INTERNATIONAL JOURNAL OF GERIATRIC PSYCHIATRY
Int J Geriatr Psychiatry 2007; **22**: 9–22.
Published online 10 November 2006 in Wiley InterScience
(www.interscience.wiley.com) **DOI**: 10.1002/gps.1643

Effectiveness and acceptability of non-pharmacological interventions to reduce wandering in dementia: a systematic review

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SUMMARY

Background Wandering occurs in 15–60% of people with dementia. Psychosocial interventions rather than pharmacological methods are recommended, but evidence for their effectiveness is limited and there are ethical concerns associated with some non-pharmacological approaches, such as electronic tracking devices.

Objective To determine the clinical and cost effectiveness and acceptability of non-pharmacological interventions to reduce wandering in dementia.

Design A systematic review to evaluate effectiveness of the interventions and to assess acceptability and ethical issues associated with their use. The search and review strategy, data extraction and analysis followed recommended guidance. Papers of relevance to effectiveness, acceptability and ethical issues were sought.

Results (i) Clinical effectiveness. Eleven studies, including eight randomised controlled trials, of a variety of interventions, met the inclusion criteria. There was no robust evidence to recommend any intervention, although there was some weak evidence for exercise. No relevant studies to determine cost effectiveness met the inclusion criteria.
(ii) Acceptability/ethical issues. None of the acceptability papers reported directly the views of people with dementia. Exercise and music therapy were the most acceptable interventions and raised no ethical concerns. Tracking and tagging devices were acceptable to carers but generated considerable ethical debate. Physical restraints were considered unacceptable.

Conclusions In order to reduce unsafe wandering high quality research is needed to determine the effectiveness of non-pharmacological interventions that are practically and ethically acceptable to users. It is important to establish the views of people with dementia on the acceptability of such interventions prior to evaluating their effectiveness through complex randomised controlled trials.

KEY WORDS — dementia; ethical issues; health care; mental health

BACKGROUND

Wandering represents one of a range of behavioural problems occurring in people with dementia (Hope and Fairburn, 1990; Ballard *et al*., 1991; Cohen-Mansfield *et al*., 1992a; Hope *et al*., 1994). The term incorporates a complex collection of behaviours which occur for different reasons (Hope *et al*., 1994). Wandering behaviour has been described according to geographical pattern (Martino-Saltzman *et al*., 1991), typology (Hope *et al*., 1994) and linked to neurocognitive deficits (Algase, 1999). A single definition has been attempted (Snyder *et al*., 1978; Stokes, 1986) but this is unsatisfactory and does not

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Received 28 February 2005
Accepted 1 June 2006

acknowledge the diversity of behaviours the term represents. In addition wandering is often conflated within the term 'agitation' or 'agitated behaviour' (Cohen-Mansfield *et al*., 1992b). The lack of a precise definition and the complexity of the problem may lead to research difficulties in terms of defining the research question and relevant outcome measures. It may be beneficial to people with dementia as a form of exercise and improving circulation (Heim, 1986; Cohen-Mansfield *et al*., 1991) but it can also be associated with earlier institutionalisation (Balestreri *et al*., 2000; Phillips and Diwan, 2003), physical harm, emotional distress and even death (O'Connor *et al*., 1990; Ballard *et al*., 2001).

Traditional management comprised physical barriers, physical restraints and drugs. However, considerable ethical concerns exist regarding the use of barrier/restraint methods (Hughes, 2002). Neuroleptic drugs have harmful side effects and show only modest efficacy in managing some behavioural problems in dementia (Ballard and O'Brien, 1999; Howard *et al*., 2001). Over the last decade, a new ethos in the management of wandering has evolved with a move towards promotion of safe walking, rather than the prevention of wandering, in order to balance a person with dementia's need for autonomy with the need to minimise risk (Coltharp *et al*., 1996; Cohen-Mansfield and Werner, 1998;). Current interventions include non-pharmacological approaches (Howard *et al*., 2001) such as: electronic tagging and tracking devices; behavioural approaches; carer interventions; exercise; music therapy; sensory therapies (aromatherapy, multi-sensory environment); environmental designs and subjective barriers (visual modifications that may be interpreted as a barrier but are not physically so). Evidence on the effectiveness and acceptability of the above interventions is limited; with the exception of subjective barriers, which were the subject of a recent Cochrane Review (Price *et al*., 2004). The aim of this systematic review was to evaluate the effectiveness, cost-effectiveness and acceptability of non-pharmacological interventions (excluding subjective barriers) to prevent or reduce wandering in people with dementia.

METHODS

Search strategy

Details of the criteria for inclusion and search strategy are shown in Box 1. Due to the complexity of the behaviour under study the term 'wandering' was represented by a descriptive typology rather than a single definition (Hope *et al*., 1994). Searching continued up to 31 October 2005.

Study selection

Two reviewers (DH, LC) independently assessed, on the basis of titles and abstracts, whether the studies met the inclusion criteria. Full papers were obtained for all potentially relevant studies. Independent review of the full articles was carried out (DH, LC); disagreements were resolved through discussion or consultation with a third reviewer (LR, JB).

If the study outcome was a composite measure which indicated wandering as a component, e.g. Neuro Psychiatric Inventory (NPI; Cummings *et al*., 1994) or INTERACT (Baker and Dowling, 1995), but wandering-specific data was not reported, authors were contacted for relevant raw data. Studies using other instruments (Gustafson *et al*., 1985; Cohen-Mansfield, 1986; Verstraten, 1988), such the Cohen-Mansfield Agitation Inventory (Cohen-Mansfield, 1986), where it was not possible to separate wandering from other measured behaviour, were excluded.

Lists of both included and excluded studies were sent to external experts to check for completeness.

Data extraction

Each study was independently reviewed by two assessors (DH and either HD, AV, TF or JH) using a specially developed and piloted form to abstract characteristics of the study population, intervention, outcomes, acceptability and quality criteria. Any differences were resolved by discussion.

Acceptability of interventions was assessed from the following questions: (a) do patients and carers appear to find the included interventions acceptable? And (b) are some interventions viewed as more acceptable than others?

Reviewers also extracted data indicating ethical issues, through particular terms (e.g. dignity, rights) or ethical principles (e.g. beneficence, non-maleficence).

Assessment of quality

Assessment of the quality of individual studies followed recommended guidance (see Box 2).

Data synthesis

Efficacy. Two of the included studies used similar interventions: multi-sensory environment or Snoezelen,

DOI: 10.1002/gps

Box 1 Inclusion criteria and search strategy

Criteria for inclusion

Types of studies:

i) Effectiveness: randomised and non-randomised controlled trials, controlled before-and-after studies, cohort and case-control studies.

ii) Cost effectiveness: studies costing the intervention strategies or wandering behaviour and full economic evaluations assessing the intervention strategies.

iii) Acceptability: surveys of opinion, qualitative studies and discussion papers.

Participants: people with dementia (diagnostic criteria DSM IV or ICD 10) and acquired cognitive impairment in any setting.

Interventions: physical barriers; restraints; electronic tagging/tracking devices; behavioural interventions; carer interventions; exercise, music therapy, homeopathy; sensory therapies eg aromatherapy, multi-sensory environment, and environmental designs.

Outcome measures:

Primary: any measure of wandering behaviour.

Secondary: accidents; deaths; withdrawal from treatment (as an indicator of tolerability); satisfaction with intervention; quality of life of person with dementia and informal carer(s); anxiety/distress of person with dementia and informal carer(s); costs of care; use of health and social services and costs of intervention and its implementation.

There was no language restriction. Foreign language texts were translated by relevant experts.

Search strategy

Electronic searches: Cochrane Library (which includes *CENTRAL, CDSR, DARE, HTA, NHS EED* (2005)); MEDLINE (1966-2005); ISI Proceedings (1990-2005) Current Contents – clinical medicine, social &behavioural sciences; EMBASE (1980-2005); Science Citation Index (1981-2005); Social Science Citation Index (1981-2005); CINAHL (1982-2005); PsycINFO (1940-2005); HEED(2005); ADEAR (Alzheimer's disease clinical trials database 2005); National ResearchRegister 2005; Ageline (AARP database – US 2005); AgeInfo (Centre for Policy on Ageing – UK 2005). A general web search included BIOME (Health and life sciences gateway), Current Controlled Trials, ClinicalTrials.gov, Google and Zapmeta. ETHX database, Bioethicsweb (2005).

Grey literature: ISTP (ISI Science and Technology Proceedings (1990-2005)); ZETOC (British Library database of conference proceedings (2005)); Index to Theses (2005).

Additional literature searches: Hand searches of journals not covered by the Cochrane Library, the Journal of Dementia Care (1999 to 2004) and Dementia (2002 to 2004).

Search terms (Studies in Set 1, Set 2 and Set 3 were combined)
Set 1: Cognitive function
a) Dementia, delirium, Alzheimer's, Pick, Huntington, Creutzfeldt, JCD, Binswanger, Korsakoff, Wernicke, Lewy OR
b) (cognition, memory) AND (impairment, decline, disorder, disturbance, defect, confusion)
Set 2: Wandering behaviour
Wandering, walking, pacing, ambulation, escape, elopement, orientation, agitation, restlessness, sundowning
Set 3: Interventions
Tagging, tracking, alarms, electronic, restraints, locks, Buxton chairs, barriers, cocoons, complementary therapies, snoezelen, aromatherapy, sensory therapies, music therapies, exercise, environment, smart homes, lighting, design, education, management, therapy, behaviour, activities, distraction, prevention, intervention.

DOI: 10.1002/gps

Box 2 Criteria for quality assessment of studies included in the review

Efficacy studies

Adequacy of randomisation for randomised controlled trials (RCTs); concealment of allocation; blinding of outcome assessors; loss to follow-up and comparability of treatment groups at baseline for non-RCT parallel trials only. (Juni et al. 2001; Khan et al. 2001)

Qualitative studies

Appropriateness and replicability of methods; appropriateness and replicability of analysis; original evidence (including negative cases) reported; and triangulation of findings (Khan et al. 2001).

(an approach involving the exploration of unpatterned multi-sensory experiences in an atmosphere of trust and relaxation) (Baker *et al*., 1998; Baker *et al*., 2003). These studies also had similar designs and outcome measures, so their results were pooled in a meta-analysis using a fixed effect model and mean difference methods. A third study, which also evaluated multi-sensory environment (McNamara and Kempenaar, 2001), was not included in the meta-analysis as it reported no participants showing wandering behaviour. Other included studies differed substantially in their interventions and measures of wandering so their results were not pooled in a formal meta-analysis. Nevertheless the results of individual studies (Groene, 1993; Swanson *et al*., 1993; Frisoni *et al*., 1998; Ballard *et al*., 2002; Landi *et al*., 2004; Woods *et al*., 2005), which reported the standard deviations of the effects of interventions, are presented in a forest plot, where the treatment effect in each study is standardised by dividing by the overall standard deviation in the study (Deeks *et al*., 2001). These should be interpreted with caution since, despite standardisation, the treatment effect may not be comparable between studies, as the underlying constructs measured may differ and the variance of the measures may be influenced by extraneous factors. The results of studies which did not report standard deviations could not be presented graphically (Mitchell, 1993; Ingersoll-Dayton *et al*., 1999). The quality of evidence regarding each type of intervention was graded using the Guideline Recommendation and Evidence Grading (GREG) Scheme (Mason and Eccles, 2003).

Acceptability. The relevant papers were coded thematically as 'original transcripts' (May *et al*., 2004). Initially two papers were coded in detail by members of the project team (DH, TF, JH, LC, LR), who then met to develop the initial coding frame and discuss discrepancies. The coding frame was piloted on two further papers and refined. The remaining papers were coded following this refined frame using the Non-numeric Unstructured Data Index Searching and Theorising (NUD*IST) software programme for the organisation and comparison of qualitative data.

This study was approved by Newcastle and North Tyneside REC and adhered to research governance procedures.

RESULTS

Box 3 summarises the flow of studies through the review.

Effectiveness review

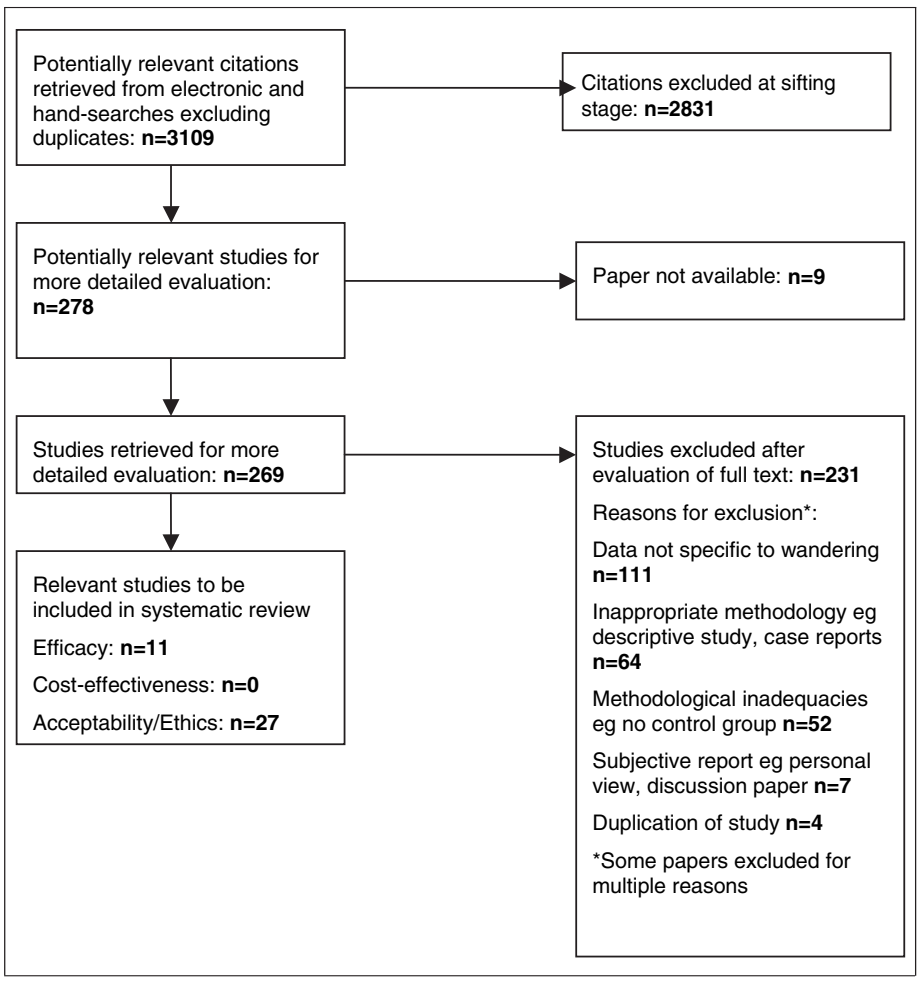
We found no studies determining cost effectiveness which met our inclusion criteria.

Characteristics of included studies for clinical effectiveness (see Table 1).

Eleven studies, enrolling 549 participants, met the review inclusion criteria (Groene, 1993; Mitchell, 1993; Swanson *et al*., 1993; Baker *et al*., 1998; Frisoni *et al*., 1998; Ingersoll-Dayton *et al*., 1999; McNamara and Kempenaar, 2001; Ballard *et al*., 2002; Baker *et al*., 2003; Landi *et al*., 2004; Woods *et al*., 2005), including eight randomised controlled trails (Groene,

DOI: 10.1002/gps

Box 3 Flow chart demonstrating study selection process



1993; Mitchell, 1993; Baker *et al*., 1998; McNamara and Kempenaar, 2001; Ballard *et al*., 2002; Baker *et al*., 2003; Landi *et al*., 2004; Woods *et al*., 2005) (see Table 1). Studies compared a variety of interventions. Nine studies reported mean age (overall mean 79 years, range 54–98) (Groene, 1993; Swanson *et al*., 1993; Baker *et al*., 1998; Frisoni *et al*., 1998; McNamara and Kempenaar, 2001; Ballard *et al*., 2002; Baker *et al*., 2003; Landi *et al*., 2004; Woods *et al*., 2005). Eight studies reported gender [37% were male (Groene, 1993; Swanson *et al*., 1993; Baker *et al*., 1998; Frisoni *et al*., 1998; McNamara and Kempenaar, 2001; Ballard *et al*., 2002; Landi *et al*., 2004; Woods *et al*., 2005)]. Only four studies reported ethnicity and in these all the participants were reported as 'Caucasian' (Swanson *et al*., 1993; Ingersoll-Dayton *et al*., 1999; Landi *et al*., 2004;Woods *et al*., 2005). The median duration of follow-up was six weeks ranging from three days (Woods *et al*., 2005) to one year (McNamara and Kempenaar, 2001).

Quality of included studies (see Table 1)

Reporting of studies was generally poor and so the quality of the conduct of the studies was uncertain. Concealment of allocation could be confirmed as adequate in only two of the eleven studies (18%) (Baker *et al*., 1998; Woods *et al*., 2005). Six studies

DOI: 10.1002/gps

Table 1. Characteristics of included trials

Trial	No. of participants enrolled	Population -Setting -Mean age in years (range) -Type/severity of dementia	Study design	Treatment (No. of participants completing)	Comparison (No. of participants completing)	Frequency of intervention	Duration of follow-up	Quality markers: Randomisation	Concealment of allocation	Binding of outcome assessor	Loss to follow-up	Baseline comparability for non RCTs	Outcome	Grade of Evidence~
Multi-sensory environment														Low
Baker *et al.*, 1998	50	UK, Day centres 78(?$^{+}$) 33 AD*, 7 VD*, 10 mixed	RCT, parallel	Multi-sensory environment (n = 22)	One-to-one activity sessions (content not described) (n = 25)	8 × 30 minutes/month	2 mth	Y	Y	N	6%		INTERACT	
Baker *et al.*, 2003	136	UK, day hospitals. Netherlands, psycho-geriatric ward. 82 (?) AD, VD and mixed (number not specified) MMSE 0–17	RCT, parallel	Multi-sensory environment (n = 55)	Activity sessions (playing cards, doing quizzes, looking at photographs) (n = 62)	4×2 sessions/week	4 wks	Y	N	N	14%		INTERACT	
McNamara and Kempenaar, 2001	12	UK, nursing homes 89 (79–98) 5 VD, 3 mixed, 1 Lewy Body-mild/moderate dementia	RCT, crossover	Multi-sensory stimulation (visual equipment, music, hand massage) (n=not reported)	Tactile stimulation (hand massage only) (n = not reported)	2 × 30 minutes/week	6 wks	?*	N	N	8%		INTERACT	
Therapeutic touch														Intermediate
Woods *et al.*, 2005	57	USA, special care units in long term care facilities 82 (67–93) AD (DSM-IV criteria), MMSE<20	RCT, parallel	Therapeutic touch (n = 19)	Placebo therapeutic touch (n = 19) Usual care (n = 19)	5–7 minutes twice a day for 3 days	3 days post-treatment	Y	Y	Y	0%		Aberrant Behavior Rating Scale (ABRS)	

Music therapy															Low
Groene *et al.*, 1993	30	USA, nursing homes 77.5 (60–91) Primary degenerative dementia Level 6/7 on GDS scale[1]	RCT, parallel	Individual music sessions (listening to music, playing percussion, singing) (n = not reported)	Individual reading sessions (reading by participant or being read to) (n = not reported)	1×15 minutes/day (5 total)	7days	?	N	?	Sitting/proximity times				
Exercise															Low
Landi *et al.*, 2004	30	Italy, nursing homes 81 (?) AD and other dementia Cognitive Performance scale—35% moderate cognitive impairment	RCT, parallel	Exercise programme (moderate intensity—combination of aerobic/endurance activities and strength, balance and flexibility training) (n = 15)	Usual care (n = 15)		4wks	?	N	?	Minimum Data Set-Nursing Homes (MDS-NH)				
Special care unit															Low
Frisoni *et al.*, 1998	66	Italy, nursing homes 81 (59–97) 44 AD, 13 VD, 11 mixed MMSE <16	Non-RCT, parallel	Special care unit (no detailed description provided) (n = 31)	Traditional nursing home (n = 35)	—	3mth	N	N	0%	Y	Aberrant Moto Behaviour subscale of Neuropsychiatric Inventory (NPI)			
Swanson *et al.*, 1993	63	USA, nursing homes 72.5 (34–93) 63 AD Stage 4–6 GDS[1]	Non-RCT, parallel	Special care unit (reduced stimuli environment) (n = 13)	Traditional unit—not defined (n = 9)	—	<12mth	N	N	65%	Y	No. of episodes of wandering			
Aromatherapy															Low
Ballard *et al.*, 2002	72	UK, nursing homes 78.5 (?) Type not specified Clinical Dementia Rating Scale Stage 3	Cluster RCT, parallel	Aromatheray with Melissa essential oil (lemon balm to face and arms) (n = 35)	Sunflower oil (n = 36)	$2 \times$ daily	4 wks	Y	?	Y	1%	Aberrant Motor Behaviour subscale of Neuropsychiatric Inventory (NPI)			
Mitchell, 1993	12	UK, residential and day care units • ? (64–91) Type	RCT, crossover	Essential oils (lemon balm and lavender) (n = not reported)	Control oils (n = not reported)	$3 \times$ daily	2 wks	?	?	Y	?	Satisfaction rating for wandering			
Individual behaviour management															Low

(*Continues*)

DOI: 10.1002/gps

Table 1. (Continued)

Trial	No. of participants enrolled Population-Setting -Mean age in years (range) -Type/severity of dementia	Study design	Treatment (No. of participants completing)	Comparison (No. of participants completing)	Frequency of intervention	Duration of follow-up	Quality markers: Randomisation Concealment of allocation Binding of outcome assessor Loss to follow-up Baseline comparability for non RCTs				Outcome	Grade of Evidence~
								N	N	?		
Ingersoll-Dayton *et al.*, 1999	21 USA, nursing homes ? (60–?) Type	Non-RCT, crossover	Behaviour management programme (using solution focused approach) (n = not reported)	Comparison not reported (n = not reported)	—	7 wks		N	?	?	? Caretaker Obstreperous-Behaviour Rating Assessment Scale	

AD = Alzheimer's disease; VD = vascular dementia; †GDS = Global Deterioration Scale; ? = data not available; ~ = GREG Scale used.

reported the number of participants assigned to treatment and control groups (Swanson *et al*., 1993; Baker *et al*., 1998; Frisoni *et al*., 1998; Ballard *et al*., 2002; Baker *et al*., 2003; Woods *et al*., 2005). Where this was not reported, we assumed that randomisation resulted in approximately equal sized groups (Groene, 1993; Mitchell, 1993; Ingersoll-Dayton *et al*., 1999; McNamara and Kempenaar, 2001; Landi *et al*., 2004). Blinding of the outcome assessors was confirmed in only three studies (27%) (Mitchell, 1993; Ballard *et al*., 2002; Woods *et al*., 2005). Among the eight RCTs, randomisation could be confirmed as adequate in only four (50%) (Baker *et al*., 1998; Ballard *et al*., 2002; Baker *et al*., 2003; Woods *et al*., 2005). Following requests for additional information from authors, this was forthcoming for only one study (Ballard *et al*., 2002).

Outcomes

The primary outcome measures. Eight studies used behavioural scales which included measures of wandering, restlessness or pacing (Baker *et al*., 1998; Frisoni *et al*., 1998; Ingersoll-Dayton *et al*., 1999; McNamara and Kempenaar, 2001; Ballard *et al*., 2002; Baker *et al*., 2003; Landi *et al*., 2004; Woods *et al*., 2005) for example INTERACT and INTERACT SHORT (Baker *et al*., 1998; McNamara and Kempenaar, 2001; Baker *et al*., 2003). None of the studies reported any of the pre-specified secondary outcome measures (see Box 1).

Evidence synthesis

The pooled effect of the two multi-sensory environment studies (Baker *et al*., 1998; Baker *et al*., 2003), which provided information on wandering/restlessness, was a statistically non-significant reduction of 0.03 [95% Confidence Intervals (CI): −0.12–0.18] in the INTERACT scores during sessions and a statistically significant reduction of 0.22 (95% CI: 0.02–0.41) in the INTERACT scores during the 10 min after intervention (see Figure 1).

The forest plot (see Figure 2) suggested that exercise therapy (Landi *et al*., 2004) may be effective in reducing wandering. However as the standard deviation of the scores for wandering in each treatment group were not reported and were therefore imputed from reported *p*-values, the 95% CI on the estimated treatment effect should be interpreted with caution. Participants who received therapeutic touch showed significantly less pacing than those who received a placebo intervention or usual care, but little

DOI: 10.1002/gps

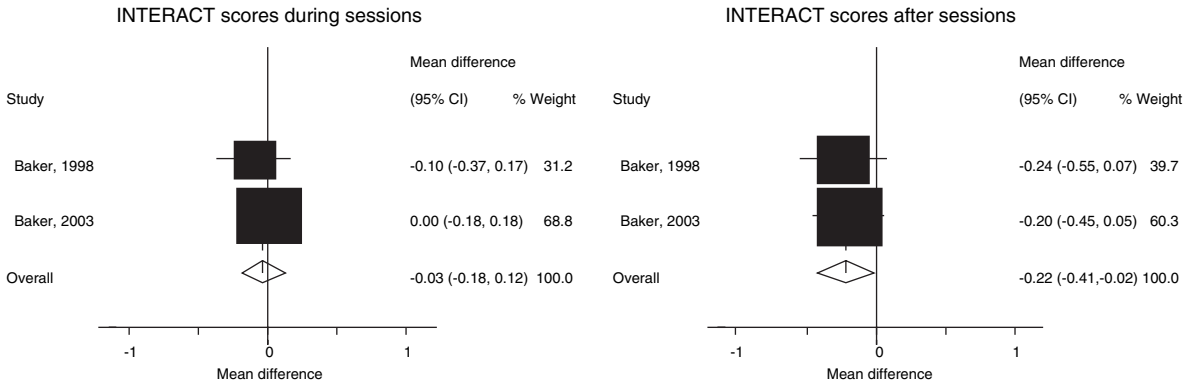


Figure 1. Meta-analysis of studies of multi-sensory environments (Baker *et al*., 1998; Baker *et al*., 2003)

difference on the other two outcomes measured: searching/wandering and escape restraints (Woods *et al*., 2005). One study found patients receiving essential oils showed significantly less wandering behaviour than those receiving control oils (Ballard *et al*., 2002), but this finding was of marginal statistical significance ($p = 0.05$) and was based on an approximate allowance for clustering of patients within nursing homes (Donner and Klar, 2000). The other study of essential oils found they had no effect on wandering compared to control oils (Mitchell, 1993). Other studies showed no significant net reduction in wandering in the treatment group except one (Swanson *et al*., 1993), but this may have been because participants who wandered more were differentially assigned to the treatment group. Two studies (Mitchell, 1993; Ingersoll-Dayton *et al*., 1999;) did not report the standard deviation of the

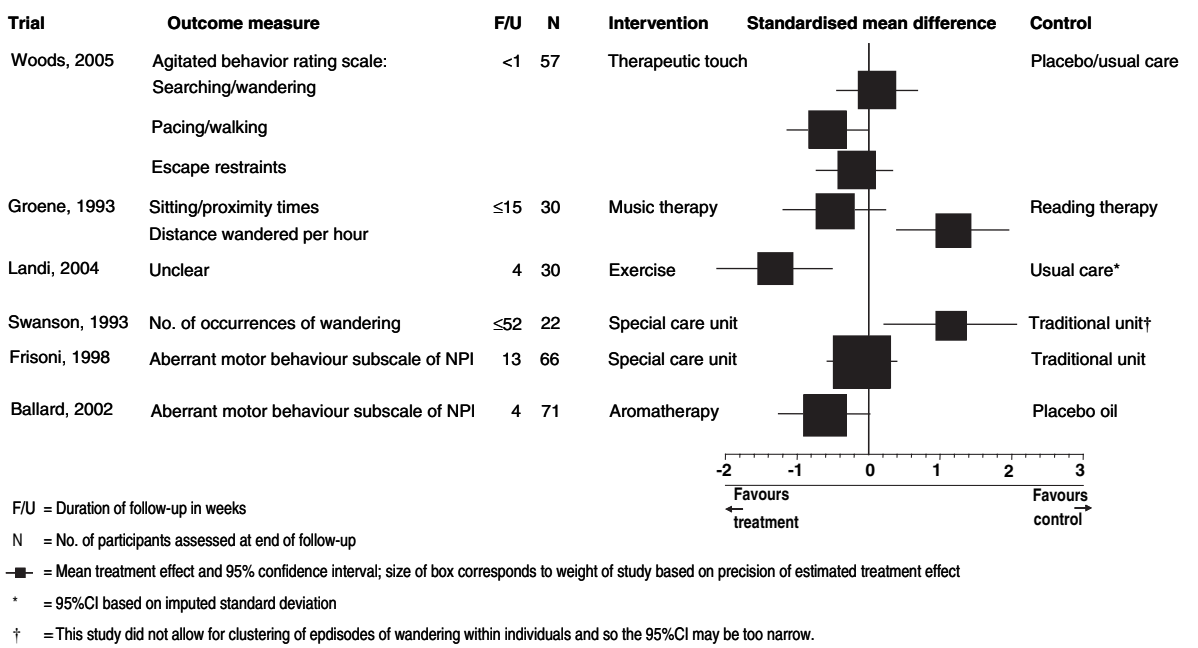


Figure 2. Forest plot of studies which reported standard deviations of the intervention effects

DOI: 10.1002/gps

effect of treatment and so could not be presented graphically. The grade of evidence for therapeutic touch was judged to be intermediate; for all other types of intervention it was judged to be low (see Table 1).

Effectiveness of interventions included in the review

We found no high quality evidence for the effectiveness of any of the included interventions. There was some evidence for the effectiveness of exercise therapy but as this was provided by only one study of low quality and not confirmed by independent trials, the evidence should be regarded as of low quality. Neither of two of the studies evaluating multi-sensory environments (Baker *et al*., 1998; Baker *et al*., 2003) showed a significant effect in reducing wandering. When their results were pooled, participants receiving the therapy showed significantly less restlessness than the control group immediately after sessions. However, the practical importance of such a small, short-term change is doubtful.

Acceptability of non-pharmacological interventions to prevent wandering

Characteristics of included papers. Twenty-seven papers were included (Rosswurm *et al*., 1986; Blackburn, 1988; Gaze, 1989; Marr, 1989; Moss and La Puma, 1991; Smith-Jones and Francis, 1992; Coleman, 1993; Dodds, 1994; Mapp, 1994; McShane *et al*., 1994; *The Lancet* (Anon.), 1994; Richter *et al*., 1995; Cantes and Rigby, 1997; Holmberg, 1997; Dawkins, 1998; Kilstoff and Chenoweth, 1998; McShane *et al*., 1998; Melillo and Futrell, 1998; Nicolle, 1998; Thompson, 1998; Morgan and Stewart, 1999; Wilber and Machemer, 1999; Altus *et al*., 2000; Hughes and Louw, 2002; Welsh *et al*., 2003; Kinney *et al*., 2004; Miskelly, 2004). Electronic tagging and tracking devices were most commonly discussed (Gaze, 1989; Marr, 1989; Moss and La Puma, 1991; Smith-Jones and Francis, 1992; Mapp, 1994; *The Lancet*, 1994; Cantes and Rigby, 1997; Dawkins, 1998; McShane *et al*., 1998; Altus *et al*., 2000; Hughes and Louw, 2002; Welsh *et al*., 2003; Kinney *et al*., 2004; Miskelly, 2004) None of the papers reported directly the views of people with dementia. The majority of the papers on ethical issues were discussion papers, mostly opinion-based, with little empirical evidence cited to support the arguments presented. The papers discussing acceptability issues were based on findings from non-controlled research or pilot studies (e.g. before and after studies, qualitative studies or surveys), mostly using small convenience samples.

Acceptable interventions

Walking/exercise groups (Rosswurm *et al*., 1986; Smith-Jones and Francis, 1992; Holmberg, 1997), music groups (Smith-Jones and Francis, 1992), and distraction therapies such as diverting people with meaningful and safe activities, e.g. housework (Dodds, 1994), were perceived by carers to be the most acceptable approaches. Other carer strategies such as validation, reminiscence (McShane *et al*., 1998) and reassurance (Dodds, 1994; Richter *et al*., 1995) were regarded as helpful. Establishing personal histories was essential for professional carers to determine appropriate interventions (Richter *et al*., 1995).

Acceptable interventions with some limitations

Electronic devices (Blackburn, 1988; McShane *et al*., 1998; Melillo and Futrell, 1998; Nicolle, 1998; Thompson, 1998; Altus *et al*., 2000; Miskelly, 2004), environmental modifications or designs (Rosswurm *et al*., 1986; Richter *et al*., 1995; Cantes and Rigby, 1997) and massage/touch (Kilstoff and Chenoweth, 1998) were generally perceived by carers to be acceptable. For electronic devices, reservations included technical (Altus *et al*., 2000; Kinney *et al*., 2004) and practical difficulties (McShane *et al*., 1998), including patients removing the device (Blackburn, 1988; Altus *et al*., 2000) increased demand on carers' time (Cantes and Rigby, 1997) and cost (Welsh *et al*., 2003). Such devices did not abolish risk (Mapp, 1994; McShane *et al*., 1998; Nicolle, 1998) but often gave peace of mind to informal carers (McShane *et al*., 1998; Welsh *et al*., 2003; Kinney *et al*., 2004). Some environmental designs such as low density units, 'defined as fewer residents per area per person' (Morgan and Stewart, 1999), and the position of doors within a building, were found to encourage exit-seeking and increase restlessness. Although generally well received, massage (Cantes and Rigby, 1997; Kilstoff and Chenoweth, 1998) and multi-sensory environment (Baker *et al*., 1998; Baker *et al*., 2003) could increase agitation. The use of locked doors reduced lay carer anxiety (Wilber and Machemer, 1999) but generated fire risk concerns (Dodds, 1994).

DOI: 10.1002/gps

Table 2. Summary of the effectiveness and acceptability/ethical issues for non-pharmacological interventions to reduce wandering in dementia

Intervention	Effectiveness	Acceptability	Ethical issues
Walking/exercise	Significant reduction in wandering with exercise in one study, of low quality	Acceptable	No ethical issues reported
Music therapy	No evidence for effectiveness	Very acceptable	No ethical issues reported
Multi-sensory environment	Some evidence of effectiveness from pooling of results from two studies, of low quality	Acceptable	No ethical issues reported
Massage/touch	Significant reduction in pacing, but not wandering, in one study	Acceptable	No ethical issues reported
Special care unit	No evidence for effectiveness	No data	No ethical issues reported
Aromatherapy	Significant reduction in wandering in one study	No data	No ethical issues reported
Electronic devices	No relevant studies included	Acceptable	Considerable discussion of ethical issues
Physical barriers	No relevant studies included	Acceptable	Some ethical issues
Environmental modifications	No relevant studies included	Acceptable	Some ethical issues
Behavioural techniques			
Reality orientation			
Collusion	No relevant studies included	Unacceptable	Some ethical issues
Physical restraints	No relevant studies included	Unacceptable	Considerable discussion of ethical issues

Unacceptable interventions

The use of physical restraints (Moss and La Puma, 1991; Coleman, 1993; Cantes and Rigby, 1997; Dawkins, 1998), reality orientation (Dodds, 1994; Richter *et al*., 1995; Cantes and Rigby, 1997) and collusion (Dodds, 1994; Cantes and Rigby, 1997) were considered unacceptable strategies. The many negative psychological and physical effects of restraints were cited, they were considered useful as a temporary measure to safeguard residents (Moss and La Puma, 1991; Coleman, 1993; Cantes and Rigby, 1997; Dawkins, 1998).

Ethical issues exist with tagging and tracking devices (Blackburn, 1988; Gaze, 1989; Marr, 1989; Mapp, 1994; McShane *et al*., 1994; *The Lancet*, 1994; McShane *et al*., 1998; Melillo and Futrell, 1998; Nicolle, 1998; Thompson, 1998; Altus *et al*., 2000; Hughes and Louw, 2002; Welsh *et al*., 2003; Miskelly, 2004), physical barriers (Wilber and Machemer, 1999), restraints (Moss and La Puma, 1991; Coleman, 1993; Dawkins, 1998), environmental modifications (Morgan and Stewart, 1999) and carer strategies (Rosswurm *et al*., 1986; Smith-Jones and Francis, 1992; Dodds, 1994; Richter *et al*., 1995; Cantes and Rigby, 1997). These included tensions between the principles of beneficence (the duty to do good) and non-maleficence (the duty to do no harm), and between ensuring safety and the individual's right to autonomy. The risk of harm both to patients and to other residents should be balanced (Moss and La Puma, 1991; Coleman, 1993; McShane *et al*., 1994; Dawkins, 1998; Wilber and Machemer, 1999). The tension between the use of surveillance and a person's right to privacy was discussed (McShane *et al*., 1994; Hughes and Louw, 2002; Welsh *et al*., 2003). Electronic devices may increase the stigma attached to people with dementia because of the association of tagging in the criminal justice system (Marr, 1989).

Table 2 summarises the conclusions of both the effectiveness and acceptability data from the review.

DISCUSSION

There is currently no adequate, robust evidence from controlled trials to recommend the use of any non-pharmacological intervention to reduce wandering in dementia. From both a practical and moral perspective, acceptable interventions included walking/exercise and music therapy. Physical restraints were deemed unacceptable. Considerable ethical concerns still exist regarding the use of electronic tagging and tracking devices. Theoretically concerns also exist with the use of physical barriers, but practically, 'locked doors' now appear to be an acceptable aspect for ensuring a safe society in general, and not specific to dementia care. It is disappointing to note that the views of people with dementia towards the acceptability of the interventions could not be determined

DOI: 10.1002/gps

from the narrative review as the literature included only carers' views and proxy reports.

This systematic review brought together both quantitative (effectiveness) and qualitative (acceptability) data. However there is no consensus regarding the formal synthesis of such data within a systematic review (Dixon-Woods *et al*., 2004; Thomas *et al*., 2004). We selected an approach that was felt best to meet the study objectives and allow integration of both datasets (Dixon-Woods *et al*., 2004; Thomas *et al*., 2004). However, limitations to the study exist. The quality of the effectiveness studies was poor with limited methodological reporting. Additional data from authors, that may have been useful, could only be obtained for one study. The papers considered for acceptability generally reported original research such as qualitative studies, pilot projects and surveys but the majority of papers reviewed for consideration of ethical issues were opinion-based discussion papers.

There is no single definition of wandering; it encompasses a range of diverse behaviours (Hope and Fairburn, 1990; Hope *et al*., 1994; Algase, 1999) which are often subsumed within the term agitation or agitated behaviour. Such diversity led to difficulties in the effectiveness review in identifying clearly the specific behaviour under study and the exclusion of potentially relevant studies where 'agitated behaviour' was the outcome measure (Baillon *et al*., 2004). Acknowledgement that wandering encompasses a range of behaviours, which occur for a variety of reasons, should be mirrored in the management approach. A range of interventions, that can be tailored to individual need, the specific behaviour in question and the underlying reasons for it is required. The use of a systematic review to address such diversity within a management approach may not have been the most appropriate methodology to use, being largely inclusive of RCTs. The exclusion criteria relating to the types of studies included in a systematic review meant that new and potentially useful interventions, which have only been tested in a single case or observational studies, are excluded (Cohen-Mansfield and Werner, 1998; Cohen-Mansfield *et al*., 2000).

Recently 'wandering' has been replaced by the term 'walking' with respect to dementia care. Increasing recognition that wandering may be beneficial for people with dementia (Heim, 1986; Cohen-Mansfield and Werner, 1998) and that an individually tailored management approach is required addressing the specific behaviour and underlying reasons for it, will facilitate a more person-centred approach in this area of dementia care. There is a need to determine accurately both the benefits and risks of walking/wandering for people with dementia and to ascertain specifically the impact of such behaviour on costs of care. None of the studies included in the review included data on secondary outcomes measures such as the physical and emotional wellbeing of both patients and carers.

KEY POINTS

- There is currently no adequate, robust evidence to recommend the use of any non-pharmacological intervention to reduce wandering in dementia.
- Previous research on the acceptability of such interventions has neglected users' views. It is important to establish the views of people with dementia on the acceptability of new interventions prior to evaluating their effectiveness through complex and expensive trials.
- Wandering represents a diverse range of behaviours which occur for different reasons. This individuality and diversity should be mirrored in the management approach ie what may be effective for one person in one situation is not effective for all.

In conclusion, high quality studies are required to determine the clinical and cost-effectiveness of interventions, that are considered practically and morally acceptable to people with dementia and their carers, to promote safe walking. Such studies, however, should acknowledge the diversity of behaviours under study and not assume that what may be effective for one person in one situation is effective for all. Establishing the views of people with dementia is particularly relevant as the rapid progress in assistive technology allows for the development of more sensitive and practical electronic devices. Research into users' views on the acceptability and feasibility of such interventions should precede evaluation of their effectiveness in complex and expensive randomised controlled trials (Medical Research Council, 2000).

ACKNOWLEDGEMENTS

This study was commissioned and funded by the NHS Health Technology and Assessment Programme (Grant No. 03/16/04). The authors would like to acknowledge the considerable help from the project

DOI: 10.1002/gps

advisory panel: Professor Martin Eccles, Professor Ian McKeith, Ms Lorna McKenzie and Ms Joanne Mears. The authors would also like to thank our external experts for their screening role in systematic review: Professor Jiska Cohen-Mansfield, Ms Jan Dewing, Dr Frank Miskelly and Ms Susan Slaughter. We are indebted to Professor Clive Ballard for proving additional data, to Professor Carl May for his comments made on the manuscript and to Mrs Linda Duckworth for secretarial expertise. The views and opinions expressed are those of the authors and do not necessarily reflect those of the Department of Health.

REFERENCES

Algase DL. 1999. Wandering. A dementia-compromised behavior. *J Gerontol Nurs* **25**(9): 10–16.

Altus DE, Mathews RM, Xaverius PK, *et al*. 2000. Evaluating an electronic monitoring system for people who wander. *Am J Alz Dis* **15**(2): 121–125.

Baillon S, van Diepen E, Prettyman R, *et al*. 2004. A comparison of the effects of Snoezelen and reminiscence therapy on the agitated behaviour of patients with dementia. *Int J Geriatr Psych* **19**: 1047–1052.

Baker R, Bell S, Assey J, *et al*. 1998. *A Randomised Control Trial of the Snoezelen Multi-Sensory Environment for Patients with Dementia*. Dorset Healthcare NHS Trust: Bournemouth.

Baker R, Dowling Z. 1995. *INTERACT: A New Measure of Response to Multi-Sensory Environments [Research Publication]*. Research and Development Support Unit, Institute of Health and Community Studies, Bournemouth University: Bournemouth.

Baker R, Holloway J, Holtkamp CCM, *et al*. 2003. Effects of multi-sensory stimulation for people with dementia. *J Adv Nurs* **43**(5): 465–477.

Balestreri L, Grossberg A, Grossberg GT. 2000. Behavioural and psychological symptoms of dementia as a risk factor for nursing home placement. *Int Psychoger* **12**: 59–62.

Ballard CG, Mohan RNC, Bannister C, *et al*. 1991. Wandering in dementia sufferers. *Int J Geriatr Psych* **6**(8): 611–614.

Ballard CG, O'Brien J. 1999. Treating behavioural and psychological signs in Alzheimer's disease: the evidence for current pharmacological treatments is not strong. *Brit Med J* **319**: 138–139.

Ballard C, O'Brien J, James I, Swann A. 2001. *Dementia: Management of Behavioural and Psychological Symptoms*. Oxford University Press: Oxford.

Ballard CG, O'Brien JT, Reichelt K, Perry EK. 2002. Aromatherapy as a safe and effective treatment for the management of agitation in severe dementia: the results of a double-blind, placebo-controlled trial with Melissa. *J Clin Psychiat* **63**(7): 553–558.

Blackburn P. 1988. Freedom to wander. *Nurs Times* **84**(49): 54–55.

Cantes S, Rigby P. 1997. Freedom to wander safely. *Eld Care* **9**(4): 8–10.

Cohen-Mansfield J. 1986. Agitated behaviors in the elderly. II. Preliminary results in the cognitively deteriorated. *J Am Geriatr Soc* **34**(10): 722–727.

Cohen-Mansfield J, Garfinkel D, Lipson S. 2000. Melatonin for treatment of sundowning in elderly persons with dementia: a preliminary study. *Arch Gerontol Geriat* **31**: 65–76.

Cohen-Mansfield J, Marx MS, Werner P. 1992a. Agitation in elderly persons: an integrative report of findings in a nursing home. *Int Psychoger* **4**(Suppl 2): 221–240.

Cohen-Mansfield J, Werner P. 1998. The effects of an enhanced environment on nursing home residents who pace. *Gerontologist* **38**(2): 199–208.

Cohen-Mansfield J, Werner P, Marx MS. 1991. Two studies of pacing in the nursing home. *J Gerontol Nurs: Med Sci* **46**(3): M77–M83.

Cohen-Mansfield J, Werner P, Marx MS. 1992b. The social environment of the agitated nursng home resident. *Int J Geriatr Psych* **7**: 789–798.

Coleman EA. 1993. Physical restraint use in nursing home patients with dementia. *J Am Med Ass* **270**(17): 2114–2115.

Coltharp WJ, Richie MF, Kaas MJ. 1996. Wandering. *J Gerontol Nurs* **22**: 5–10.

Cummings JL, Mega M, Gray K, *et al*. 1994. The Neuropsychiatric Inventory: comprehensive assessment of psychopathology in dementia. *Neurology* **44**: 2308–2314.

Dawkins VH. 1998. Restraints and the elderly with mental illness: ethical issues and moral reasoning. *J Psych Nurs* **36**(10): 22–27.

Deeks JJ, Altman DG, Bradburn MJ. 2001. Statistical methods for examining heterogeneity and combining results from several studies in meta-analysis. In *Systematic Reviews in Health Care: Meta-Analysis in Context*. BMJ Publishing Group: London; 285–312.

Dixon-Woods M, Agarwal S, Young B, *et al*. 2004. *Integrative Approaches to Qualitative and Quantitative Evidence*. NHS Health Development Agency: London.

Dodds P. 1994. Wandering: A short report on coping strategies adopted by informal carers. *Int J Geriatr Psych* **9**(9): 751–756.

Donner A, Klar N. 2000. *Design and Analysis of Cluster Randomization Trials in Health Research*. Arnold: London.

Frisoni GB, Gozzetti A, Bignamini V, *et al*. 1998. Special care units for dementia in nursing homes: a controlled study of effectiveness. *Arch Gerontol Geriat* **27**(Suppl 6): 215–224.

Gaze H. 1989. An invisible leash? *Nurs Times* **85**(25): 22–23.

Groene RW. 1993. Effectiveness of music therapy 1:1 intervention with individuals having senile dementia of the Alzheimer's type. *J Music Ther* **30**(3): 138–157.

Gustafson L, Lindgren M, Westling B. 1985. The OBS scale: A new rating scale for evaluation of confusional states and other organic brain syndromes. Paper presented at the 2nd International Congress on Psychogeriatric Medicine, Umeå, Sweden.

Heim KM. 1986. Wandering behaviour. *J Gerontol Nurs* **12**: 4–7.

Holmberg SK. 1997. A walking program for wanderers: volunteer training and development of an evening walker's group. *Geriatr Nurs* **18**(4): 160–165.

Hope RA, Fairburn CG. 1990. The nature of wandering in dementia: a community-based study. *Int J Geriatr Psych* **5**(4): 239–245.

Hope T, Tilling KM, Gedling K, *et al*. 1994. The structure of wandering in dementia. *Int J Geriatr Psych* **9**(2): 149–155.

Howard R, Ballard C, O'Brien J, Burns A, on behalf of the UK and Ireland Group for Optimization of Management in Dementia. 2001. Guidelines for the management of agitation in dementia. *Int J Geriatr Psych* **16**(7): 714–717.

Hughes JC. 2002. Ethics and the psychiatry of old age. In *Psychiatry in the Elderly*. Jacoby R, Oppenheimer C (eds). Oxford University Press: Oxford; 863–895.

Hughes JC, Louw SJ. 2002. Electronic tagging of people with dementia who wander: ethical considerations are possibly more important than practical benefits. *Br Med J* **325**(7369): 847–848.

Ingersoll-Dayton B, Schroepfer T, Pryce J. 1999. The effectiveness of a solution-focused approach for problem behaviors among nursing home residents. *J Gerontol Soc Work* **32**(3): 49–64.

Juni P, Altman DG, Egger M. 2001. Assessing the quality of randomised controlled trials. In *Systematic Reviews in Health Care: Meta-Analysis in Context*. Egger M, Davey-Smith G, Altman DG (eds). BMJ Books: London; 87–108.

Khan KS, ter Riet G, Glanville J, Sowden AJ, Kleijnen J. 2001. *Undertaking systematic reviews of research on effectiveness: CRD's guidance for carryingout or commissioning reviews.* Report no. 4. 2nd ed. NHS Centre for Reviews and Dissemination: University of York, York, UK.

Kilstoff K, Chenoweth L. 1998. New approaches to health and well-being for dementia day-care clients, family carers and day-care staff. *Int J Nurs Pract* **4**(2): 70–83.

Kinney JM, Kart CS, Murdoch LD, Conley CJ. 2004. Striving to provide safety assistance for families of elders. *Dementia* **3**(3): 351–370.

Landi F, Russo A, Bernabei R. 2004. Physical activity and behavior in the elderly: a pilot study. *Arch Gerontol Geriat* **Suppl 9**: 235–241.

Mapp S. 1994. Breaking bounds. *Comm Care* **2**: 24.

Marr J. 1989. Electronic tagging. *Nurs Stand* **4**(9): 54.

Martino-Saltzman D, Blasch BB, McNeal-Boyette L. 1991. Travel behavior of nursing home residents perceived as wanderers and non wanderers. *Gerontologist* **31**(5): 666–672.

Mason J, Eccles M. 2003. *Guideline Recommendation and Evidence Grading (GREG): A New Grading Method for Clinical Guideline Development Groups. Report 109*. Centre for Health Services Research, University of Newcastle upon Tyne: Newcastle upon Tyne.

May C, Allison G, Chapple A, *et al*. 2004. Framing the doctor-patient relationship in chronic illness: a comparative study of general practioners' accounts. *Sociol Health Ill* **26**(2): 135–158.

McNamara C, Kempenaar L. 2001. *A Pilot Study for Comparison of Specific Sensory Stimulation with Multi Sensory Stimulation with People with Dementia in a Community Setting*. Ayreshire & Arran Primary Care NHS Trust: Ayr.

McShane R, Gedling K, Kenward B, *et al*. 1998. The feasibility of electronic tracking devices in dementia: a telephone survey and case series. *Int J Geriatr Psych* **13**: 556–563.

McShane R, Hope T, Wilkinson J. 1994. Tracking patients who wander: ethics and technology. *Lancet* **343**(8908): 1274.

Medical Research Council. 2000. *A Framework for the Development and Evaluation of RCTs for Complex Interventions to Improve Health*. Medical Research Council: London.

Melillo KD, Futrell M. 1998. Wandering and technology devices: helping caregivers ensure the safety of confused older adults. *J Gerontol Nurs* **24**: 32–38.

Miskelly F. 2004. A novel system of electronic tagging in patients with dementia and wandering. *Age Ageing* **33**: 304–306.

Mitchell S. 1993. Aromatherapy's effectiveness in disorders associated with dementia. *Int J Aromath* **5**(2): 20–23.

Morgan DG, Stewart NJ. 1999. The physical environment of special care units: needs of residents with dementia from the perspective of staff and family caregivers. *Qual Health Res* **9**(1): 105–118.

Moss RJ, La Puma J. 1991. The ethics of mechanical restraints. *Hastings Centre Report January/February*: 22–25.

Nicolle C. 1998. Issues in the use of tagging for people who wander: a European perspective. Proceedings of the Conference Working with Vulnerable Adults: Innovative Practice and Technology in Risk Management, Belfast: 10–22.

O'Connor DW, Pollitt PA, Roth M, *et al*. 1990. Problems reported by relatives in a community study of dementia. *Brit J Psychiat* **156**: 835–841.

Phillips VL, Diwan S. 2003. The incremental effect of dementia-related problem behaviours on the time to nursing home placement in poor, frail, demented older people. *J Am Geriatr Soc* **51**(2): 188–193.

Price JD, Hermans DG, Grimley Evans J. 2004. Subjective barriers to prevent wandering of cognitively impaired people (Cochrane Review). In *The Cochrane Library*. John Wiley & Sons Ltd: Chichester.

Richter JM, Roberto KA, Bottenberg DJ. 1995. Communicating with persons with Alzheimer's disease: experiences of family and formal caregivers. *Arch Psychiat Nurs* **9**(5): 279–285.

Rosswurm MA, Zimmerman SL, Schwartz-Fulton J, Norman GA. 1986. Can we manage wandering behavior? *J Long-Term Care Adm* **14**(3): 5–8.

Smith-Jones SM, Francis GM. 1992. Disruptive, institutionalized elderly: a cost-effective intervention. *J Psych Nurs* **30**(10): 17–20.

Snyder LH, Rupprecht P, Pyrek J, *et al*. 1978. Wandering. *Gerontologist* **18**(3): 272–280.

Stokes G. 1986. *Common Problems with the Elderly Confused: Wandering*. Winslow Press: London.

Swanson EA, Mass ML, Buckwalter KC. 1993. Catastrophic reactions and other behaviors of Alzheimer's residents: special unit compared with traditional units. *Arch Psychiat Nurs* **7**: 292–299.

The Lancet. (ANON) 1994. Wondering about the wanderers. *Lancet* **343**(8908): 1237–1238.

Thomas J, Harden A, Oakley A, *et al*. 2004. Integrating qualitative research with trials in systematic reviews. *Br Med J* **328**: 1010–1012.

Thompson M. 1998. How 'bracelets' can open doors. *Care Plan September*: 21–23.

Verstraten PFJ. 1988. The GIP: an observational ward behavior scale. *Psychopharmacol Bull* **24**(4): 717–719.

Welsh S, Hassiotis A, O'Mahoney G, Deahl M. 2003. Big brother is watching you—the ethical implications of electronic surveillance measures in the elderly with dementia and in adults with learning difficulties. *Aging Ment Health* **7**(5): 372–375.

Wilber KH, Machemer J. 1999. Balancing the competing values of freedom and safety in long-term dementia care: the Secured Perimeter Program. *J Ethics, Law Aging* **5**(2): 121–130.

Woods DL, Craven RF, Whitney J. 2005. The effect of therapeutic touch on behavioral symptoms of persons with dementia. *Alternative Therapies in Health & Medicine* **11**(1): 66–74.

DOI: 10.1002/gps