreviation: MMAT, Mixed Methods Appraisal Tool.

TABLE 6.
Quality Assessment of Uncontrolled Trials

Type of Trial	Trial	Screening Questions		Methodological Quality Criteria				MMAT Score
Uncontrolled trial		Clear quantitative research questions (or objectives)	The collected data address the research question (objective)	Participants (organizations) are recruited in a way that minimizes selection bias	Measurements are appropriate regarding the exposure/intervention and outcomes	The groups being compared, are comparable, or researchers take into account the difference between groups	Outcome data are complete (≥80%), and response rate is acceptable (≥60%), or an acceptable follow-up rate for cohort trials	
	Collette et al[14]	Yes	No (n = 10)	No	No	N/A	Unclear	25%
	De Gagne et al[31]	Yes	No (n = 25)	Yes	Yes	N/A	Yes	50%
	Ehlman et al[18]	Yes	Unclear (posttest sample = 48)	No	Unclear	N/A	No (>50% attrition)	25%
	Frasure[32]	Yes	No (n = 20)	No	Yes	N/A	Unclear	50%
	Lekan-Rutledge[20]	Yes	Unclear (n = 21)	No	Yes (ie, wet checks)	N/A	Unclear	50%
	Mathis et al[21]	Yes	Unclear (posttest sample (n = 38)	No	No—researcher-developed survey	N/A	No (>50% attrition)	25%
	Rahman et al[22]	Yes	Unclear	No	No—UI rates based on opinion	Yes	Unclear	50%
	Remsburg et al[23]	Yes	No (n = 17)	No	Yes—wet checks	N/A	Yes	50%
	Rigby[33]	Yes	Unclear due to attrition	No	No—researcher-developed survey	N/A	No (>50% attrition)	25%
	Sampselle et al[27]	Yes	Unclear due to attrition	No	Yes	N/A	No (> 50% attrition)	50%
	Skelly and Kenny[28]	Yes	Yes	No	Yes	N/A	No (>50% attrition)	50%
	Vinsnes et al[25]	Yes	No (n = 18)	No	Yes (ie, wet checks)	N/A	Yes	75%

Abbreviations: N/A, not available; UI, urinary incontinence.

TABLE 7.
Included Studies of the Effects of Education on Knowledge

Authors	Design	Sample/Setting	Intervention	Findings
Bignell and Getliffe[30]	A controlled trial: quasiexperimental design with 3 phases and a control group	UK: 246 community nurses ± district nurse qualifications	Evidence-based clinical guidelines for continence care, accompanied by an education program, facilitation, meetings, and outreach	Statistically significant improvements in the intervention group's knowledge of anticholinergic drugs as a possible treatment for UI in phase 3 ($P = .001$), of physiotherapy referral ($P = .033$) and of modifying caffeine intake ($P = .037$). Mention of absorbent pads was significantly reduced ($P = .049$)
Campbell et al[17]	A quasiexperimental trial with repeated measures and a control group	USA: 166 staff (35 RNs, 14 LPNs & 117 NAs)	A prompted voiding toileting assistance program combined with education compared to usual care	A slight but significant difference by group and time, $F(2,135) = 3.39$, $P < .05$ in knowledge scores—favoring the intervention group
Collette et al[14]	An uncontrolled quasiexperimental trial with repeated measures	Canada: 10 RNs from a geriatric university institute	1 × 3-h program about UI over a 3-wk period	Knowledge scores increased from 53% to 77% (increase of 19.15%; $P = .005$)
De Gagne et al[31]	An uncontrolled 1-group, pre-/posttest design	Korea: 25 community health nurses	An online education program about UI	The mean preintervention knowledge score was 24.88 (SD = 2.38) (range 20-29). Postintervention mean knowledge score increased to 27.28 (SD = 1.13) (range 26-30) ($t = 3.787$, $P = .001$)
Ehlman et al[18]	An uncontrolled quasiexperimental, within-subject, longitudinal design (2-time points)	USA: n = 107 pretest staff: 16 RNs, 58 LPNs, 33 CNAs; n = 48 posttest staff: 14 CNAs, 26 LPNs, 8 RNs	An education program about UI and the introduction of a bladder ultrasound scanner	The percentage of correct responses to the statement that "bladder disorders are a normal part of ageing" increased from 50% (n = 23) in the pretest to 91.2% (n = 42) in the posttest
Lekan-Rutledge[20]	An uncontrolled 1-group, pretest/posttest	USA: 31/56 nursing home staff (10 RNs and LPNs, 21 CNAs) + 9 residents	A prompted voiding toileting assistance program informed by theory of diffusion of innovation, consisting of staff education, staff management, and quality monitoring	All RNs passed both the pre- and posttests. No LPN successfully passed pre-and posttests. CNAs demonstrated high pass rates for both tests
Mathis et al[21]	An uncontrolled quasiexperimental, within-subject, longitudinal pretest/posttest	USA: 166 staff: baseline = 23 RNs, 37 LPNs, 64 CNAs, and 39 nonnursing staff. Posttest = 38 (7 RNs, 6 LPNs, 21 CNAs, and 4 nonnursing staff)	A 6-wk education intervention on the types and treatment of UI and attitudes toward UI	55.2% identified stress UI pre- and 82.4% postintervention; 44.7% identified functional UI pre- and 73.7% postintervention; 15.8% identified overflow UI pre- and 60.5% postintervention, 71.1% identified urge UI pre- and 84.2% postintervention. Changes in knowledge about the types of UI showed statistical significance for stress ($P < .001$), functional ($P < .003$), and overflow ($P < .00$) UI. Changes in staff knowledge about the assessment and treatment of UI did not reach statistical significance. 60.6% correct response to the statement that bladder disorders are a normal part of aging at baseline and 97% postintervention
Rahman et al[22]	An uncontrolled descriptive comparative trial	USA: 28 nursing home staff members in course 1 and 140 in course 2 (CNAs and supervisors)	Two distance coaching courses to facilitate the adoption of evidence-based protocols for the management of UI	Knowledge increased significantly for both groups, scores for course 1 participants (n = 15) increased from 57% to 73% ($P = .01$) compared to 57%–85% ($P < .001$) for course 2 participants (n = 35)—not statistically significant
Rigby[33]	An uncontrolled pre-/postevaluation	UK: 91/130 RNs and ENs plus n = 6 for qualitative interview	Two separate workshops on male catheterization and general continence care	Mean preworkshop score 7/postworkshop score 12
Williams et al[34]	A controlled pretest-posttest	UK: 117 RNs and ENs from hospitals in a health authority	Dissemination of a clinical handbook about continence care for qualified nurses	The experimental group's average knowledge score improved by 7.03 (95% CI, 5-675, 8-383), while the control group improved by 1.40 (95% CI, 1-145, 3-945)

Abbreviations: CI, confidence interval; CNA, certified nursing assistant; EN, enrolled nurse; LPN, licensed practice nurse; NA, nursing assistant; UI, urinary continence.

TABLE 8.
Included Studies Regarding Effect of Education on Practice

Authors	Design	Sample/Setting	Intervention	Findings
Bignell and Getliffe[30]	A controlled trial: quasiexperimental design with 3 phases and a control group	UK: 246 community nurses ± district nurse qualifications	Evidence-based clinical guidelines for continence care, accompanied by an education program, facilitation, meetings, and outreach	Statistically significant improvements by the intervention group in phase 3 for the monitoring of UI episodes ($P = .045$), urine testing ($P = .0002$), and treatment planning ($P = .0002$) compared with phase 1. Urine testing also improved in the control group in phase 3 ($P = .0007$)
Cheater et al[26]	A cluster RCT	UK: 176/270 community nurses and 700/1078 patients with UI from 157 family practices	(1) Audit and feedback, (2) education outreach, (3) audit and feedback in combination with education outreach, compared to printed education materials	The intervention did not improve care at 6-mo follow-up.
Collette et al[14]	An uncontrolled quasiexperimental trial with repeated measures	Canada: 10 RNs from a geriatric university institute	1 × 3-h education program about UI over a 3-wk period	The ability to plan an effective intervention increased by 27.05% ($P = .005$)
Frasure[32]	An uncontrolled time-series design	USA: 20/33 nurses from a neuroscience acute care stroke unit, plus 29 stroke patients	A prompted voiding toileting assistance program informed by translation strategies and combined with education materials, education meetings, reminders, and audit and feedback	Nurses' adoption of an evidence-based bladder protocol increased 2-fold: the mean adoption rate preintervention was 18.1% and 33.4% postintervention
Lekan-Rutledge[20]	An uncontrolled 1-group, pretest-posttest	USA: 31/56 nursing home staff (10 RNs and LPNs, 21 CNAs) + 9 residents	A prompted voiding toileting assistance program informed by theory of diffusion of innovation, consisting of staff education, staff management, and quality monitoring.	Staff adherence was 93% in wk 1, 94% at 6 wk, 81% at 3 mo, and 85% at 6 mo
Rahman et al[22]	An uncontrolled descriptive comparative trial	USA: Number of residents not reported: 28 nursing home staff members in course 1 and 140 in course 2 (CNAs and supervisors)	Two distance coaching courses to facilitate the adoption of evidence-based protocols for the management of UI	Participants in course 1 assessed more residents on average than course 2 (22 range 6-60 vs 12 range 3-52)
Sampselle et al[27]	An uncontrolled prospective cohort trial	USA: 29 nursing site coordinators plus 132/1474 women with UI from one of 21 women's ambulatory care health sites	An evidence-based protocol for initial evaluation and treatment of UI among women attending ambulatory clinics	Higher rates of identification of UI (57%) compared to rates reported in prior research (38%-41%)—no predata. Postdata interviews with 6 participants suggested participation increased opportunities and more positive collaboration with physician colleagues resulting in greater professional satisfaction
Thomas et al[29]	A 3-arm parallel, open exploratory, pragmatic RCT	UK: Number of nurses not reported	Usual care or systematic voiding program alone, or with support/facilitation	Adherence to documenting the regime interval and voiding program was 38.9% in intervention; 31.9% in supported group. Closer adherence to protocol regarding catheter removal in supported group [median 13 d, interquartile range (IQR) 5-35 d vs median 20 d, IQR 8.75-35.25] and patients still catheterized at discharge (19, 15.2% vs. 35, 21.3%)

Abbreviations: CNA, certified nursing assistant; LPN, licensed practice nurse; RCT, randomized controlled trial; UI, urinary continence.

volume of urine loss), the number of pad changes and average postvoid residual volumes remained unchanged. Remsburg and associates[23] found that the continence status of most residents remained the same or declined following an education program for staff about UI, its causes, and prompted voiding.

Sackley and coinvestigators[24] conducted a phase II exploratory cluster RCT to evaluate the effects of a training program for staff about UI and mobility support compared to standard care. Although the number of patients who reported being continent at 6 weeks increased, the trial was inadequately powered to determine the magnitude of effect produced by the intervention.

The strongest evidence of the effects of education in the nursing home setting derives from a large stepped-wedge RCT

TABLE 9.
Included Studies Regarding Effect of Education on Patient Outcomes

Authors	Design	Sample/Setting	Intervention	Findings
Cheater et al[26]	A cluster RCT	UK: 176/270 community nurses and 700/1078 patients with UI from 157 family practices	(1) Audit and feedback, (2) education outreach, and (3) audit and feedback in combination with education outreach, compared to printed education materials	At 6 mo, quality-of-life and self-rated health scores were similar between groups
Frasure[32]	An uncontrolled time-series design	USA: 20/33 nurses from a neuroscience acute care stroke unit, plus 29 stroke patients	A prompted voiding toileting assistance program informed by translation strategies and combined with education materials, education meetings, reminders, and audit and feedback	No statistical differences in the pre- and postintervention frequency of UI
Kohler et al[19]	A controlled stepped-wedge design	Switzerland: 140 residents with dementia from 7 nursing homes	An education session of 4 h targeted to RNs and health assistants plus 6 × 1-h ward-based case conferences	At 6 mo, UI decreased or was approximately equivalent to baseline. At the end of the study, UI increased (nonstatistically significant). Quality of life improved
Lekan-Rutledge[20]	An uncontrolled 1-group, pretest-posttest survey	USA: 31/56 nursing home staff (10 RNs and LPNs, 21 CNAs) + 9 residents	A prompted voiding toileting assistance program informed by theory of diffusion of innovation, consisting of staff education, staff management, and quality monitoring	All residents experienced a reduction in UI: UI rates were 71% at baseline, 80% at 6 wk, 78% at 3 mo, and 85% at 6 mo. The average number of wet episodes per day: 2.3 at baseline, 1.57 at 6 wk, 1.79 at 3 mo, and 1.34 at 6 mo
Rahman et al[22]	An uncontrolled descriptive comparative trial	USA: Number of residents not reported: 28 nursing home staff members in course 1 and 140 in course 2 (CNAs and supervisors)	Two distance coaching courses to facilitate the adoption of evidence-based protocols for the management of UI	Supervisors in both courses reported residents were more continent. The χ^2 test showed no significant differences
Remsburg et al[23]	An uncontrolled pre-/postevaluation	USA: 16/17 residents + 64 staff members from 1 rehab unit and 3 LTC units	A prompted voiding toileting assistance plus staff education program	Overall continence improved in 5 (31%) of residents, 6 (38%) remained the same, and continence status deteriorated in 5 (31%)
Sackley et al[24]	A phase II, exploratory cluster RCT	UK: 32/34 residents + 41 care home staff	Physiotherapy-led group exercise and staff continence and mobility facilitation training compared to standard care	The number of residents agreeing with the statement "Do you ever leak any urine when you don't mean to?" in the intervention group decreased from 12/17 at baseline to 7/17 at 6 wk and increased from 9/16 at baseline to 9/15 at 6 wk in the control group
Sampselle et al[27]	An uncontrolled prospective cohort trial	USA: 29 nursing site coordinators plus 132/1474 women with UI from one of 21 women's ambulatory care health sites	An evidence-based protocol for initial evaluation and treatment of UI among women attending ambulatory clinics	n = 132/1474 cases for whom baseline (pretreatment) and 4-mo (posttreatment) data were available. Significant postintervention reductions in: (i) leakage in a typical week (0.002) (ii) number of days of leakage past week (0.0001) (iii) average volume of urine loss (0.03) (iv) night-time frequency (0.012) (v) cost of self-management (0.031) (vi) bother score (0.0001) (vii) percentage of avoiding activities (0.001)
Skelly and Kenny[28]	An uncontrolled prospective pilot trial	Canada: 50/174 patients + 4 nurse continence advisors (NCAs)	75 h of self-directed education and small-group + problem-based learning + 75 h each of supervised clinical practice and independent practice	60% (n = 30/50) of patients reported a reduction in UI. NCAs rated 42% (73/174) of the patients moderately improved or continent. The cost for the NCA visits to the home care programs was an average of $95 per patient
Thomas et al[29]	A 3-arm parallel, open exploratory, pragmatic RCT	UK: 413 patients from 12 stroke services (124 usual care, 164 intervention, and 125 supported/facilitated implementation)	Usual care or systematic voiding program alone, or with support/facilitation	No difference for presence/absence of UI at 6 and 12 wk poststroke [intervention vs usual care: odds ratio (OR) 1.02, 95% CI, 0.54-1.93; supported implementation vs usual care: OR 1.06, 95% CI, 0.54-2.09]. ICIQ and ISI: No evidence of better outcomes at 6 wk poststroke. At 12 wk, there was weak evidence of better outcomes on the ICIQ in supported implementation (OR 1.22, 95% CI, 0.72-2.08), but the CI is wide and includes both clinically relevant benefit and harm. Both intervention arms had higher estimated odds of continence for patients with urge UI than usual care (intervention: OR 1.58, 95% CI, 0.83-2.99; supported implementation: OR 1.73, 95% CI, 0.88-3.43). There was a similar increase in the estimated odds of continence for patients with stress UI in supported implementation (OR 1.82, 95% CI, 0.82-4.01), but this was not as marked in intervention (OR 1.04, 95% CI, 0.45-1.82).
Vinsnes et al[25]	An uncontrolled pre-/postevaluation	Norway: 18/22 nursing home residents plus staff from the unit (number of nurses/NAs not reported)	A unit-based education program in a teaching nursing home	The number of pad changes remained the same as did total urine output and PVR. The volume of UI was significantly less per pad (161 mL vs 120 mL, $P = .03$). The maximum weight (ie, volume) of urine fell significantly from 274 to 193 mL ($P = .05$).

Abbreviations: CI, confidenc interval; CNA, certified nursing assistant; LPN, licensed practice nurse; LTC, long-term care; NA, nursing assistant; OR, odds ratio; PVR, postvoid residual urine; RCT, randomized controlled trial; UI, urinary continence.

conducted in Switzerland. Kohler and collegues[19] randomized residents with dementia to the intervention on a stepped basis. The 4-hour education session for RNs and NAs focused on UI and dementia and the management of behavioral and psychological symptoms of dementia. In addition, the researchers convened 6 inpatient care-based case conferences. While UI decreased between baseline and follow-up at 6 months, no significant between-group differences were seen at the study end point (at 14 months for cluster 1, 11 months for cluster 2, 9 months for cluster 3, and 7 months for cluster 4).

Findings from the 3 trials undertaken in ambulatory community or primary care settings also reveal mixed results.[26-28] The strongest evidence about the effects on patient outcomes of continence education for nurses working in the community derives from an RCT by Cheater and coworkers,[26] who reported that while nocturia and voiding frequency improved in up to half of all patients in 6 months, improvements were similar across all groups. In a nonrandomized trial, Sampselle and colleagues[27] found significant increases in women's self-rated UI frequency, UI volume, cost of self-management, and avoidance activities following an educational intervention designed to increases nurses' identification and management of UI in women. Participants also reported they were less bothered by their symptoms. A further uncontrolled trial found reductions in the volume of UI experienced by community-dwelling adults as well as increases in their knowledge and ability to control and cope with their UI after receiving home-based advice from nurse continence advisors (NCAs) who completed a 3-month self-directed education program combined with 75 hours of supervised clinical practice and independent practice.[28] The NCAs also subjectively rated reported that 42% (73/174) of patients were moderately improved or continent.

No studies were identified that evaluated the effects of education on patient outcomes in acute care units. However, 2 trials provide evidence of the effects of nursing education about UI on patient outcomes in rehabilitation units,[29,32] both enrolled stroke patients. Frasure[32] found no significant differences in the pre- and postintervention frequency of UI among 29 stroke patients in a neuroscience ward, despite a reported 50% improvement in the implementation of a prompted voiding protocol. Similarly, Thomas and associates[29] reported no difference in the presence or absence of UI at 6- and 12 weeks poststroke based on the ICIQ-UI Short Form. Overall, 161 (39.7%) of participants were continent at discharge; 72 (44%) in group 1; 51 (41%) in group 2; and 38 (31%) in group 3. We believe this trial provides the strongest evidence of the effects of educating nurses on patient outcomes in a rehabilitation setting.

DISCUSSION

We completed a systematic review of the efficacy of UI education on nurses' and NAs' knowledge, attitude toward, practices, and patient outcomes and found mixed evidence. Whilst nonrandomized and before-after studies tended to report positive effects, these findings were not confirmed in RCTs. Moreover, in 2 large RCTs, education combined with facilitation[29] and/or audit and feedback[26] did not produce statistically significant differences in patient-related outcomes. This finding is inconsistent with research in other areas about facilitation, audit, and feedback.[35] There are many possible reasons for the lack of between-group statistical improvements; they include (1) variability in the methodological quality of the trials, (2) variability in the strength and quality of the educational intervention, (3) the inherent limitations of education in achieving behavioral and organizational change, and (4) limitations of current outcome measures.

Variability in Methodologic Quality

Trial quality is an important consideration. Most researchers described a complex educational intervention comprising multiple components, rendering it difficult to identify the relative merit of one component over another. The methodological quality of the studies varied from 25% to 75% for uncontrolled trials and 25% to 100% for controlled trials. Reasons for the low quality ratings included small sample sizes, multifaceted and complex interventions, reliance on subjective reporting measures, low response rates, high dropout rates, incomplete outcome data, potential bias in recruitment methods, nonvalidated data collection instruments, and incomplete reporting. Future research on the topic should be informed by reporting guidelines, such as the Consolidated Standards for Reporting Trials (CONSORT) statement.[36]

Variability in Educational Interventions

The strength and quality of the various educational interventions is also an important consideration. Educational content should align with evidence-based recommendations for the management of UI. We assert that these education programs should also be theoretically informed and accommodate the specific context. For example, we assert that RN and NA education should differ. It is unclear if this was the case in most of the trials that included NAs. Nursing assistants are the first-line managers of UI and other bladder and bowel disorders in most nursing homes[37] and are key to the uptake of interventions to optimize continence.[20] Further research is required to elucidate the differential education RNs and nurse assistants require to assess and manage UI.

Limitations of Education in Achieving Behavioral and Organizational Change

While improved knowledge and attitudes are important enablers of change, continuing education alone is unlikely to produce sustained changes in practice or corporate culture.[38] Similarly, evidence suggests that increased knowledge about UI does not necessarily translate into improvements in practices that improve patient outcomes.[39,40] RNs and NAs are not solely responsible for the quality of continence care. Few studies accounted for or addressed contextual factors or facilitation/support of practice change in the setting.

Based on review findings, a key barrier to the uptake of educational recommendations about UI could be a lack of audit and feedback data about patients' objective continence status. Thomas and colleagues[29] found staff members' belief in the efficacy of the intervention was a critical factor in the uptake of a systemic voiding program. However, nurses are not always able to identify patients' actual continence status,[23] possibly due to the challenge of obtaining objective data. Further attention should be given to improving methods to increase nurses' ability to accurately identify patients' frequency and severity of UI.

Limitations of Current Outcome Measures

Outcomes used in the studies included in this systematic review were primarily based on the implicit goal of cure or reducing rates of UI and/or FI, which may be unrealistic for some people. A large proportion of individuals, and particularly

those with chronic degenerative neurological conditions and/or a poor prognosis, are not amenable to restoration of continence.[41] Ostaszkiewicz[42] argues education programs for RNs and NAs should place equal value on helping people adjust to changes in bodily function that affect their identity, autonomy, control, and independence. Stated simply, we assert that researchers should evaluate measures of care as well as cure.

CONCLUSION

All RNs and NAs should be equipped with the depth and breadth of knowledge needed to prevent and actively manage UI. Further well-designed trials are required to determine the specific effects of education on nurses' and NAs' continence care practices and patients' continence outcomes.

ACKNOWLEDGMENTS

We kindly thank Ms Rachel Bush for her contribution to the research and Professor Trisha Dunning for their helpful comments on the article. We also acknowledge funding support from the Continence Nurses Society Australia (Victorian/Tasmanian Branch) for the 2017 Research/Project Scholarship. The research was conducted through the Centre for Quality and Patient Safety Research at Deakin University.

KEY POINTS

- Education improves nurses' and NAs' knowledge about UI; however, the most effective forms of education that affect practice and patient outcomes are not known.
- The lack of statistically significant changes in practices and patient-related outcomes observed in controlled trials may be attributable to variability in the methodological quality of the trials, the strength and quality of the educational intervention, a reliance on education to achieve behavioral and organizational change, and/or the selection of outcome measures.
- Future trials on the topic should be informed by contemporary reporting guidelines.

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Disclosure Statement: The authors and planners have disclosed that they have no financial relationships related to this article.

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DOI: 10.1097/WON.0000000000000679