A Systematic Overview of Interventions to Reduce Physical Restraint Use in Long-Term Care Settings

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Abstract

Purpose

(1) The purpose of this systematic integrative review was to summarize the empirical evidence regarding the effectiveness of interventions or programs to reduce physical restraint use in long-term care facilities.

Conclusions

(2) Research findings indicate that physical restraint reduction programs which included an educational component, restraint removal, and interventions individualized to residents' specific needs were successful in decreasing restraint use. There were no significant negative consequences for residents or staff associated with the implementation of restraint reduction programs or interventions. Educational programs had a positive impact on nurses' knowledge, attitudes, and practices regarding restraint use. Findings, however, must be considered in light of the methodological weaknesses noted in the studies.

Implications

(3) The practice goal of achieving least-restraint or restraint-free long-term care facilities is an appropriate and achievable one. This objective can be facilitated through ongoing mandatory educational programs for staff, individualized assessment and implementation of appropriate interventions for residents, and adequate administrative support. Well-designed research studies investigating the efficacy of specific interventions, cross-cultural issues, and longitudinal outcomes would all contribute to the further development of evidence-based practice regarding restraint use in long-term care facilities.

Statement of the Practice Problem

(4) The use of physical restraints became common practice in long-term care facilities during the latter half of the twentieth century, reaching a peak in the late 1980s (Levine, 1996 [12]; Strumpf & Tomes, 1993 [21]). This practice went largely unquestioned until a movement toward providing more humanistic care and protecting the rights of individuals emerged in the 1980s (Evans & Strumpf, 1989 [8]). There was increasing evidence of an association between restraint use and a wide range of negative physical and psychological outcomes (Evans & Strumpf, 1989 [8]; Marks, 1992 [14]; Miles & Irvine, 1992 [15]; Miles & Meyers, 1994 [16]; Schieb, Protas, & Hasson, 1996 [18]). The federal government in the United States responded to these concerns by including a mandate in the 1987 Omnibus Budget Reconciliation Act (OBRA) to reduce restraint use in long-term care settings (Castle & Mor, 1998 [4]; Ejaz, Folmar, Kaufmann, Rose, & Goldman, 1994 [5]). Following its enactment, interventions and programs to reduce the use of restraints were initiated. A number of studies have since evaluated the outcomes of these interventions and programs. The purpose of this systematic overview was to summarize evidence of the effectiveness of these interventions and programs in reducing restraint use for elderly residents in long-term care facilities.

Summary of Research

General Characteristics of the Studies

(5) All 15 studies included in this overview, except one, were conducted in the United States. These studies took place in nursing homes or extended care facilities. A summary of the interventions evaluated is presented in Table 1. A synopsis of the data extracted from each study is outlined in Table 2. The most frequently utilized interventions to achieve restraint reduction in long-term care facilities were: 1) restraint removal strategies designed to maintain or improve the physical and/or cognitive status of residents; and 2) educational programs designed to change the knowledge, attitudes, and practices of nursing staff. The term nursing staff includes registered nurses (RNs), licensed practical nurses (LPNs), and non-licensed care providers.

(6) Restraint removal and individualized interventions, such as environmental modifications, activity programming, strategic use of equipment, and rehabilitation programs, were usually implemented together (Ejaz, Folmar, et al., 1994 [5]; Ejaz, Jones, & Rose, 1994 [6]; Ejaz, Rose, & Jones, 1996 [7]; Werner, Cohen-

Table 1: Summary of Interventions from Strong and Moderate Studies (n=15)

Intervention	Number of Studies*		
	Strong (n=8)	Moderate (n=7)	Total (n=15)
Educational program for nursing staff	5	5	10
Educational program for residents	0	1	1
Educational program for families	1	1	2
Educational program for administration	0	1	1
Consultation	2	0	2
Implementation of institutional policy	0	1	1
Individualized interventions	2	2	4
Restraint removal	4	2	6
Specialized care unit	2	1	3

* Columns may add to greater than 8, 7, and 15, respectively, as a number of studies utilized more than 1 intervention.

Mansfield, Koroknay, & Braun, 1994a [24]). For a minority of residents (9.5%), restraints were removed without making any other alterations in their care (Werner et al., 1994a [24]). Educational programs for nursing staff varied in length from 1 hour to approximately 20 hours. Some were offered as one or two day workshops, while others were presented as weekly one to two hour sessions spread over several months. Most programs utilized adult learning principles and incorporated a variety of teaching strategies including demonstrations and role playing (Bradley, Siddique, & Dufton, 1995 [1]; Capezuti, 1995 [2]; Ejaz et al., 1996 [7]; Ejaz, Folmar, et al., 1994 [5]; Ejaz, Jones, et al., 1994 [6]; Evans & Strumpf, 1992 [9]; Evans, Strumpf, Allen-Taylor, Capezuti, Maislin, & Jacobsen, 1997 [10]; Sundel, Garrett, & Horn, 1994 [22]; Werner et al., 1994a [24]). Gerontological nurse specialists or staff members most often planned and implemented the restraint reduction programs and/or provided consultation services to staff (Bradley et al., 1995 [1]; Capezuti, 1995 [2]; Ejaz et al., 1996 [7]; Ejaz, Jones, et al., 1994 [6]; Evans & Strumpf, 1992 [9]; Evans et al., 1997 [10]; Kovach & Stearns, 1994 [13]; Rovner, Steele, Shmuely, & Folstein, 1996 [17]; Sloane, Mathew, Scarborough, Desai, Koch, & Tangen, 1991 [19]; Sundel et al., 1994 [22]; Werner, Cohen-Mansfield, Farley, Segal, & Lipson, 1994 [23]; Werner, Cohen-Mansfield, Koroknay, & Braun, 1994b [25]; Werner et al., 1994a [24]). Occasionally, external consultants were employed (Ejaz, Folmar, et al., 1994 [5]; Ejaz, Jones, et al., 1994 [6]).

Frequency of Restraint Use

(7) All but one of the studies in this overview reported the prevalence of restraint use as an outcome. Twelve studies reported a decrease in restraint use following implementation of a restraint reduction program (Bradley et al., 1995 [1]; Capezuti, 1995 [2]; Ejaz et al., 1996 [7]; Ejaz, Folmar, et al., 1994 [5]; Ejaz, Jones, et al., 1994 [6]; Evans et al., 1997 [10]; Rovner et al., 1996 [17]; Sloane et al., 1991 [19]; Stratmann, Vinson, Magee, & Hardin, 1997 [20]; Sundel et al., 1994 [22]; Werner et al., 1994 [23]; Werner et al., 1994b [25]).

(8) In a large clinical trial (Evans et al., 1997 [10]) and in a secondary analysis of a subset of the participants in the trial (Capezuti, 1995 [2]), there was a significant reduction in restraint use following an educational program and weekly consultation with a gerontological clinical nurse specialist. Findings were supported by Ejaz, Jones, and colleagues (1994 [6]). In their sample of restrained residents, 85% were totally unrestrained following the restraint reduction program. Restraints were successfully removed from Werner and associates' (1994 [23]) entire sample of residents, 70% of whom had a diagnosis of dementia. In another study, Werner and colleagues (1994b [25]) reported that restraints were successfully removed from 61.3% of their sample. Bradley and associates (1995 [1]) reported that restraint use decreased significantly in two nursing homes which received 10, one-hour educational sessions, but they found no significant change in restraint use at two other nursing homes

which received only a single, two-hour educational session. Stratmann and colleagues (1997 [20]) also found that restraint use in two extended care units and two nursing home units decreased over a three-year period. Sundel and colleagues (1994 [22]) reported that restraint use (which included the use of bedrails) decreased significantly over a 14 month period. Following a restraint reduction program, restraint use, as measured by physician orders for restraints on residents' charts, decreased in two studies conducted by Ejaz and colleagues (Ejaz, Folmar, et al., 1994 [5]; Ejaz, Jones, et al., 1994 [6]). Rovner and colleagues (1996 [17]) reported that residents in a dementia care program were three times less likely to be restrained than those in the control group. Similarly, Sloane and associates (1991 [19]) found that restraint use was significantly lower for residents in dementia units compared to those in traditional units.

(9) Conversely, two studies found no significant change in restraint use following restraint reduction programs. Kovach and Stearns (1994 [13]) did not find any change in restraint use for 22 residents in a dementia care unit. It is possible, though, that restraint use had already been reduced prior to the study's initiation since a restraint reduction program had been implemented six months earlier. Evans and Strumpf (1992 [9]) found only a negligible decrease in overall restraint use in a pilot study of one unit in a nursing home. They did, however, note that the pattern of restraint use changed following the educational program. Vest restraints were replaced by less restrictive alternatives.

Physical and Cognitive Status of Residents

(10) In total, ten studies examined residents' physical status. Generally, physical status was measured using behavioral symptoms, incidence of injuries and falls, or functional status. Werner and colleagues (1994b [25]) found that residents' level of agitation decreased significantly in terms of aggressive, verbally agitating, and physically non-aggressive behaviors. Likewise, Bradley and colleagues (1995 [1]) reported a general decline in resident aggression and violent behavior. Kovach and Stearns (1994 [13]) also found an improvement in behavioral symptoms, and Evans and Strumpf (1992 [9]) noted that staff rated residents as less behaviorally disturbed following an educational program. Similarly, Rovner and colleagues (1996 [17]) found that behavioral disorders decreased more in the experimental group (100% to 28.6%) than in the control group (100% to 51.3%). Although the difference was clinically significant, statistical significance was not reported. The researchers speculated that the decrease in behavioral disorders in the control group may have been, in part, a result of the staff members' awareness of the ongoing study. Alternatively, this finding may have been influenced by the fact that more staff were available to participants in the control group while the experimental group attended the activity program.

(11) In Capezuti's (1995 [2]) analysis of data from three nursing homes, restraint removal was associated with significantly fewer falls. In Evans and associates' study (1997 [10]), the rate of falls was lower for participants in both experimental groups (education only or education plus consultation) compared to those in the control group. Similarly, Bradley and colleagues (1995 [1]) reported a decrease in the number of falls, as well as injuries, for their study participants. In contrast, two studies reported no change in the number of falls after a restraint reduction program (Evans & Strumpf, 1992 [9]; Werner et al., 1994b [25]), while two other studies reported an increase in the overall number of falls (Ejaz, Folmar, et al., 1994 [5]; Ejaz, Jones, et al., 1994 [6]). While the number of non-serious falls increased in one of these studies, the number of serious (i.e., injury-related) falls did not change (Ejaz, Jones, et al., 1994 [6]). Although the second study reported a small increase in the number of serious falls (4 to 7), the significance of the increase was not reported (Ejaz, Folmar, et al., 1994 [5]). Stratmann and colleagues (1997 [20]) noted that the percentage of individuals who were restrained at the time of a fall decreased from 28% to 7% following implementation of a new policy on restraint use.

(12) Rovner and colleagues reported that residents' functional status remained relatively constant over time (1996 [17]). This finding was supported by Evans and Strumpf (1992 [9]). They found no significant difference in residents' functional status following the intervention. Similarly, Werner and others (1994b [25]) did not find any difference in residents' ability to perform activities of daily living or in their frequency of urinary incontinence after physical restraints were removed.

(13) Rovner and colleagues (1996 [17]) found that residents in the experimental group had increased levels of cognitive functioning compared to the control group following the intervention. Evans and Strumpf (1992 [9]), however, did not find any significant change in residents' cognitive status or in their symptoms of depression in their pilot study. They did note that nursing staff perceived residents as less oriented following the intervention.

Knowledge and Attitudes of Nursing Staff

(14) Four studies assessed nursing staffs' knowledge about restraint use following an educational program. Several studies noted a significant change. Following the educational program, nursing staff in Ejaz and colleagues' study (1996 [7]) viewed restraint use as significantly less acceptable. Nurses had more knowledge about alternatives to restraints and about the effects of restraints on residents (Bradley et al., 1995 [1]; Sundel et al., 1994 [22]). Evans and Strumpf (1992 [9]), however, reported that nursing staff actually identified fewer alternatives to restraints following the educational program in their pilot study.

(15) Six studies assessed nursing staffs' attitudes concerning restraint use, morale, stress, and burnout. Three studies noted a reduction in the perceived importance of restraint use with increased exposure to educational sessions (Bradley et al., 1995 [1]; Evans & Strumpf, 1992 [9]; Werner et al., 1994a [24]). Sundel and colleagues (1994 [22]) asked nursing staff to rate their level of agreement with a series of statements assessing attitudes toward restraint use. Agreement with 7 of 10 statements about the practice of restraint use changed in the expected (positive) direction; there was no change in responses to the remaining three statements. In contrast, other researchers reported that there was no change in nursing staffs' perceptions about restraints (Ejaz et al., 1996 [7]; Stratmann et al., 1997 [20]). In one of these studies the intervention was of a relatively low intensity, since it only included implementing an institutional policy restricting restraint use (Stratmann et al., 1997 [20]).

(16) Three studies examined the emotional impact of restraint removal on nursing staff. Werner and colleagues (1994a [24]) found a significant decrease in the nursing staff's level of stress, while Bradley and colleagues (1995 [1]) found no significant change in morale. Evans and Strumpf (1992 [9]) did not find any change in nursing staffs' perceptions of burnout following an educational program in their pilot study.

Knowledge and Attitudes of Family Members and Residents

(17) Ejaz and colleagues (1996 [7]) examined residents' and family members' knowledge and attitudes about restraint use. They found that family members viewed the use of restraints as significantly less acceptable over time. Overall, however, family members agreed with significantly more reasons for using restraints than nursing staff. Family members' perceptions of the benefits of restraint reduction did not change following an information session and a discussion of individualized care plans. Interestingly, relatives of residents who had been previously restrained perceived fewer benefits to unrestraining their relatives than did family members of residents who had never been restrained. Family members' attitudes were also affected by their relatives' physical status and ability to carry out activities of daily living.

Health Care Utilization

(18) Eight studies examined outcomes related to health care utilization such as nursing staffing patterns, hospitalization rates, cost of supplies, and chemical restraint use. Evans and colleagues (1997 [10]) did not find any significant change in the average number of nursing staff hours per resident after implementing a restraint reduction program. Similarly, Ejaz, Folmar, and colleagues (1994 [5]) found that the average number of nursing staff hours per resident remained constant. Rovner and colleagues (1996 [17]) did not find any difference in hospitalization rates between the control and experimental groups. In addition, they found no change in the average monthly cost per resident during the six-month course of their study. Moreover, Stratmann and others (1997 [20]) found that the cost of purchasing restraint supplies decreased after implementing a restraint reduction program.

(19) Chemical restraint use following implementation of a restraint reduction program decreased in three studies, remained constant in two studies, and increased negligibly in one study. Rovner and colleagues (1996 [17]) found that subjects in the control group were twice as likely to be receiving antipsychotic drugs as those in the experimental group. Werner and colleagues (1994 [23]) found that psychotropic drug use decreased significantly in the experimental group. In another study, Werner and colleagues (1994b [25]) found that the number of residents receiving antipsychotic medication also decreased significantly for the residents who were formerly restrained. In Evans and colleagues' (1997 [10]) study of three nursing homes, the proportion of residents who were taking psychoactive drugs remained the same over time. Sloane and colleagues (1991 [19]) did not find any significant difference in the rate of psychoactive drug use between residents in dementia care units and those in traditional units. On the other hand, Kovach and Stearns (1994 [13]) reported a minimal increase in chemical restraint use following the intervention.

Practice Implications

(20) The evidence suggests that physical restraint reduction programs are effective in reducing restraint use with elderly residents in long-term care settings. The findings, however, need to be considered in light of the methodological limitations of the studies reviewed. Few studies exercised adequate control through either rigorous designs or statistical analysis. Consequently, it is not possible to determine with a high degree of certainty whether or not outcomes were directly related to the intervention or program.

Outcomes of Educational Interventions

(21) Most restraint removal programs in this review included an educational component for nursing staff. Despite relatively poor attendance at the educational sessions at most facilities, a number of studies reported positive changes in nursing staffs' knowledge, attitudes, and behaviors. Restraint use decreased in 9 of the 10 studies which utilized an educational approach, a finding which is clinically significant. The available evidence supports the conclusion that mandatory educational programs may have a positive impact on nursing staffs' knowledge, attitudes, and practices. Educational programs should include information concerning: 1) the negative outcomes of restraints on the physical and psychological status of long-term care residents; 2) techniques to assess residents' need for restraints; and 3) appropriate individualized interventions. Findings support the need for a comprehensive educational program that is ongoing. Those that incorporated adult learning principles and received administrative support were more effective in decreasing restraint use than those that did not.

(22) Only two restraint reduction programs included an educational component for family members (Ejaz, Folmar, et al., 1994 [5]; Ejaz et al., 1996 [7]). Interestingly, family members, especially those with relatives who had been previously restrained, generally had more favorable attitudes toward the use of restraints and perceived fewer benefits of restraint-free care. It is possible that family members had misconceptions about the efficacy of restraints. They may have believed that restraint use was necessary for safety reasons. Although it was reported on one occasion that an educational program for residents was provided, its impact on residents' knowledge or attitudes was not described. Further development of ongoing educational programs for family members and residents is clearly warranted.

Outcomes of Restraint Removal and Individualized Care

(23) Restraint removal and individualized care were usually implemented concurrently. Various interventions such as environmental modifications, activity programming, strategic use of equipment, and rehabilitation programs were used in place of restraints. A key component in removing restraints successfully

was an individualized assessment and implementation plan for each resident. These findings suggest that interventions must be tailored to residents' individual needs. In most restraint reduction programs, gerontological clinical nurse specialists, external consultants, or on-site restraint teams provided guidance to nursing staff about the process of restraint removal and individualized interventions, particularly for residents with complex or multiple problems. Evans and colleagues (1997 [10]) provided the most conclusive evidence for the effectiveness of a consultative role in a restraint reduction program. They demonstrated that a nursing educational program combined with weekly consultation was more effective in reducing restraint use than an educational program alone.

(24) Impact on residents' physical and cognitive status. Preventing injuries is the reason most often reported for using restraints with elderly residents (Evans & Strumpf, 1989 [8]; Marks, 1992 [14]; Stratmann et al., 1997 [20]). In the studies included in this overview, however, a decrease in the prevalence of restraint use was not accompanied by a significant increase in the number of serious injuries or serious falls. Several studies, in fact, noted a decrease in the incidence of falls. Another reason commonly reported for using restraints is to protect medical devices such as intravenous lines, catheters, or nasogastric tubes (Evans & Strumpf, 1989 [8]; Marks, 1992 [14]). There were, however, no studies that addressed this issue or even documented the percentage of residents who had such medical devices in place.

(25) Following restraint removal, residents' physical and cognitive status either improved or stayed the same in most studies. Only one study examined the frequency of urinary incontinence before and after restraint removal, an interesting omission given the prevalence of this problem in residents in long-term care. Furthermore, no studies investigated residents' quality of life or family members' perceptions of changes in their relatives' mood, behavior, or general quality of life following restraint removal. Concerns that the use of chemical restraints may increase when physical restraints are removed were not substantiated. In five of the six studies which examined psychotropic drug use following restraint reduction, drug use either stayed the same or decreased. These findings suggest that restraints can be safely removed from most residents provided there is adequate individualized assessment, planning, and implementation of appropriate interventions.

(26) Impact on health care utilization. Of considerable interest to administrators and health policy makers is the impact of restraint reduction programs on health care utilization. Although not a major focus in the studies reviewed, no changes in staffing patterns, number of nursing staff hours per resident, or hospitalization rates were found in the few studies examining these outcomes. However, in a recent survey of 15,074 American nursing homes, Castle and Fogel (1998 [3]) found that restraint-free facilities had more RN full time equivalents per resident, lower LPN full time equivalents per resident, and lower nurse aide full time equivalents per resident compared to facilities that were not restraint free. This factor may affect overall staffing costs. In addition, the actual cost of mounting a restraint reduction program, particularly one which utilizes external consultants, may add to the cost of care. Unfortunately, these costs were not reported in any study.

Implications for Policy

(27) In the United States, the enactment of OBRA was a significant driving force in decreasing the use of restraints in long-term care settings. In Canada, no similar national policy exists and restraint use remains an issue for health care providers (Bradley et al., 1995 [1]; Godkin, Onyskiw, & England, 1997 [11]). It was evident in many of the studies reviewed that OBRA acted as a stimulus which led facilities to develop institutional policies and implement programs to decrease physical restraint use. The findings of this overview, disseminated through presentations and a final report, are being used to develop evidence-based policy on restraint use in several regional health authorities in Alberta, Canada.

(28) Administrative support at the institutional level was integral to the success of restraint reduction programs. Administrative support was manifested through paid time for staff to attend inservice education, attendance and participation by administrators and leadership at such inservices, and implementation of facility least-restraint or restraint-free policies.

Research Needed

(29) One of the main difficulties encountered in conducting this overview was the ambiguity associated with the measurement of physical restraint use. This was due, in part, to the variety of restraining devices used (i.e., geri-chairs, mitts, vests, ankle or wrist ties, seat belts or ties, bedrails), inconsistent use of the terms "positioning," "safety device," and "restraint," differing methods of measuring restraint usage (i.e., chart review, observations, physician orders), varying definitions of restraints and restraint use, and inconsistent or absent documentation of restraint use. Explicit definitions of restraints and detailed information about measurement protocols would facilitate interpreting study results and comparing across studies.

(30) Similarly, more detailed descriptions of the interventions or programs would be helpful. Unfortunately, most studies did not provide sufficient detail about the educational programs or individualized interventions to clearly evaluate overall effectiveness. Detailed information needs to be provided about specific teaching methods, content of educational programs, types of environmental modifications, and components of activity programs in order to compare outcomes and inform practice. Since these details were not sufficiently clear, the relative impact of specific interventions remains unknown. As a result, it was not possible to identify specifically which components of multi-faceted programs had the greatest impact on outcomes or which interventions would be appropriate for residents with specific characteristics or behaviors.

(31) Few studies adequately controlled for confounding variables. Although it may not be ethically possible to conduct randomized clinical trials of restraint reduction programs, before/after designs could be strengthened by using control or comparison groups with similar demographic characteristics and

Table 2: Summary of Data Extracted from Studies Rated as Strong or Moderate (n=15)

Study	Design/Sample	Intervention/ Intervenor	Outcomes
Bradley, Siddique, & Dufton (1995) [1] Rating: moderate	**Design:** before/after; same subjects **Sample:** n=345 residents in 4 sites n=349 nursing staff in 4 sites	staff education program by clinical nurse specialist (program varied in length at each site)	**Restraint Use**: Decreased significantly but only in sites receiving longer program ($p<.001$). **Physical and Cognitive Status of Residents**: Decreased incidence of falls and a general decline in aggression (SNR). **Knowledge and Attitudes of Nursing Staff**: Increased significantly only for staff in sites receiving longer programs ($p<.05$). Staff in sites receiving longer programs perceived restraint use as less efficacious measured using the Perception of Restraint Use Questionnaire (PRUQ).
Capezuti (1995) [2] Rating: strong	**Design**: quasi-experimental **Sample**: n=126 residents in 3 sites	staff education program and consultation by clinical nurse specialist at one site; staff education program only at 1 site; control group at 1 site	**Restraint Use**: Decreased significantly (32% to 14%) for the group receiving both the education program and consultation. **Physical and Cognitive Status of Residents**: Fall risk lowered, but not significantly. Survival analysis demonstrated that the site which averaged an 11% reduction in restraint use had a 50% higher rate of falls ($p<.01$) and twice the rate of fall-related minor injuries ($p<.001$) compared to the sites with 23% and 56% restraint reduction.
Ejaz, Folmar, Kaufmann,Rose, & Goldman (1994) [5] Rating: moderate	**Design**: before/after; same subjects **Sample**: n=144 residents in 2 sites n=131 all staff in 2 sites	education program for staff and families, restraint removal, and individualized care by consulting firm	**Restraint Use**: Decreased as measured by physician orders, nurses' reports, and observation (SNR). **Physical and Cognitive Status of Residents:** Non-serious falls increased significantly ($p<.05$); the number of serious falls increased from 4 to 7 (SNR). **Health Care Utilization**: Mean number of nursing hours per patient remained constant.
Ejaz, Jones, & Rose, (1994) [6] Rating: strong	**Design**: before/after; same subjects **Sample**: n=295 residents in 7 sites (111 in control group)	staff education program, restraint removal, and individualized care alternatives by consulting firm in 2 sites: by staff in 5 sites	**Restraint Use**: At T1, 100% of subjects were restrained; at T2, 85% were totally unrestrained, 11% partially unrestrained, and 4% were restrained (SNR). **Physical and Cognitive Status of Residents**: Total mean weekly falls increased from 1.87% to 3.01% for experimental group; remained constant in control group. Number of falls resulting in serious injury did not significantly increase.

Table 2 continued on next page...

Table 2 (cont): Summary of Data Extracted from Studies Rated as Strong or Moderate (n=15)

Study	Design/Sample	Intervention/ Intervenor	Outcomes
Ejaz, Rose, & Jones (1996) [7] Rating: strong	**Design**: before/after; same subjects **Sample**: n=161 nursing staff n=153 family members	family education program, staff education program, restraint removal, and individualized care alternatives by clinical nurse specialist and restraint reduction task force	**Restraint Use**: Decreased number of physician orders for restraints (p<.001). Significant decrease in prevalence of restraint use (p<.001). **Knowledge and Attitudes of Nursing Staff**: Restraints viewed as less acceptable (p<.01). Those with prior exposure to restraint reduction programs cited fewer reasons for using restraints (p<.01). Perception of benefits of restraint removal did not change (SNR). **Knowledge and Attitudes of Family Members**: Restraints viewed as less acceptable (p<.01). Those with prior exposure to restraint reduction programs cited fewer reasons for using restraints (p<.01). Families agreed with a greater number of reasons for using restraints than nursing staff (p<.01). Family members of previously restrained residents saw fewer benefits of not restraining their relative than family members of never-restrained residents. Family attitudes differed according to their relative's health status.
Evans & Strumpf, (1992) (see also: Strumpf, Evans, Wagner, & Patterson 1992) [9] Rating: moderate	**Design**: before/after; same subjects **Sample**: n=79 residents n=33 all staff	staff education program by clinical nurse specialist	**Restraint Use**: Restraint use was 52.6% at T1 (pre-intervention), 53.6% at T2 (immediately post-intervention) and 47.3% at T3 (3 months post-intervention) (SNR). Types of restraint varied across time (fewer vests, more geri-chairs) (SNR). Pattern of restraint use changed from around the clock to only when residents were out of bed (SNR). **Physical and Cognitive Status of Residents**: No serious injuries reported in time period preceding and following intervention. No difference in overall functional status as measured by the Psychogeriatric Dependency Rating Scale. No change in scores on the Mini-Mental State Exam or Cornell Scale for Depression. **Knowledge and Attitudes of Nursing Staff:** Staff identified fewer interventions (SNR). Staff perceived restraint use as less efficacious as measured by PRUQ (p<.05). No change in scores on Maslach Burnout Inventory.
Evans, Strumpf, Allen-Taylor, Capezuti, Maislin, & Jacobsen, (1997) [10] Rating: strong	**Design**: quasi-experimental **Sample**: n=463 residents in 3 sites n=269 nursing staff in 3 sites	staff education program and consultation by clinical nurse specialist at 1 site; staff education program only at 1 site; control group at 1 site	**Restraint Use**: Decreased significantly for the group receiving both an education program and consultation from 32% to 14%. **Physical and Cognitive Status of Residents**: Fall rates were 64.7% for control group, 41.5% for education group, 42.5% for education/consultation group (SNR). Serious falls were 2.2% for control group, 5.3% for education group, and 0% for education/consultation group (p<.05). **Health Care Utilization**: Average number of nursing staff hours per resident per day did not change significantly. Psychoactive drug use remained constant.

Table 2 continued on next page...

Table 2 (cont): Summary of Data Extracted from Studies Rated as Strong or Moderate (n=15)

Study	Design/Sample	Intervention/ Intervenor	Outcomes
Kovach & Stearns, (1994) [13] Rating: moderate	**Design**: before/after; same subjects **Sample**: n=22 residents with dementia	residence in a specialized dementia care unit by a multi-disciplinary team	**Restraint Use**: Minimal difference in use of physical restraints (SNR). **Physical and Cognitive Status of Residents**: Resident behavior as measured by BEHAVE-AD improved ($p<.001$). No change in global rating of symptoms. **Health Care Utilization**: Minimal increase in use of chemical restraints (SNR).
Rovner, Steele, Shmuely, & Folstein (1996) [17] Rating: strong	**Design**: before/after; randomized subjects **Sample**: n=81 residents (39 in control group)	AGE Dementia Care Program by psychiatrist and day program staff	**Restraint Use**: During activities, decreased from 40.5% to 31.1% in experimental group and increased from 43.6% to 47.2% in control group; while on nursing unit, decreased from 40.5% to 34.1% in experimental group and increased from 43.6% to 52.6% in control group (SNR). Control group three times as likely to be restrained during activity and twice as likely to be restrained on nursing unit. **Physical and Cognitive Status of Residents:** Behavior disorders decreased from 100% to 28.6% for experimental group; 100% to 51.3% for control group (SNR). Functional status remained constant. No significant change in cognitive status. **Health Care Utilization**: No significant difference in hospitalization rates between the control and the experimental group. No change in average monthly cost per patient. Control group twice as likely to receive antipsychotics.
Sloane, Mathew, Scarborough, Desai, Koch, & Tangen (1991) [19] Rating: strong	**Design**: case-control **Sample**: n=625 residents in 63 units (318 in 32 traditional units in control group)	residence in dementia care unit with care provided by staff	**Restraint Use**: In dementia units, 18.1%; in traditional units, 51.6% ($p<.001$). Residents in traditional units were 4 times as likely to be restrained. **Health Care Utilization**: Chemical restraint use did not differ between dementia care and traditional units.
Stratmann, Vinson, Magee, & Hardin (1997) [20] Rating: moderate	**Design**: before/after; different subjects **Sample**: n=172 (T1) n=168 (T2) residents in 4 units (2 nursing home/2 extended care) n=71 nursing staff	implementation of new restraint policy by site administration	**Restraint Use**: Decreased from 25% to 14% (SNR). Time in restraints/resident increased from 16.7 to 19.5 hours (SNR). Types of restraints used did not differ (SNR). Documentation of reason for restraint use increased from 50% to 79% (SNR). **Physical and Cognitive Status of Residents:** Number of falls decreased slightly (SNR). **Knowledge and Attitudes of Nursing Staff**: Reasons for applying restraints did not change (SNR). **Health Care Utilization**: Cost of restraints decreased from $24,000 to $8,000 per year.

Table 2 continued on next page...

Table 2 (cont): Summary of Data Extracted from Studies Rated as Strong or Moderate (n=15)

Study	Design/Sample	Intervention/ Intervenor	Outcomes
Sundel, Garrett, & Horn (1994) [22] Rating: moderate	**Design**: before/after; difference subjects **Sample**: n=252 (T1) n=251 (T2) residents n=182 (T1) n=209 (T2) all staff	staff education program, restraint removal, and individualized care alternatives by onsite advisory committee and project team	**Restraint Use**: Decreased from 67.5% to 36.7% (p<.0001). Mean number of restraints per resident decreased from 1.56 to .67 (p<.0001). **Knowledge and Attitudes of Nursing Staff**: Increased knowledge of effects of restraints and appropriate use of bedrails (p<.01). Attitudes toward restraints changed in the expected direction for 7/10 statements (p<.01) and did not change for 3/10 statements.
Werner, Cohen-Mansfield, Farley, Segal, & Lipson (1994) [23] Rating: strong	**Design**: before/after; same subjects **Sample**: n=115 residents (27 in control group)	restraint removal by facility/staff administration	**Restraint Use**: Restraints were removed from all study participants. **Health Care Utilization**: Psychotropic drug use decreased from 59% to 37% (p<.05).
Werner, Cohen-Mansfield, Koroknay, & Braun, 1994a (see also: Werner, Koroknay, Braun, & Cohen-Mansfield 1994) [24] Rating: moderate	**Design**: before/after; same subjects **Sample**: n=50 nursing staff	staff education program, restraint removal, and individualized care alternatives by clinical nurse specialist	**Knowledge and Attitudes of Nursing Staff**: Restraint use perceived as less efficacious as measured by PRUQ (p<.05). Stress level decreased (p<.01).
Werner, Cohen-Mansfield, Koroknay, & Braun, 1994b [25] Rating: strong	**Design**: before/after; same subjects **Sample**: n=172 residents	staff education program, restraint removal, and individualized care alternatives by clinical nurse specialist	**Restraint Use**: Decreased from 31.2% to 1.6% (SNR). Restraints removed from 61.3% of participants; 32.4% of subjects died before restraints could be removed; 6.3% of residents remained restrained. **Physical and Cognitive Status of Residents:** No significant differences in ADL, incidence of pressure ulcers, or frequency of urinary incontinence. Levels of agitation decreased (p<.01). Ambulation deteriorated for still-restrained residents (p<.01). **Health Care Utilization**: Use of anti-psychotic medication decreased from 34.5% to 19.5% (p<.01).

SNR: Statistical significance not reported
T1: Time 1
T2: Time 2
T3: Time 3

Table 3: Validity Instrument

DESIGN & ALLOCATION:

Is this a prospective study?
- prospective 1
- not prospective 0

How are subjects assigned to groups?
- random assignment 4
- matched 3
- non-equivalent 2
- subjects as own controls 1
- no controls/comparison groups 0

Sub-Total ..... ____

INCLUSION & FOLLOW-UP:

Is sample clearly described?
- yes 2
- somewhat 1
- unclear 0

Is sample likely to be representative of population?
- yes (random selection) 2
- somewhat 1
- unclear 0

Is the same sample followed across time?
- yes 1
- no 0
- unable to assess 0

What is the attrition rate?
- <20% 2
- 21-50% 1
- >50% 0
- not applicable 0

What is the length of time between pre- and first post-intervention measurement?
- <6 months 2
- 6-12 months 1
- >12 months 0
- not applicable 0

What is the total sample size?
- n>100 3
- n=50-100 2
- n=20-49 1
- n<20 0

Sub-Total ..... _____

CONTROL OF CONFOUNDERS:

Is gender controlled for?
- yes, similar (statistically assessed) 3
- yes, similar (by description) 2
- no, not similar (statistically assessed) 1
- unable to assess 0

Is age controlled for?
- yes, similar (statistically assessed) 3
- yes, similar (by description) 2
- no, not similar (statistically assessed) 1
- unable to assess 0

Is physical status controlled for?
- yes, similar (statistically assessed) 3
- yes, similar (by description) 2
- no, not similar (statistically assessed) 1
- unable to assess 0

Is cognitive status controlled for?
- yes, similar (statistically assessed) 3
- yes, similar (by description) 2
- no, not similar (statistically assessed) 1
- unable to assess 0

Is use of psychotropic medications accounted for?
- yes, similar (statistically assessed) 3
- yes, similar (by description) 2
- no, not similar (statistically assessed) 1
- unable to assess 0

Sub-Total ..... _____

DATA COLLECTION:

Is the intervention (independent variable) clearly defined?
- yes 2
- somewhat 1
- no 0

Are outcome measures (dependent variables) clearly defined?
- yes 2
- somewhat 1
- no 0

Is data collection protocol clearly described?
- yes 2
- somewhat 1
- no 0

Is past reliability and validity of measurement tools reported?
- yes 2
- somewhat 1
- no 0

Table 3 continued on next page...

Table 3 (cont): Validity Instrument

Is current reliability reported?
- yes 2
- somewhat 1
- no 0

Sub-Total ..... _____

STATISTICAL ANALYSIS & CONCLUSIONS:

Is the statistical analysis used appropriate?
- yes 2
- somewhat 1
- no 0

Are the conclusions drawn reasonable and supported by the data?
- yes 2
- somewhat 1
- no 0

Sub-Total ..... _____

CALCULATION OF VALIDITY SCORE:

Categories	Sub-Total	Rating
Design & Allocation	_____	_____
Inclusion & Follow-up	_____	_____
Control of Confounders ...	_____	_____
Data Collection	_____	_____
Statistical Analysis & Conclusions	_____	_____
Total	_____	_____

SUBSCALE VALIDITY RATINGS:

Design and Allocation:
- 0-1 ..... Weak
- 2-3 ..... Moderate
- 4-5 ..... Strong

Inclusion and Follow-up
- 0-4 ..... Weak
- 5-7 ..... Moderate
- 8-12 ..... Strong

Control of Confounders
- 0-2 ..... Weak
- 3-5 ..... Moderate
- 6-15 ..... Strong

Data Collection
- 0-4 ..... Weak
- 5-7 ..... Moderate
- 8-10 ..... Strong

Statistical Analysis and Conclusions
- 0-1 ..... Weak
- 2-3 ..... Moderate
- 4 ..... Strong

OVERALL VALIDITY RATING:
- ≥2 weaks ..... Weak
- <2 weaks, <3 strongs ..... Moderate
- ≥3 strongs, 0 weaks ..... Strong

Table 4: Methodological Assessment by Category of Relevant Studies (n=32)

	Validity Rating Number (Percentage)		
Category	**Strong**	**Moderate**	**Weak**
Design and allocation	2 (6.3)	15 (46.9)	15 (46.9)
Inclusion and follow-up	10 (31.3)	14 (43.8)	8 (25.0)
Control of confounders	7 (21.9)	2 (6.3)	23 (71.9)
Data collection	9 (28.1)	12 (37.5)	11 (34.4)
Statistical analysis and conclusions	17 (53.1)	12 (37.5)	3 (9.4)

diagnoses to the experimental group, incorporating repeated measures of outcomes, and/or statistically controlling for potentially confounding variables. These measures would strengthen the study design and increase the validity of the findings.

(32) Further research is needed on the cost-effectiveness of restraint reduction programs and the impact of restraint reduction programs on residents' quality of life. Longitudinal studies are needed which examine the impact of these programs over time. Research which clearly defines program components and outcome variables would contribute to knowledge in this area and would help ensure that the most beneficial and cost-effective interventions are being utilized. Since restraints are less commonly used in the United Kingdom and Scandinavian countries (Castle & Fogel, 1998 [3]; Evans & Strumpf, 1992 [9]), cross-cultural studies of restraint use might yield fruitful information about other effective interventions.

Method

Search Strategies

(33) A comprehensive search for published and unpublished studies was undertaken using the following search strategies. A computer search of online databases (i.e., CINAHL, MEDLINE, HealthSTAR, PsycINFO, and Current Contents), abstracting services (i.e., Cambridge Scientific Abstracts—Health and Safety Sciences and Dissertation Abstracts International), and registries and indexes (i.e., the Cochrane Collaboration, Agency for Health Care Policy and Research, Canadian Research Index, and Government Publication Office Monthly) was conducted for the time period from January 1985 to April 1997. Key words used to identify articles were physical restraint; long-term care, residential care, and/or residential facility; aged; and/or research. In addition, hand searches of pertinent journals (i.e., *Contemporary Longterm Care*, *The Gerontologist*, *Journal of the American Geriatrics Society*, and *Journal of Gerontological Nursing*) were conducted; reference lists of retrieved articles were reviewed; and several key informants were contacted.

(34) A total of 96 articles were identified. All but one article were located and retrieved. Two-thirds of the articles were found through computerized searches and one-third through the other search strategies.

Relevance and Validity Assessment

(35) Three inclusion criteria were used to determine if a study was relevant for the overview. Studies were included if they: 1) evaluated an intervention or program designed to decrease restraint use; 2) provided information on resident, family, and/or staff-focussed outcomes; and 3) were conducted in a residential long-term care facility. The first author assessed all 95 retrieved articles to determine if they met the inclusion criteria. The second author assessed a subset of these articles (47/95). Agreement between reviewers was high (kappa = 0.84). Any discrepancies between reviewers were resolved through discussion. In total, 32 of the 95 articles retrieved met the criteria for inclusion in the overview.

(36) An instrument to evaluate the methodological quality of the studies was developed, pretested, and modified (see Table 3). Since most studies used a before/after design without a control or comparison group, this factor was considered when the validity instrument and overall rating system were developed. The quality of each study was assessed using criteria in five categories: 1) research design and method of subject allocation to study groups; 2) sample size, representativeness of the sample, and rate of attrition; 3) control of potentially confounding variables; 4) methods of data collection; and 5) appropriateness of statistical analyses and conclusions drawn. Each category was rated as weak, moderate, or strong. The overall validity rating was based on the total number of weak, moderate, and strong category scores.

(37) Using this instrument, the first author rated the validity of all 32 relevant studies. The second author independently rated a subset of the studies (24/32). The level of agreement between the two reviewers was high (kappa = 0.80). A consensus approach was used to determine the overall rating when discrepancies arose. Eight studies received a strong rating, 7 studies received a moderate rating, and 17 studies received a weak rating. The most common methodological weaknesses noted in the studies were a failure to control for potentially confounding variables and the absence of control or comparison groups. Table 4 presents a summary of the number and percentage of studies which received a rating of strong, moderate, or weak in each category.

(38) An instrument to extract data was then developed, pretested, and modified. Five outcome categories were identified: frequency of restraint use; physical and cognitive status of residents; knowledge and attitudes of nursing staff; knowledge and attitudes of family members and residents; and health care utilization (see Table 2). Data were extracted in these outcome categories from the 15 studies that received a strong or moderate rating.

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A final report which includes the instruments, relevance and validity scores, and a detailed summary of extracted data from the systematic overview is available by contacting the College of Licensed Practical Nurses at 10604-170 Street, Edmonton, Alberta, T5S 1P3; by phone at (780) 484-8886; or by e-mail at pclpn@compusmart.ab.ca.