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The Effectiveness of a Nursing Staff Education Program in Reducing the Use of Physical Restraints as Measured by Physical Restraint Intensity in Patients Residing in a Long Term Care Facility

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Title: T**he Effectiveness of a Nursing Staff Education Program in Reducing the Use of Physical Restraints as Measured by Physical Restraint Intensity in Patients Residing in a Long Term Care Facility**

Clinical Scenario: The clinical situation that led me to pursue this question was the implementation of an education program for nursing staff to reduce the use of physical restraints (PR) on residents receiving care from a long term care (LTC) setting. PRs have been used in LTC facilities with the intent of providing patient protection. Some common rationales used by nursing staff for PR use include: enhancing poor patient physical functioning, patient behavioral problems, patient restlessness, (Pekkarinen et al, 2006), preventing patient falls and injuries (Shorr et al, 2002; Lane and Harrington, 2011), preventing disruption to therapeutic devices, controlling for patient agitation or patient wandering, providing legal protection to the facility, and providing nursing staff with comfort and reassurance (Lane and Harrington, 2011). However, several studies (Shorr et al, 2002; Lane and Harrington, 2011) have shown PR not only cause patient confusion, agitation, depression, and fear, but have been shown to cause decubiti, falls, loss of muscle strength, incontinence, and strangulation. Research supports the idea that not only does PR not provide patent protection from falls or injuries (Shorr et al, 2002; Capezuti 1995; Oliver 2007), but rather act as the cause of injury (Hantikainen and Kappeli, 2000; Myers et al, 2001) and have even led to patient death (Berzlanovich et al, 2012).

Brief Introduction: As physical therapists (PTs) are considered to be highly educated experts in promoting patient movement, pain reduction, physical function restoration, and preventing disabilities (APTA, 2003), educating LTC staff on the dangers of PRs lies within PT scope of practice. The purpose of this clinical appraised topic is to explore the research concerning whether nursing staff education significantly reduces the use of PR on patients residing in a LTC facility. PR is defined throughout this paper as any device used to involuntarily limit a patient's freedom of movement.

My Clinical Question: Does a nursing staff education program significantly reduce the use of PR on residents living in a LTC facility?

Clinical Question PICO:

Population:	The subjects of interest are adult nursing staff working in LTC facilities more than three months. Nursing staff are defined as registered nurses, care workers, care helpers, care assistants, licensed practical nurses, and nurses' aides.
Intervention:	The intervention consisted of an education program focused on reducing the use of PR in LTC facilities.
Comparison:	The comparison treatment consisted of nursing staff refraining from participating in a PR reduction education program.
Outcome:	Subjective staff knowledge was assessed with PR intensity, types of restraints used, minimum data set (MDS) scale (which included: cognitive performance scale, activities of daily living (ADLs) self-performance, mobility scale, depression rating scale, and social engagement scale), knowledge of legislation, PR and seclusion questionnaire/knowledge scale, job satisfaction scale, general self-efficacy scale, number of patients who fell in one month, and number of patients using pharmaceutical PRs.

Overall Clinical Bottom Line: Based on the results of the outcomes from Huizing et al (2009), nursing staff PR reduction education may not significantly decrease the use of PR on residents living in a LTC facility. However, a significant threat to internal validity (Huizing et al, 2009) was having only 30% of the total nursing staff participated in PR reduction education. Based on the results of the outcomes from Pellfolk et al (2010), nursing staff PR reduction education program may not significantly decrease the use of PR, decrease the occurrence of a fall event, change staff attitudes towards the use of PR, or decrease staff perceived risk of residents' falls. However, there was a significant increase in PR intensity within the control group and between groups suggesting that a lack of PR reduction education may increase the use of PR. Furthermore, residents receiving care from the treatment group (staff receiving PR reduction education) had a decreased likelihood of receiving PR showing that PR reduction education reduced the chances of residents receiving PR by 47%. The studies included participants who were similar to those residents and nursing staff in the LTC facility of interest. Also, the studies were similar between populations, interventions, comparisons, and outcomes measured. Treatment included nursing staff receiving PR reduction education. Controls included nursing staff refraining from participating in PR education. Outcome measures focused on PR intensity, fall event intensity, perceptions of restraints use questionnaire (PRUQ), and fall risk. In both of the studies, nursing staff PR reduction education did not significantly decrease the use of PR on residents living in a LTC facility as compared to within-group pre-treatment scores. All experiments included: randomization, acceptable external validity, fair to good internal validity, and feasible parameters. The primary cost of PR reduction education was time of nursing staff to attend the sessions and other associated costs with preparing and presenting education. From a clinical perspective, the benefits of treatment outweigh the costs.

Search Terms: Restraint, falls, LTC

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Chosen Articles:

Huizing, A. R., Hamers, J., Gulpers, M., & Berger, M. A cluster-randomized trial of an educational intervention to reduce the use of physical restraints with psychogeriatric nursing home residents. *Journal of the American Geriatrics Society,* 2009; *57*(7), 1139-1148.

Kontio R, Lahti M, Pitkanen A, Joffe G, Putkonen H, Hätönen H, Katajisto J, and Välimäki M. Impact of eLearning course on nurses' professional competence in seclusion and restraint practices: A randomized controlled study. *Journal of Psychiatric & Mental Health Nursing,* 2011; *18*(9), 813-821.

Pellfolk, T. J., Gustafson, Y., Bucht, G., & Karlsson, S. Effects of a restraint minimization program on staff knowledge, attitudes, and practice: A cluster randomized trial. *Journal of the American Geriatrics Society,* 2010; *58*(1), 62-69.

Rationale for Chosen Articles: I chose articles that would closely match the population, interventions, and comparisons with those of my clinical question. I selected those articles with outcome measures that assessed objective changes regarding nursing staff knowledge. From the list of articles, which I obtained from the search terms, I selected the abstracts that appeared to have the best research design while focusing on interventions related to nursing staff education programs designed to reduce PR.

As Table 1 presents, the final three articles chosen had populations similar to that of my clinical question, interventions focused educating staff on reducing PR use, comparisons that were focused on within group changes, and outcomes related to objective changes in staff procedures.

Table 1: Comparison of article PICOs

	Huizing et al (2009)	**Kontio et al (2011)**	**Pellfolk et al (2010)**

Population	• 15 Dutch psychogeriatric nursing home wards
	  ◦ 241 residents
	  ▪ 76-90 y/o, M, F
	  ▪ Frequent dx: dementia
	  ▪ Lacked hx of Korsakov's disease
	  ◦ Nursing staff
	  ▪ 27-47 y/o; M, F
		• 12 Finnish acute psychiatric inpatient wards
		  ◦ Practicing closed doors, seclusion, & PR
		  ◦ > 168 residents
		  ▪ Frequent dx: schizophrenia, psychotic mood disorders, drug-related psychoses
		  ◦ 229 nursing staff
		  ▪ 24-64 y/o; M, F
			• 40 Swedish group dwelling units
			  ◦ 353 residents
			  ▪ Frequent dx: dementia
			  ◦ 346 nursing staff
			  ▪ 29-55 y/o; M, F

Intervention	• PR reduction education
	  ◦ PR effectiveness, consequences, decision-making, residents' risk behavior
	• Consulting with RN trained in use & reduction of PR
	• Five, 2-hour educational sessions for 2 months
	• 90 min plenary session
		• PR reduction eLearning
		  ◦ legal, ethical, behavior-related factors, therapeutic relationship, teamwork, knowledge integration
		• 120 hours over 3 months
		• 12 Tutors supervised & gave feedback
			• PR reduction education
			  ◦ Dementia, delirium, falls & fall prevention, use of PR, caring for people with dementia, complications in dementia
			• Six, 30-min videotaped lectures for 6 months

Comparison	• No educational program • Residents received care as usual	• Continuing vocational education not involving PR • 3.5 days over 12 months	• No educational program • Residents received care as usual

Outcome Measures	• PR intensity recorded
	• Types of PR used
	• MDS scale
	  ○ Cognitive Performance
	  ○ ADLs self-performance
	  ○ Mobility
	  ○ Depression Rating
	  ○ Social Engagement
		• Knowledge of legislation
		• PR questionnaire/ knowledge Scale
		• Seclusion questionnaire/ knowledge scale
		• Job satisfaction scale
		• General self-efficacy scale
			• 100-mm visual analogue scale measured subjective staff knowledge on caring for people with dementia
			• PRUQ measured staff attitudes toward PR use
			• MDDAS
			• Scoring of residents' ADL function, behavioral symptoms, and psychiatric symptoms
			• Gottfries cognitive scale
			• 100-mm visual analogue scale measured residents' fall risk.

ADLs: Activities of Daily Living
Dx: Diagnosis
F: Female
Hx: history
LPN: Licensed practical nurse
M: Male
MDDAS: Multi-Dimensional Dementia Assessment Scale
MDS: Minimum Data Set, version 2.1
Min: minutes
PR: Physical restraints
PRUQ: Perceptions of Restraints Use Questionnaire
RN: Registered nurse
y/o: Years old

Table 2 presents the final three articles PEDro scores which are measures of the quality and integrity of each experiment including randomization and blinding.

Table 2: Comparison of PEDro Scores

	Huizing et al (2009)	Kontio et al (2011)	Pellfolk et al (2010)
Random	1	1	1
Concealed allocation	0	1	0
Baseline comparability	0	0	1
Blind Subjects	0	0	0
Blind Therapists	0	0	0
Blind Assessors	1	0	0
Adequate Follow-up	1	1	0
Intention-to-treat	0	0	1
Between Groups	1	1	1
Point Estimates & Variability	1	1	1
Total Score	5/10	5/10	5/10

Based on the above comparisons, I have chosen to write this critically appraised paper on the articles by Huizing et al (2009) and Pellfolk et al (2010). These articles fit my population of interest, closely match the intervention of providing staff education on reducing the use of PR, have comparisons that can focus on within-group changes, and include outcome measures that assess objective changes in staff actions.

Huizing, A. R., Hamers, J., Gulpers, M., & Berger, M. A cluster-randomized trial of an educational intervention to reduce the use of physical restraints with psychogeriatric nursing home residents. *Journal of the American Geriatrics Society,* 2009; *57*(7), 1139-1148.

Clinical Bottom Line: The evidence from this article suggests that a nursing staff education program focused on reducing PR use does not significantly decrease the use of PR. Both groups (treatment and control) had significant increases of PR use during follow-up. The participants in this study were of similar characteristics as residents receiving care in a LTC setting. However, the participants in this study were categorized as residents receiving care (making them passive participants in the treatment), whereas the population of interest was categorized as nursing staff providing care (resulting in them being active participants in the treatment). The treatment group participated in five, 2-hour sessions of PR reduction education over two months while the control group refrained from PR reduction education for the duration of the study. Performance was measured via PR intensity by trained observers. The evidence presents with an unknown effect size as the authors did not provide sufficient data to calculate an effect size. This study was flawed with multiple threats to internal validity including lack of subject and examiner blinding, not following a strict protocol, inaccurate instrumentation, and inadequate statistical power. A significant threat to internal validity was having only a third of the total treatment group actually receiving the treatment which may be sufficient explanation as to why PR reduction education was not found to significantly decrease the use of PR. External validity of this study is fair and does not compromise the ability to generalize results to the LTC setting of interest.

Article PICO

Population: The subjects included 241 male and female residents from fourteen Dutch psychogeriatric nursing home wards between the ages of 74-89 years. Residents were being cared for by nursing staff. Nursing staff was defined as RNs, care workers, care helpers, and care assistants. The most frequent diagnosis of the residents was dementia.

Intervention: The intervention consisted of educational sessions focused on reducing PR. The education program included topics on the effectiveness of PR, the consequences of PR, decision-making processes, and strategies for analyzing and responding to residents' risk behaviors. The education program consisted of a 90 minute plenary session and five, 2-hour sessions delivered over two months and included discussions of real life cases as well as access to a nurse specialist who stimulated nursing staff to use alternatives to PRs.

Comparison: The comparison treatment included the nursing staff refraining from a PR reduction educational program. Residents received care as usual.

Outcomes: Types of restraints were recorded under a specific name (such as belt, bedrail, etc), as being absent or present using percentages, and as the amount of

Outcomes: (continued) restraints being used on a resident (such as having one restraint, two restraints, etc.) and were measured by a trained observer using an observation tool. Resident age, sex, cognitive status, self-performance in ADLs, mobility, depression, and social engagement were measured by the MDS version 2.1.

Blinding: This study included blinded observers who were unaware of experimental and control conditions. However, neither the residents nor the nursing staffs were blinded in this study, which may result in a Hawthorne effect, Rosenthal effect, or rater bias. The nursing staff initially did not receive information about the study's aim and design until after randomization, at which point the experimental group became fully informed; the control group did not receive formal instruction on the study's aim and design. Blinding the residents would not have been difficult in this study. Blinding the nursing staff may have been difficult in this study because the intervention included an education program. The outcome measures for the use of PR were objective and less likely to be affected by the lack of blinding. These threats are also minimized by within-group comparisons that would control for lack of blinding as each person was compared to their own group's performance.

Controls: All participants were residents living in Dutch psychogeriatric nursing home wards whose most prevalent diagnosis was dementia. The control group did not receive any formal education training on PR reduction during the study; residents received care as usual. The treatment group received care from nursing staff that had participated in an educational program focused on reducing PR by teaching topics on the effectiveness of PR, the consequences of PR, decision-making processes, and strategies for analyzing and responding to residents' risk behaviors. The education program consisted of a 90 minute plenary session and five, 2 hour sessions delivered over two months and included discussions of real life cases as well as access to a nurse specialist who stimulated nursing staff to use alternatives to PR. The control group was an appropriate comparison group because the difference between the groups was the presence of an educational program focused on PR reduction. Therefore differences in baseline PR use and follow-up PR use could be attributed to the presence of the educational program.

Randomization: The Dutch psychogeriatric nursing home wards were randomly assigned to either the control group or the education group. The authors did not provide clarifying details on how the randomization process was conducted. However, randomization did seem to be successful since the authors found no statistical differences in baseline measures between resident characteristics. Both groups had similar initial test scores for percentage of restrained residents, restraint intensity, and for the use of multiple restraints.

Study: This study was a cluster-randomized trial in which residents living in Dutch psychogeriatric nursing home wards were screened. The authors did not provide details on the method of participant screening. However, it may be implied that subjects were selected based on a non-probability sampling such as convenience. This study included 371 residents from 14 wards, with a primary diagnosis of dementia, randomly divided by wards into a control group (n = 163) and a treatment group (n = 208). Trained observers, who were blinded to the experimental and control conditions, measured the use of PR on four separate occasions over a 24 hour period. The treatment group received one 90-minute plenary session and five, 2-hour educational sessions focused on reducing PR delivered over a two month period. The education

program included topics on the effectiveness of PR, the consequences of PR, decision-making processes, and strategies for analyzing and responding to residents' risk behaviors. The treatment group also conducted discussions of real life cases and received access to a nurse specialist who stimulated nursing staff to use alternatives to PR. The control group included the nursing staff refraining from an educational program where residents received care as usual.

Although the authors did not specifically state inclusion criteria, the following exclusion criteria were enforced: residents with Korsakov's disease and residents with psychiatric diseases residing in special Korsakov's or psychiatric wards.

Outcome Measures: I am interested in the percentage of residents receiving PR within the control group and within the treatment group because these measures assess the intensity of the PR being used. The percentage of residents that were restrained is a better measure than the numbers of residents that were restrained as an unequal number of subjects in both groups were lost at follow-up (mostly due to mortality). Measures were taken prior to and following the intervention; the authors did not specify how soon after the intervention the observations were made. The authors noted that these measures were reliable, but they did not note if the measures were valid. The authors did not validate the outcome measures with a second independent standard. The authors did not state a minimally clinically important difference (MCID); a MCID was not found with a clinical inquiry database search using the following search terms: minimal, difference, physical restraint, or MCID.

Study Losses: In the treatment group, 39.4% of the treatment residents were lost to the study after the staff received PR education. In the control group, 29.4% of the control residents were lost to the study after the study was complete. Reasons for study losses were due to mortality (94% for the control group and 64% for the treatment group), resident discharge (2% for the control group and 1% for the treatment group), staff dropping out due to a lack of time (35% for the treatment group), and residents not attending a posttest (4% for the control group).

Summary of internal validity: This study had fair internal validity: randomized allocation to groups, a control group, a good study design, adequate statistical power and appropriate statistical testing. Two significant threats to internal validity were identified: lack of subject and examiner blinding and not following a strict protocol as only 30% of the total nursing staff participated in PR reduction education. Accurate and reliable instrumentation was a minor internal threat. A lack of examiner and subject blinding may have caused a Hawthorne effect, Rosenthal effect, or rater bias to occur. Blinding the subjects (residents) in this study would have been feasible, however blinding the nursing staff or observers would have been difficult. The authors did not follow a strict protocol as demonstrated by having only 30% of the total nursing staff from each ward invited to attend PR education. The authors stated that the 30% of the treatment group receiving PR education was selected based on their key role of influencing the remainder of the ward in regards to reducing the use of PR. However, only having a third of the total treatment group actually receiving the treatment may be sufficient explanation as to why PR reduction education was not found to significantly decrease the use of PR.

Although the authors noted that the outcome measure of PR intensity via observation had a good inter-rater reliability score (kappa = 1), the score was attained by comparing one observation event at baseline. Observation reliability may not have been consistent throughout the duration of the study. This study did not use an independent reference standard.

The authors did not state that a power analysis was calculated. However, for a power of 0.8, medium effect size of 0.3, and alpha error probability of 0.05, this study would need a minimum of 82 subjects to participate. This study did exceed the minimum sample size as there were 371 subjects at baseline.

Evidence: I am interested in within-group comparisons, of the before and after intervention, for PR intensity for the control group and the treatment group. The authors stated that there was not a treatment effect found after performing a logistic regression analyses for PR status for either group. The format of the data presented by the authors did not permit inferential statistical analysis to be completed. The authors did state that at baseline 54% (n = 208) of the intervention group residents were physically restrained, and at the end of the study 64% (n = 126) of the residents were physically restrained. At baseline 49% (n = 163) of the control group residents were physically restrained, and at the end of the study 60% (n = 115) of the residents were physically restrained. According to the authors, this demonstrates a significant increase in PR intensity for both groups.

Applicability of Study Results:

Similarity to my patients: The subjects in this study were similar to the patients a clinician may encounter in a LTC setting. The treatment group subjects' (residents' whose nursing staff received PR education) mean age was 82.0 ±7.7 with 28 males and 98 females. The control group subject mean age was 83.4 ± 6.5 with 23 males and 92 females. Residents in this study were being cared for by nursing staff; the most frequent diagnosis of the residents was dementia. According to Natan et al (2010), the most common characteristics of elder residents that affect the use of PR by nursing staff are resident problems with mobility, ADLs, dementia, dependence on care, stress and prior falls. These are similar traits found with residents residing in a LTC setting.

Benefits vs. Costs: The PR education group and the control group both had within group significant increases in the use of PR, but did not have significant between-group differences in the use of PR. The intervention involved an additional time commitment from the nursing staff as it consisted of eleven hours and 30 minutes of PR education delivered over two months (an average of 1.44 hours a week or 17.25 minutes a day of PR education). This is not an unreasonable amount of time as continuing education (CE) requirements for nursing staff range between zero hours to thirty hours every two years (Medscape Education, 2011). The intervention also involved the additional salary of a nurse specialist to stimulate nursing staff to use PR alternatives. However, this additional salary may not be at a high fiscal cost if the nurse specialist is already employed by the LTC facility. The PR education has a lower compliance rate than the control group; however these study losses were due to mortality, resident discharge, and a much higher percentage of treatment group staff dropping out. Study losses due to mortality were much higher for the control group (94%) as compared to the treatment group (60%) (Huizing et al, 2009). Given that there were no significant changes found for either the treatment or the control group after PR education was administered, the fiscal costs of time and education preparation result in a higher cost.

Feasibility of treatment: Educating nursing staff on reducing the use of PR could be readily applied to the clinical setting assuming sufficient funding is available to pay for salary costs of the nurse specialist. The frequency and duration of PR education were within typical ranges of CE requirements for nursing staff (Medscape Education, 2011), but were almost four times as long in duration for in-service training that was observed by me in the LTC setting of interest. Although the study procedures for PR Education were not described well in the article, the authors provided references for their study design which could be used to design a similar PR education program. PR education for nursing staff is feasible as PT commonly performs in-service training on promoting patient movement, pain reduction, physical function restoration, and preventing disabilities (APTA, 2003).

Summary of external validity: The study had fair external validity. Overall the study was similar to the LTC setting of interest and PICO. The participants were of similar characteristics as residents receiving care in a LTC setting. However, the participants in this study were categorized as residents receiving care, whereas the population of interest was categorized as nursing staff providing care. Although the frequency and duration of PR education were longer than in-service training observed, frequency and duration of PR education were within typical ranges of CE requirements for nursing staff. The exclusion criteria reasonably excluded those who had psychiatric deficits, but did not exclude those residents who had visual, musculoskeletal, or other cognitive (besides Korsakov's disease) deficits.

Pellfolk, T. J., Gustafson, Y., Bucht, G., & Karlsson, S. Effects of a restraint minimization program on staff knowledge, attitudes, and practice: A cluster randomized trial. *Journal of the American Geriatrics Society,* 2010; *58*(1), 62-69.

Clinical Bottom Line: The evidence from this article suggests that a nursing staff education program focused on reducing PR use does not significantly decrease the use of PR, decrease the occurrence of a fall event, decrease staff attitudes towards the use of PR, or decrease staff perceived risk of residents' falls. However, there was a significant increase in PR intensity within the control group suggesting that a lack of PR reduction education may increase the use of PR. Furthermore, residents receiving care from the treatment group (staff receiving PR reduction education) had a decreased likelihood of receiving PR showing that PR reduction education reduced PR by 47%. The participants in this study were of similar characteristics as nursing staff in age and level of nursing training. The treatment group participated in six, 30-minute sessions of PR reduction education over six months while the control group refrained from PR reduction education for the duration of the study. Performance was measured via PR intensity, fall event intensity, PRUQ, and fall risk. The evidence presents with a medium effect size for a decreased PRUQ within the treatment group. The evidence presents with a small effect sizes for a decreased PRUQ between the treatment group and the control group. The evidence also presents with a small effect size for an increased fall risk within the treatment group. There was a small effect size for an increased fall risk between the control group and the treatment group. This study was flawed with two threats to internal validity including lack of subject and examiner blinding and accurate instrumentation. External validity of this study was fair and does not compromise the ability to generalize results to the LTC setting of interest.

Article PICO

Population: The subjects included male and female nursing staff participants between the ages of 29 and 55 years old. Nursing staff was defined as RNs, LPNs, and nurses' aides. The nursing staff participants were working in 40 Swedish group dwelling units with 355 residents. The most frequent diagnosis of the residents was dementia. Greater than twenty percent of the residents were being physically restrained.

Intervention: The intervention consisted of an educational program focused on reducing PR. The education program consisted of six main themes including dementia, delirium, falls & fall prevention, use of PR, caring for people with dementia, and complications in dementia. The education program consisted of six 30-minute videotaped lectures delivered over six months and included three clinical vignettes with group discussions.

Comparison: The comparison treatment included the nursing staff that did not receive PR reduction education. Residents received care as usual.

Outcomes: The staffs' subjective knowledge about caring for people suffering from dementia was measured using a single 100-mm visual analogue scale. Staff attitudes toward the use of PR were measured by the PRUQ. The use of PR by nursing staff was recorded by documentation and by the MDDAS. Residents were assessed for motor and ADL function, behavioral and psychiatric symptoms, and for cognition using the MDDAS. Residents' ADL function, behavioral symptoms, and psychiatric symptoms were also assessed by scoring. Resident's cognition level was measured by the Gottfries cognitive scale. Residents' fall risk was rated by staff using a 100-mm visual analogue scale.

Blinding: Blinding did not occur in this study: the participants, researchers, and analysts were aware of group allocation and the type of task being performed. Complete lack of blinding is a threat as a Hawthorne effect, Rosenthal effect, or rater bias may occur; participants' recorded performance may be influenced by their knowledge or other's knowledge of their group allocation. The outcome measures for residents' motor and ADL function, behavioral, psychiatric, and cognitive symptoms were objective and less likely to be affected by the lack of blinding. The outcome measures for staff knowledge and the use of PR were subjective and more likely to be affected by the lack of blinding. Blinding either participants or observers would be difficult in this study. These threats are also minimized by within-group comparisons that would control for lack of blinding as each person is compared to their own group's performance.

Controls: All participants were nursing staff who worked in Swedish group dwelling units providing care for residents whose most prevalent diagnosis was dementia. The control group did not receive any formal education training on PR reduction during the study; residents received care as usual. The control group was offered the same education training after the study was completed. The treatment group participated in an educational program focused on reducing PR by covering six main topics including dementia, delirium, falls & fall prevention, use of PR, caring for people with dementia, and complications in dementia. The education program consisted of six 30-minute videotaped lectures delivered over six months and included three clinical vignettes with group discussions. The control group was an appropriate comparison

group because the difference between the groups was the presence of an educational program focused on PR reduction. Therefore difference in baseline PR use and follow-up PR use could be attributed to the presence of the educational program.

Randomization: The nursing staffs were randomly assigned, by a lottery system, to either the control group or the education group. Randomization did seem to be successful since both groups had similar baseline demographic characteristics including years in health care, years in geriatric care, knowledge of dementia care, knowledge of laws, and perceptions of restraint use. The demographic characteristics of the residents receiving care from both groups of nursing staff were also similar at baseline. Both groups had similar initial test scores for the use of PR, the residents' fall risk, and for the use of benzodiazepines or neuroleptics for PR.

Study: This study was a cluster-randomized controlled trial in which nursing staff who worked in Swedish group dwelling units were recruited. The authors did not provide details on the method of participant recruitment, however, it may be implied that subjects were selected based on a non-probability sampling such as convenience. This study included 393 nursing staff, providing care to residents with a primary diagnosis of dementia, randomly divided by units into a control group (n = 188) and a treatment group (n = 205). The treatment group received six, 30-minute videotaped lectures focused on reducing PR delivered over a six month period. The education program consisted of six main themes including dementia, delirium, falls & fall prevention, use of PR, caring for people with dementia, and complications in dementia. The treatment group also included three clinical vignettes with group discussions. The control group included the nursing staff refraining from an educational program; residents received care as usual.

Although the authors did not specifically state exclusion criteria, inclusion criteria included those group dwelling units that currently used PR on more than 20% of the residents.

Outcome Measures: I am interested in the number of residents that were physically restrained at baseline and following treatment because these measures assess the intensity of the PR being used. I am interested in nursing staff PRUQ scores because this test assesses subjective perceptions of restraint use. I am interested in the 100-mm visual analogue scale of residents' fall risk and the number of residents who fell during the study as these measure both staff predictions of residents falling and the number of actual fall events. The PR intensity was measured prior to and three weeks following the intervention. The number of fall events was measured prior to and one month following the intervention. The PRUQ and perception of fall risk were measured prior to and following the intervention – the authors were not specific as to how soon. I am interested in within group changes of the control group and the staff education group for PR intensity, PRUQ, perceived resident fall risk, and for the number of fall events. I am interested in group changes between the control and intervention for the PRUQ and for fall risk, since the groups' pre-intervention measures were similar and established that the groups did not differ prior to the treatment, I am only interested in the post-treatment scores between groups. The authors noted that the PRUQ was reliable, but they did not note if the other outcome measures were reliable or valid. The authors did not validate the outcome measures with a second independent standard. The authors did not state a minimally clinically important difference (MCID) for any of the outcome measures; a MCID was not found with a clinical

inquiry database search using the following search terms: minimal, restraint, perceptions, or MCID.

Study Losses: In the treatment group, 23.9% of the nursing staff were lost to the study after receiving PR education. In the control group, 29.3% of the nursing staff were lost to the study after the study was complete. The authors did not provide reasons for study losses.

Summary of internal validity: This study had: good internal validity, randomized allocation to groups, a control group, a good study design, adequate statistical power, appropriate statistical testing, and a strict protocol. One significant threat to internal validity was identified: lack of subject and examiner blinding. Accurate and reliable instrumentation was a minor internal threat. A lack of examiner and subject blinding may cause a Hawthorne effect, Rosenthal effect, or rater bias to occur. However, blinding either the nursing staff or observers would have been difficult in this study. Although the authors noted that the PRUQ was found to be reliable, the authors did not note if the other measures were reliable or valid. This study did not use an independent reference standard.

Evidence: I am interested in within-group comparisons, of the before and after intervention, for PR intensity, PRUQ, and fall risk for the control group and the treatment group. I am interested in between-group comparisons, of the after interventions, for the number of residents who fell, PRUQ, and fall risk. Significant differences were found for PR intensity within the control group and between the control and intervention groups, but not within the treatment group. Significant differences were not found for the PRUQ or fall risk. Table 3 presents the treatment group's McNemar Chi Square analysis for PR intensity within-group changes and Table 4 presents the control group's McNemar Chi Square analysis for PR intensity within-group changes. This data was calculated by me. Table 5 presents the Chi Square analysis for between-group PR intensity and Table 6 presents the Chi Square analysis for between-group fall events for the control group and for the treatment group. This data was calculated by me. Table 7 presents each group's mean changes and standard deviations from the PRUQ and fall risk. Mean and standard deviation data was calculated by the authors using SPSS statistical package 16.0 and Stata 9.0. All data in Table 7 will be used for further analysis in Table 8. Table 8 data was calculated by me.

Table 3: McNemar Chi Square for the Within-Treatment Group Changes Collected from PR Intensity

		Baseline			McNemar Score
		Yes PR	No PR	Total	
Post-Intervention	Yes PR	30	0	30	2.00
	No PR	2	117	119	
	Total	32	117	149	

At baseline 21.5% (n = 32) of the intervention group residents were physically restrained, and at the end of the study 20.1% (n = 30) of the residents were physically restrained. Table 3 indicates that this is not a significant decrease of PR as evidenced by a McNemar score of less than 3.84. The probability that the change within the intervention group occurred by chance is 0.157.

Table 4: McNemar Chi Square for the Within-Control Group Changes Collected from PR Intensity

		Baseline			McNemar Score
		Yes PR	No PR	Total	
Post-Intervention	Yes PR	28	25	53	25.00
	No PR	0	86	86	
	Total	28	111	139	

At baseline 20.1% (n = 28) of the control group residents were physically restrained, and at the end of the study 38.1% (n = 53) of the residents were physically restrained. Table 4 indicates that those residents whose nursing staff did not receive PR education had a significant increase of PR. Table 4 indicates that the difference is significant at p = 0.001.

Table 5: Chi Square for the Between Group Changes Collected from the PR Intensity

	Yes PR	No PR	Total	Chi Square Score
Intervention Group	30	119	149	11.35
Control Group	53	86	139	
Total	83	86	288	

At the end of the study 38.1% (n =53) of the control group residents were receiving PR and 20.1% (n=30) of the intervention group residents were receiving PR. Table 5 indicates that this difference is significant at p = 0.05. Over the test period, an additional 25 subjects in the control group received PR, whereas 2 subjects in the intervention group were taken off PR. Based on the results, the number needed to treat (NNT) is 5.56 with a 95% CI of 3.5 to 13.0, showing that for every 5.56 patients cared for by PR educated staff, 1 less resident had PR used at the end of the study. The narrow 95% confidence interval range is always positive showing that the treatment is effective. An ARR score of 0.18 shows that the residents in the control group have an 18% greater chance of receiving PR than if they were in the intervention group as compared to the entire group of 288 subjects. A RRR score of 0.47 shows that the residents who received PR reduction education reduced their chances of receiving PR by 47% by being in the treatment group.

Table 6: Chi Square for the Number of Residents Who Fell Between the Control and the Intervention Groups

	Yes Falls	No Falls	Total	Chi Square Score
Intervention Group	15	134	149	0.174
Control Group	12	127	139	
Total	27	261	288	

At the end of the study 8.6% (n =12) of the control group residents had a fall event and 10.1% (n=15) of the intervention group residents had a fall event. Table 6 indicates that this difference is not significant at p = 0.05.

Table 7: Mean and Standard Deviation (SD) for Baseline and Follow-up Data Collected from the PRUQ and Fall Risk for the Control and Treatment Groups

	Control Group (No PR education)				Treatment Group (PR education)			
	Baseline		Follow-up		Baseline		Follow-up	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
PRUQ (scale of 1-5)	3.5	0.8	3.4	0.8	3.5	0.7	3.2	0.9
Fall Risk (100-mm analog scale)	36.8	30.9	40.4	30.9	36.7	32.8	37.4	32.7

The PRUQ is a five point scale that measures staff attitudes toward the use of PR. Higher scores indicates that a person is more prone to use PR (Pellfolk et al, 2010). Table 7 indicates that those who received PR education (the treatment group) are less likely to use PR than those who did not receive PR education (the control group) as demonstrated by the treatment group having greater mean changes on the PRUQ. However, this difference was not found to be statistically significant (Table 8). Table 7 indicates that those who received PR education rate residents' fall risks to be lower than those who did not receive PR education as evidenced by the treatment group having smaller mean score at follow-up.

Table 8: Mean Difference, P-value, Effect Size, and 95% Confidence Intervals (CI) for the Within-Treatment Group and for Between-Group Data Changes Collected from the PRUQ and the Fall Risk

	Mean Difference	Mean Difference 95% CI	P-Value	Effect Size	Effect Size 95% CI
PRUQ (Within-Treatment Group)	0.3	0.11 to 0.49	Not Given	0.43	NA
PRUQ (Between-Group)	0.2	-0.01 to 0.41	0.51	0.23	0.0 to 0.47
Fall Risk (Within-Treatment Group)	0.7	-7.65 to 9.05	Not Given	0.02	NA
Fall Risk (Between-Group)	3.0	-4.96 to 10.96	0.46	0.09	-0.14 to 0.34

Table 8 indicates that the between-group differences for the PRUQ and Fall Risk are not significant as evidenced by p-values of greater than 0.05. It is unknown if the within-treatment group differences for the PRUQ and fall risk are significant as the authors did not provide p-value data. Mean difference refers to the difference in scores between the baseline and follow-up scores for the PR education within-group data, and between the follow-up scores for both groups. Mean difference and the 95% CI were calculate by me using Microsoft Excel software and were based on the data provided by the authors. Effect size quantifies the size of the difference within and between the two groups and is used to discuss if the difference is remarkable. Effect sizes greater than 0.60 are considered to be large, effect sizes greater than 0.30 are considered to be medium, and effect sizes less than 0.30are considered to be small. Effect size was calculated by me based from the data presented by the authors.

Table 8 indicates that with 95% confidence, the mean increase (in PRUQ points) for the nursing staff to use PR, after receiving PR reduction education, is -0.01 to 0.41. A negative 95% CI value indicates that if the study were repeated multiple times, occasionally the control group would score higher than the treatment group and decrease their PR use after receiving PR education. Table 8 indicates that with 95% confidence, the mean increase for resident fall risk (as perceived by nursing staff after receiving PR reduction education) is -4.96 to 10.96. A negative 95% CI value indicates that if the study were repeated multiple times, occasionally the control group would score higher than the treatment group and perceive a decrease in resident fall risk

According to Table 8, there was a small effect size for the PRUQ between-group changes, for the fall risk within-treatment group changes, and for the fall risk between-group changes. There was a medium effect size for the PRUQ within-treatment group changes which shows that PR education was moderately effective at reducing PRUQ within the treatment group.

Applicability of Study Results:

Similarity to my patients: The subjects in this study were similar to the nursing staff a clinician may encounter in a LTC setting. The treatment group subjects' (nursing staff who received PR education) mean age was 43.5 ± 11.8 with 19 males and 165 females. The control group subject mean age was 41.8 ± 12.1 with 15 males and 146 females. The nursing staff participants were working in group dwelling units with the most frequent diagnosis of the residents being dementia. An important difference between the LTC setting of interest and the participants in this study was that greater than twenty percent of the residents in this study were being restrained while less than twenty percent of the residents in the setting of interest were being restrained.

Benefits vs. Costs: The PR education group did not have a within-group significant decrease in the use of PR. However, the group that did not receive PR education did have a within-group significant increase in the use of PR. The between-group differences of PR intensity were significant with residents in the control group having an 18% greater chance of receiving PR than if they were in the treatment group (see Table 6). The between-group differences were not significant for residents experiencing a fall event, the PRUQ, or for fall risk. The intervention involved an additional time commitment as it consisted of at least three hours of PR education delivered over six months (an average of 0.125 hours a week or 1.5 minutes a working day of PR education). This does not include the three extra clinical vignettes and group discussions. This is not an unreasonable amount of time as continuing education requirements for nursing staff range between zero hours to thirty hours every two years (Medscape Education, 2011). The PR education had a higher rate of compliance (76.1%) as compared to the control group (70.7%) (Pellfolk et al, 2010). Thus, it may be assumed that the PR education was more enjoyable or feasible as refraining from PR education. The authors did not elaborate on the causes for non-compliance for either group.

Feasibility of treatment: Educating nursing staff on reducing the use of PR could be readily applied to the clinical setting. The frequency and duration of PR Education were within typical ranges of CE requirements for nursing staff (Medscape Education, 2011), but were four times less as long in duration for in-service training that was observed by me in the LTC setting of interest. The authors did not describe their PR education design with sufficient detail or

references to replicate the study, however, a similar PR education design could be formulated with an additional literature research. PR education for nursing staff is feasible as PT commonly performs in-service training on promoting patient movement, pain reduction, physical function restoration, and preventing disabilities (APTA, 2003). The higher compliance rate for the treatment group suggests that PR education for nursing staff is a reasonable intervention for reducing the use of PR on residents.

Summary of external validity: The study had fair external validity. Overall the study was similar to the LTC setting of interest and PICO. The participants had similar characteristics as nursing staff providing care in a LTC setting and received feasible prescription of treatment (frequency and duration). This study lacked exclusion criteria that would exclude those residents who had visual, cognitive, or musculoskeletal deficits that would impact the results of this study.

Synthesis/Discussion: Per the evidence and the nursing staffs' response to PR education, PR reduction education directed at nursing staff may not be an effective treatment option for reducing PR in a LTC facility. Huizing et al (2009) and Pellfolk et al (2010) found that nursing staff PR reduction education may not significantly decrease the use of PR on residents living in a LTC facility. However, Huizing et al (2009) had a significant threat to internal validity by not following a strict protocol, as only 30% of the total nursing staff participated in PR reduction education. Having only a third of the total treatment group actually receiving the treatment may be sufficient explanation as to why PR reduction education was not found to significantly decrease the use of PR. Furthermore, Pellfolk et al (2010) found that a lack of PR reduction education may increase the use of PR. Pellfolk et al (2010) also found that residents receiving care from the staff receiving PR reduction education had a decreased likelihood of receiving PR showing that PR reduction education reduced the chances of residents receiving PR by 47%. From my clinical experience, I have seen PR reduction education used with the intent of reducing PR use on residents. However, taking into account the lack of statistically significant improvements in PR reduction and the small and medium effect sizes, education programs similar to Huizing et al (2009) and Pellfolk et al (2010), that are directed exclusively at nursing staff, may not be my first choice as a treatment option for reducing the use of PR in a LTC facility. As a physical therapist, I may utilize PR reduction education either directed toward a more broad LTC facility interdisciplinary staff population or as a preventive measure for not increasing PR use within the LTC facility.

PRs are commonly defined as any device used to involuntarily limit a patient's freedom of movement. PRs have been used in LTC facilities with the intent of providing patient protection with rationales including: dealing with patient behavioral problems, patient restlessness (Pekkarinen et al, 2006), preventing patient falls and injuries (Shorr et al, 2002; Lane and Harrington, 2011), preventing disruption to therapeutic devices, controlling for patient agitation or patient wandering, providing legal responsibility from the facility, and providing nursing staff with comfort and reassurance (Lane and Harrington, 2011). However, several studies (Shorr et al, 2002; Lane and Harrington, 2011) have shown PRs not only cause patient confusion, agitation, depression, and fear, but have been shown to cause decubiti, falls, loss of muscle strength, incontinence, and strangulation. Research supports the idea that not only do PRs not provide patent protection from falls or injuries (Shorr et al, 2002; Capezuti 1995; Oliver 2007), but rather act as the cause of injury (Hantikainen and Kappeli, 2000; Myers et al, 2001) and have even led to patient death (Berzlanovich et al, 2012). There are three equally important

parts to patient-focused care: evidence, clinical experience, and patient autonomy. PR use on residents has been associated with loss of freedom and autonomy and obstructs social relationships (Berzlanovich et al, 2012).

Based on clinical observation, PR reduction education has been used to promote the decrease of falls in residents living in LTC facilities. Falls can often result in injuries, pain, hospitalization, decreased quality of life (QOL), loss of confidence, negative psychosocial consequences, and death (Williams et al, 2011). According to Berzlanovich et al (2012), PRs can not only hinder a patient's ability to recover from a fall event, but can often act as the cause of the fall. Even though Huizing et al (2009) did not address the issue of fall risk and Pellfolk et al (2010) did not find significant improvements in fall risk or fall events, having a PR reduction education program that highlights the importance of decreasing or not increasing fall risk would be extremely beneficial to the residents living in a LTC facility.

PR reduction education has been used to promote patient functioning in residents living in LTC facilities. Low mobility was found to be an independent predictor of poor hospital outcomes at discharge (Brown et al, 2004), and Berzlanovich et al (2012) stated that PRs can lead to muscle atrophy, decrease patient mobility, promote decubitus ulcers, pneumonia, and leg vein thrombosis. Kwok et al (2012) found that the average length of patient hospitalization was significantly lower in the year after a PR reduction program was implemented. Even though Huizing et al (2009) and Pellfolk et al (2010) did not address the effects of PRs on patient functioning, a PR reduction program would be beneficial in decreasing the length of patient hospitalization, improving patient mobility, and increasing patient outcomes at discharge.

Based on clinical observation, PR reduction education has been used to increase patient QOL by reducing decubiti, confusion, fear, depression, and incontinence. PRs have been found to cause psychological harms to the patient such as: anger, fear, denial, demoralization, humiliation, depression, agitation, regressive behaviors, loss of dignity, and abandonment. Some residents in LTC ceased to socialize after being physically restrained (Cheung and Bernard, 2005). Even though Huizing et al (2009) and Pellfolk (2010) did not address the issue of patient QOL, a PR reduction program would be beneficial in improving patient QOL.

Although the use of PR reduction education for nursing staff was not found to significantly decrease the use of PRs (Huizing et al, 2009 and Pellfolk et al, 2010), it has been supported by other literature (Pekkarinen et al, 2006; Shorr et al, 2002; Lane and Harrington, 2011; Berzlanovich et al, 2012), and a lack of PR education was found to significantly increase the use of PRs (Pellfolk et al, 2010). There are three equally important parts to patient-focused care: evidence, clinical experience, and patient autonomy. From my clinical experience, I have seen PR reduction education utilized to decrease patient fall risk, increase patient functioning, and increase patient QOL. The aforementioned research, my clinical experiences, and patient autonomy support a PR reduction education program in LTC facilities. Further research regarding other PR reduction programs would be beneficial. As a physical therapist, I may utilize PR reduction education either directed towards a broad LTC facility interdisciplinary staff population or as a preventive measure for not increasing PR use within the LTC facility.

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