

TITLE

Use of Pain Management Champions to Enhance Guideline Implementation by Care Workers in Nursing Homes

AUTHOR NAMES AND AFFILIATIONS

Thekla BRUNKERT ^{a,b}, PhD, PT

^a Nursing Science (INS), Department Public Health (DPH), Faculty of Medicine, University of Basel, Bernoullistrasse 28, 4056 Basel, Switzerland, thekla.brunkert@unibas.ch

^b University Department of Geriatric Medicine FELIX PLATTER, Burgfelderstrasse 101, 4055 Basel, Switzerland

Michael SIMON ^{a,c}, PhD, RN

^a Nursing Science (INS), Department Public Health (DPH), Faculty of Medicine, University of Basel, Bernoullistrasse 28, 4056 Basel, Switzerland, m.simon@unibas.ch

^c Inselspital Bern University Hospital, Nursing Research Unit, Freiburgstrasse 4, 3010 Bern, Switzerland

Franziska ZÚÑIGA ^a, PhD, RN

^a Nursing Science (INS), Department Public Health (DPH), Faculty of Medicine, University of Basel, Bernoullistrasse 28, 4056 Basel, Switzerland, franziska.zuniga@unibas.ch

Corresponding author:

Thekla BRUNKERT ^{a,b}, PhD, PT

^a Nursing Science (INS), Department Public Health (DPH), Faculty of Medicine, University of Basel, Bernoullistrasse 28, 4056 Basel, Switzerland, thekla.brunkert@unibas.ch

^b University Department of Geriatric Medicine FELIX PLATTER, Burgfelderstrasse 101, 4055 Basel, Switzerland

ABSTRACT

Background

Underutilization of evidence-based pain management in nursing homes is common. Evidence towards effective approaches to improve adoption of evidence-based practices in nursing homes is limited. Application of theory in evaluation approaches can increase understanding of implementation challenges.

Aim

To get a better understanding of the impact of implementation strategies by exploring underlying mechanisms using behavioral theory.

Methods

This mixed-methods study is embedded in an implementation-effectiveness study of a pain management guideline in four Swiss nursing homes. To evaluate our implementation strategies, training workshops and the introduction of trained pain champions, we developed a conceptual framework. Based on Bandura's self-efficacy theory we hypothesized how our implementation strategies might effect change in care workers' behavior.

Care workers' questionnaire surveys were conducted at baseline (n=136), after three (n= 99) and six months (n=83) to assess self-efficacy in pain management and self-reported guideline adoption. We computed linear mixed-effect models to assess changes over time in self-efficacy and logistic regressions to assess associations between self-efficacy and guideline adoption. Concurrently, we conducted focus groups with care workers (n=8) to explore their response to the implementation strategies.

Results

Overall, there was a significant increase in self-efficacy **at both time points** ($p < 0.001$). We found significant associations between self-efficacy and adoption of two guideline components, i.e. performing a comprehensive pain assessment and using observational pain assessment tools in cognitively impaired residents.

Qualitative findings showed that implementation strategies were received positively by care workers. Focus group participants reported to be more attentive to residents' pain experience and to assess and document pain more frequently and with more detail than before.

Linking Evidence to Action

Our findings highlight that training and the use of champions might increase self-efficacy and thereby induce behaviour change leading to guideline adoption. Regarding persistent implementation challenges, a theory-based conceptual model contributes to the overall understanding.

Keywords

Implementation study, Mechanisms, Nursing home, Pain management

Background

Implementation of evidence-based interventions in health care organizations has been recognized to be a challenging endeavor (Grimshaw *et al.* 2012). To increase the uptake of new practices, current literature recommends to systematically select and tailor implementation strategies with regard to needs of the implementation context (Powell *et al.* 2019). An a priori analysis of the context to identify barriers and facilitators to use the new practice, is a pivotal first step to inform the development of appropriate implementation strategies (Powell *et al.* 2017). Although there is some evidence that strategies tailored to determinants of change are more likely to change practice (Baker *et al.* 2010), little is known about the mechanisms of how implementation strategies affect change in practice (Lewis *et al.* 2018, Powell *et al.* 2019, Lewis *et al.* 2020).

A mechanism can be defined as “process or event through which an implementation strategy operates to affect desired implementation outcomes” (Lewis *et al.*, 2018, p.2). As opposed to the realist methodology which focuses on the context–mechanism–outcome configuration in program theories of complex interventions (Dalkin *et al.* 2015, Pawson & Tilley 1997), this work focuses specifically on mechanisms related to implementation strategies using methodology described by Lewis *et al.* (2018). Improving our understanding of mechanisms is central to generate a more comprehensive evidence base, helping researchers and practitioners select appropriate strategies for their implementation projects. To date, implementation science literature is vastly lacking theory about underlying mechanisms of implementation strategies. In a recent systematic review from Lewis *et al.* (2020) only 46 empirical studies focusing on implementation mechanisms in health research were identified. The authors emphasized the diversity of approaches and general conceptual and methodological shortcomings, highlighting the need for more theory-driven evaluations (Lewis *et al.* 2020).

This study reports the evaluation of a multifaceted implementation strategy comprising interactive training workshops and the introduction of trained pain champions to facilitate the implementation of a pain management guideline in nursing homes (NHs). In the field of NH care, pain management is a critical topic with an considerable knowledge-to-practice gap (Jablonski & Ersek 2009). Although international guidelines for geriatric pain management are available, their adoption into daily practice of NHs is often inadequate (Arnstein & Herr 2017, Schofield 2018). Previous studies aiming to improve pain management and other aspects of NH care used a variety of implementation strategies, however overall effects were generally mixed (Herman *et al.* 2009, Knopp-Sihota *et al.* 2016). Only few studies provided information how strategies were selected or any underlying conceptual model, hindering a comprehensive evaluation of implementation mechanisms.

The overall aim of this mixed-methods study was to evaluate the two central implementation strategies (interactive training workshops and introduction of trained pain champions) by focusing on their underlying mechanisms. Our specific aims were (1) to determine changes in the hypothesized central mechanism, care workers' self- efficacy in pain management; (2) to assess associations of self-efficacy and care workers' self-reported adoption of the pain management guideline and (3) to explore care workers' response to the implementation strategies with regard to pain management practice.

Methods

Conceptual model

In the planning phase of this study we developed a conceptual model, hypothesizing how our implementation strategies might affect change in pain management practice. To underpin our

hypothesis we defined active components of the strategies using the behavior change taxonomy (Table 1) (Michie *et al.* 2013). With regard to the central strategies, training workshops and pain champions, we hypothesized that ‘demonstration of the behavior’, ‘verbal persuasion about capability’ and ‘feedback on the behavior’ would increase self-efficacy as suggested by Bandura’s theory of self-efficacy (Bandura 1977) (Table 1). In relation to his theory, we assumed that in a first step it would be necessary to increase general awareness of resident pain and to address care workers’ negative beliefs towards pain in older people. Based on this precondition, an increase of self-efficacy in pain management can be achieved and ultimately lead to the adoption of the guideline in daily practice as depicted in Figure 1.

<<Insert here: Figure 1: Conceptual model>>

Design

A mixed-methods evaluation using quantitative and qualitative data from care workers participating in an implementation- effectiveness study (hybrid II)

Sample/ Setting

This study is part of an implementation study which was conducted in a convenience sample of six NHs located in the German-speaking part of Switzerland. All institutions belong to a privately-owned NH group, which is part of a large European operator of long-term care facilities. Of the initial six NHs, two NHs had to resign their participation before baseline data collection due to major organizational changes.

Intervention

A protocol for this study describing the intervention and implementation strategies in more detail was published previously (Brunkert *et al.* 2018). We developed a pain management guideline based on international recommendations for the management of geriatric pain, as in Switzerland currently no national guideline for the management of geriatric pain is available (American Geriatric Society Panel on Persistent Pain in Older Persons 2009). The final guideline was adapted to the local context in collaboration with the participating NHs. Core components targeted in this study comprised (A) comprehensive pain assessment; (B) use of observational pain assessment scales, e.g. Pain Assessment in Advanced Dementia Scale (PAINAD) (Warden *et al.* 2003) for residents with severe cognitive impairment; (C) pain assessments and re-evaluation after treatment on a regular base and (D) standardized documentation.

Implementation strategies

The implementation strategies have been developed based on a comprehensive contextual analysis involving perspectives of multiple stakeholders (Brunkert *et al.* 2020a, Brunkert *et al.* 2020b). An overview of the implementation strategies is displayed in Table 1. We itemized the overall implementation strategies into discrete strategies according to the Expert Recommendations for Implementing Change (ERIC) (Powell *et al.* 2015). Further, we determined corresponding behavior change techniques and their hypothesized mechanisms of change (Michie *et al.* 2013).

<<Insert Table 1 >>

Quantitative part

Sampling and data collection

For our quantitative data collection, we included care workers from all educational backgrounds, i.e. registered nurses (RNs), licensed practical nurses (LPNs) and nursing assistants (NAs) who

worked in direct resident care, had been employed for at least one month and were sufficiently fluent in German to understand the survey questions. We conducted a questionnaire survey collecting data at baseline (T0), three (T1) and six months (T2) after start of the intervention, lasting from November 2017 to November 2018.

Variables and measurement

Self-efficacy in pain management was assessed at all data collection points with a self-developed 13-item scale. Care workers were asked to rate how confident they feel in tasks related to pain management, e.g. pain assessment and documentation on an 11-point rating scale (0= not confident at all - 100= very confident). An acceptable value for the scale's reliability was established (Cronbach's $\alpha = 0.94$), for evaluation a mean score of all 13 items was calculated.

A dichotomous indicator of *self-reported adoption* of each of the four guideline components was built from survey items assessed in T2, using a two-step procedure. For each component, a first item assessed whether care workers experienced a situation requiring the application of the component (e.g. "Over the last three months, have you been responsible for the care of a resident with severe cognitive impairment"). The second item assessed the frequency with which the component was used (e.g. "How often did you use the PAINAD scale if a resident with severe cognitive impairment showed signs of pain?") on a 4-point scale (1=never- 4=always).

Further items of the care workers' questionnaire assessing sociodemographic data comprise age, sex, educational level (RN/LPN or nursing assistant), years of work experience and tenure in NH.

Data analysis

Descriptive statistics were computed to explore means, medians, distribution and confidence intervals of the data. To determine changes in self-efficacy over time we used unadjusted linear

mixed-effect models. Indicators for the time of data collection (T0, T1, T2) were added as fixed effects. To account for the nested data structure, care workers nested in NHs and the repeated measures of individuals, we added the NHs and individual IDs as random effects.

To describe core components` adoption, we built several sub-samples, considering only data from respondents who indicated to have experienced relevant situations corresponding to the core component. Further, for the indicators “comprehensive pain assessment” and “use of PAINAD”, we excluded data from nursing assistants since these components are not part of their scope of practice (Brunkert *et al.* 2019). In a next step, we determined associations between adherence to guideline components and self-efficacy items by calculating several simple logistic regressions based on these sub-samples.

Statistical analysis was performed using R statistical computing software (R Development Core Team 2018). Linear mixed-models were computed with the LME4 package (Bates *et al.* 2015). Statistical significance was assigned at the $P < .05$ level.

Qualitative part

Data collection

Qualitative data was collected via focus groups conducted three months after the start of the intervention with a convenience sample of care workers in each participating NH (March- August 2018). The semi-structured interview guides included questions towards the experience of the training workshops and pain champions and perceived changes in pain management practice. Focus group discussions were moderated by the first author (TB), additionally a research assistant took notes of the discussion and summarized main points subsequent to each topic to check with the participants. Interviews have been audio-recorded and lasted between 45 and 60 minutes each.

Data analysis

After verbatim transcription of the audio data, transcripts were re-read for familiarization with the data. For data analysis a deductive approach following the directed content analysis described by Hsieh and Shannon (2005) was used. In a first step, data was coded using pre-defined categories based on the implementation strategies and different intervention components. In the subsequent analysis steps, subcategories and new categories emerging from the data were added to the coding scheme. Finally, data was summarized in the pre-defined categories using subcategories and exemplary quotes to comprehensively describe the findings.

Integration

Findings of the quantitative and qualitative part of this study will be integrated in the discussion section of this paper.

Ethics approval

We received ethical approval for this study from the responsible ethics committee (Ethikkommission Nordwest- und Zentralschweiz: EKNZ 2017-01466) in October 2017. All care workers provided written informed consent prior to participating in focus group discussions. For the questionnaire survey, informed consent was implied by returning the questionnaire.

Results

Quantitative data

Sample size of care workers differed between the three waves of data collection due to care worker turnover and partial decline of response rates, resulting in 136 respondents at baseline (average

response rate: 84%), 99 respondents at T1 (69 %) and 83 respondents at T2 (59 %). An overview of the baseline's sample characteristics is displayed in Table 2.

<<Insert Table 2 >>

Changes of self- efficacy in pain management

In LPNs and RNs the mean score of self-efficacy increased from 69.6 (SD 14.6) at baseline to 74.2 (SD 15.2) at T1 and 76.8 (SD 14.7) at T2. In NAs, the mean score changed from 64.3 (SD 15.1) at baseline to 72.4 (SD 12.1) and 69.2 (SD 12.4) at T2. Mixed models overall confirmed a significant increase ($p < .01$) of self- efficacy between baseline, T1 ($\beta=8.84$, CI: 6.08 - 11.58) and T2 ($\beta=9.39$, CI: 6.24 – 12.49) for all educational levels.

Associations with self-reported pain management behavior

Self- reported adherence to guideline components ranged between 44% and 73% depending on the component, detailed results were reported in an earlier paper (Brunkert et al. 2019). Associations between self- efficacy items and adherence to corresponding core components were significant for components I (“comprehensive assessment”) and II (“PAINAD scale”). Yet, associations with the other two components were not significant. An overview of the associations is displayed in Table 3.

<<Insert Table 3 >>

Qualitative data

In total, we conducted eight focus groups in the four participating NHs, including 30 care workers (15 RNs/LPNs and 15 NAs). Overall, participants were mainly female (80%) and the average age was 36.6 years (SD = 8.6).

General experience with workshops

Overall, NAs appreciated the workshops more than RNs and LPNs. Several NAs highlighted that they have never received a training specifically targeted at them before. RNs and LPNs, on the other hand, partly perceived the workshops' content to be redundant to what they already knew before and would have preferred a focus on pharmacological treatment options. Yet, overall the participants agreed that the workshops were helpful to raise the care team's awareness for residents' pain situations. One aspect that was highlighted particularly by NAs was the recognition that pain almost always goes beyond its physical component and can be related to psychosocial or spiritual factors. Reflecting this aspect in depth during the workshops was perceived as a major learning moment for all participants.

“Because we could delve into the topic of pain, so that we became more aware of what pain really means in that sense. That is a matter of opinion for everybody and that we react more conscious when people complain about pain” (RN).

In particular, the perception of residents with cognitive impairment or other conditions limiting communicative abilities has changed. Participants acknowledged that prior to the workshops they would forget that these residents might also perceive pain occasionally though they do not actively express it.

Perception of the pain champions

In general, the idea of having a pain champion on the ward was perceived as a gain by most participants. NAs appreciated to have a designated go-to person on the ward who explains complex matters e.g., pain assessment instruments, using simple language. Furthermore, NAs

repeatedly noted that the pain champion takes their observations and concerns with regard to residents` pain seriously. These positive encounters were a boost for NAs confidence.

Discussions with RNs and LPNs on the other hand, showed some variation between different NHs. RNs in one NH questioned the added value of having a nurse pain champion because ultimately the physician would decide about a resident`s medication.

In contrast, RNs and LPNs in another NH reported to see the pain champion as a connector with the responsible physician to advocate residents` needs with regard to appropriate medication.

“The [physician] has a different understanding of applying pain killers, and I think, this is where [the pain champion] can be kind of a connector with the physician” (LPN)

Observing changes in pain management

Overall, there was agreement in most focus groups that during the past three months, changes in the care teams` pain management behavior were noticeable.

One behavior, most participants highlighted to have experienced change is the assessment of residents` pain, in particular with regard to the frequency and the use of more differentiated assessment questions. Several NAs reported that until recently they were not used to have conversations about the residents` pain experience, except when a resident was verbally expressing pain. In contrast, the participants reported that they now ask residents actively about their pain if they see signs of discomfort or if the resident has reported pain before. Assessing pain in residents with severe cognitive impairment, still was perceived as a challenge by NAs, however, they reported to be more aware of signs of discomfort and changes in the behavior than before

“Well, after the course, I.. tried harder to observe the resident and I took more time to look at the mimic and yes, well, I.. I was very glad about the course. And now, I pay more attention, or I ask the resident more “Do you have pain?”, which I’ve done less before.” (NA)

In addition to changes in the pain assessment, participants of all job levels agreed that timeliness of NAs` reporting of residents` pain to the charge nurse improved considerably. In the mornings, they would inform the responsible nurse as soon as possible, instead of waiting till the designated reporting time in the late morning.

RNs and LPNs on the other hand, reported that the pain champion has motivated them to go through each resident`s medication scheme to critically review if the medication is still appropriate in light of the current pain situation. Based on their critical review, they themselves or the pain champion talked with the responsible physicians about their suggestions. Participants reported that based on the reviews they were able to adapt or reduce unnecessary pain medications in several residents.

Discussion

The current study found that interactive training workshops and introduction of trained pain champions could significantly increase care workers` self-efficacy related to pain management. Our qualitative findings showed that the implementation strategies were received as supportive and led to changes in the pain assessment and reporting behavior and the pharmacological management.

Pain assessment and management in NH residents depict a challenge for care workers since pain is a highly subjective symptom and the ability to self-report pain is often limited in residents. As hypothesized in our conceptual model, qualitative findings indicate that our implementation

strategies helped to sensitize care workers for resident pain and motivated them to question their own beliefs concerning pain. Bandura`s theory of self-efficacy states that in addition to beliefs and attitudes, confidence in the own ability to perform a specific behavior can determine adoption of the new behavior (Bandura 1977). While we found significant associations between care workers` self-efficacy and adoption of two core components: `conducting a comprehensive assessment` and `use of PAINAD`, we could not find a significant relation with the components `documentation` and `re-evaluation. One reason for this finding might be that adoption of these components is less related to a person`s capability, but more to other factors, such as memory or motivation.

With our approach to introduce pain champions on the ward, we intended to provide care workers with a motivating role model, who helps to memorize specific behaviors, e.g. documentation, use of PAINAD with the goal to eventually form new habits. Previous research has established that champions can significantly improve the adherence to practice change in healthcare settings (Flodgren *et al.* 2011, Woo *et al.* 2017). Several intervention studies focusing on pain management in NHs reported use of pain champions (Hadjistavropoulos *et al.* 2016, Kaasalainen *et al.* 2015, Kaasalainen *et al.* 2012). None of these studies explored changes in care workers` behavior, nor used any theoretical underpinning for evaluation. However, to improve our understanding of what works where and why, a comprehensive evaluation developing and testing theory is crucial. Future studies should therefore invest time to develop a conceptual model prior to implementation, to guide the overall evaluation strategy.

A clear strength of this study was the systematic specification of our implementation strategies into behavior change techniques and the use of a conceptual model. The specification of strategies allowed the generation of hypotheses with the aim to increase our understanding of the underlying mechanisms. Clear definitions of implementation strategies enhance the comparability of studies

and thus facilitate the generation of transferable knowledge (Proctor *et al.* 2013). Furthermore, the mixed-methods design allowed to validate our initial findings with a set of focus groups. Besides its strengths, there are also some limitations to this study. First of all, this study was based on a quasi-experimental, uncontrolled design limiting our ability to draw direct conclusions about the effectiveness of our implementation strategies and precluding causal inferences. Secondly, the study was based on care workers' self-reports of behavior which might have introduced bias due to care workers' ability of recalling behavior or by social desirability.

Conclusions

The purpose of this current study was to comprehensively evaluate two central implementation strategies, training workshops of care workers and pain champions by exploring the underlying mechanisms leading to behavior change in the form of guideline adoption. Our findings highlight that continuous commitment of pain champions or similar implementation facilitators is pivotal to the embedding of new routines in care workers' practice. Increasing the adoption of evidence-based pain management guidelines in NHs remains of crucial importance to improve management of residents' pain and ultimately their quality of life.

Linking evidence to action

- Previous research to improve pain management in nursing homes showed mixed to low effects- yet evaluation approaches are lacking use of theory and thus impede differentiation between intervention and implementation effects and related challenges;
- Generating and testing of theory in the development and evaluation of implementation strategies contributes to an improved understanding how change can be affected in a specific context;
- Future studies investigating interventions and their implementation in NHs should therefore make use of behavioral theory to understand and tackle implementation challenges.

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Figure 1: Conceptual model

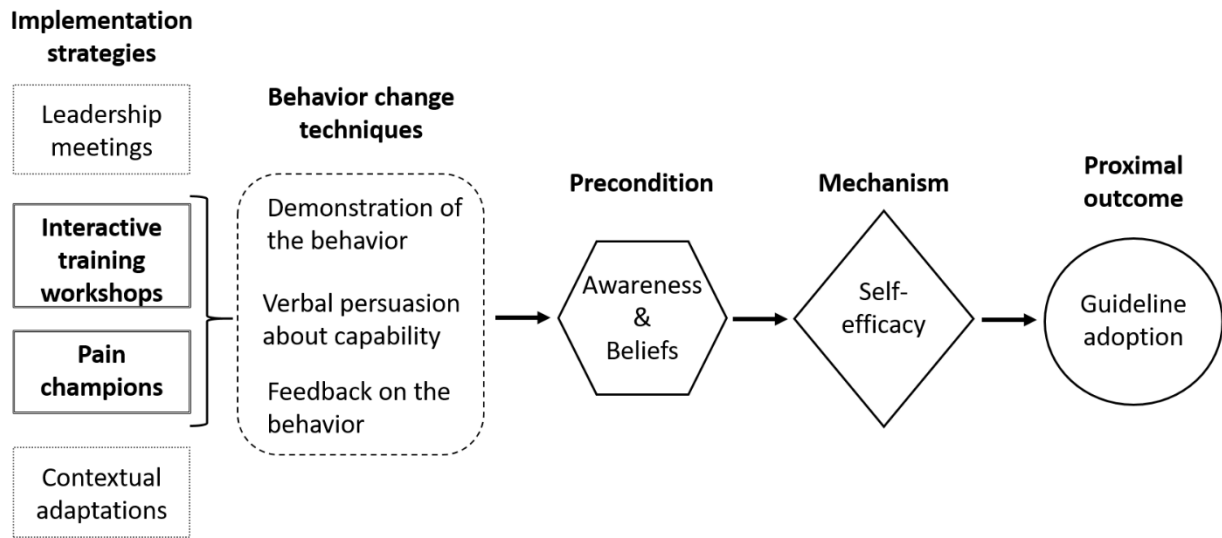


Table 1: Overview of implementation strategies

Implementation strategy	Discrete strategies	Operationalization	Behavior change techniques	Hypothesized mechanism
Interactive training workshops	<ul style="list-style-type: none"> - Conduct educational meetings - Work with educational institutions - Make training dynamic 	<ul style="list-style-type: none"> - 2x 2h face to face training/ education according to job level (RNs & LPNs/ nursing assistants) - Interactive workshops conducted by educational institute - Content according to pain management guideline, i.e. pain assessment and treatment 	<ul style="list-style-type: none"> - Information about health consequences - Instructions on how to perform the behavior - Demonstration of the behavior - Verbal persuasion about capability 	<ul style="list-style-type: none"> - Knowledge gain - Awareness building - Increase in self-efficacy
Pain champion (PC)	<ul style="list-style-type: none"> - Identify and prepare champions - Use train-the-trainer strategies - Revise professional roles - Capture and share local knowledge - Organize clinician implementation team meetings - Develop/ distribute educational material - Conduct ongoing training 	<ul style="list-style-type: none"> - Recruitment of 1-2 care workers (RNs or LPNs) from each NH - 5x 8 h interactive training focusing on pain assessment, treatment and coaching skills - NH groups' management grants 10% of regular working time for champions' role - Quarterly meetings with all PCs and researchers to reflect on implementation experiences and extend training content - Provision of material for educational booster sessions <p><u>Role PC:</u></p>	<ul style="list-style-type: none"> - Information about health consequences - Instructions on how to perform the behavior - Demonstration of the behavior - Behavioral practice/ rehearsal - Review behavior goals - Review outcome goals - Discrepancy between current behavior and goal - Feedback on behavior 	<ul style="list-style-type: none"> - Knowledge gain - Awareness building - Increase in self-efficacy

		<ul style="list-style-type: none"> - Conduct regular educational booster sessions - Monitor residents' documentation and provide individual feedback - Provide guidance and practical support in complex resident pain situations 	<ul style="list-style-type: none"> - Verbal persuasion about capability - Social support 	<ul style="list-style-type: none"> - Social influences
Meetings with NHs' leadership	<ul style="list-style-type: none"> - Mandate change - Obtain formal commitments - Use advisory boards and workgroups - Involve executive boards - Capture and share local knowledge - Provide ongoing consultation 	<ul style="list-style-type: none"> - Preparatory meetings with NH leadership prior to implementation and ongoing telephone support - Collaborative agreement between NHs and research institute - Quarterly sounding board meetings involving leadership of each participating NH, administrative leadership of NH group and researchers to discuss local barriers and progress of implementation 	<ul style="list-style-type: none"> - Restructuring the physical/social environment 	<ul style="list-style-type: none"> - Environmental context and resources
Adaptations of the documentation software	<ul style="list-style-type: none"> - Change record systems 	<ul style="list-style-type: none"> - Adaptations of the resident documentation software (e.g. pain assessment form) 	<ul style="list-style-type: none"> - Restructuring the physical environment 	<ul style="list-style-type: none"> - Environmental context and resources
Provision of educational material	<ul style="list-style-type: none"> - Develop educational materials - Distribute educational materials 	<ul style="list-style-type: none"> - Provision of guideline on each ward in paper form and intranet - Distribution of assessment tools (e.g. cardboard VAS scales) 		

Table 2: Characteristics of care workers at Baseline

	Care workers n= 136
Age (years) mean (SD)	37.7 (13.9)
Female n (%)	110 (83.3)
Professional background	
RNs n (%)	29 (21.8)
LPNs n (%)	36 (27.1)
Nursing aides n (%)	52 (39.8)
Other personnel n (%)	15 (11.3)
Work experience (years) mean (SD)	11.2 (10.5)
Tenure in NH (years) mean (SD)	3.3 (4.9)

Note. RN= registered nurse, LPN= licensed practical nurse

Table 3: Associations between self- efficacy items and self- reported adoption of core elements

	I Comprehensive Assessment	II Use PAINAD	of III Re-evaluation	IV Documentation
	OR (CI)	OR (CI)	OR (CI)	OR (CI)
How confident are you				
..to systematically interview residents about their pain	1.10* (1.03- 1.17)		1.00 (0.97 -1.04)	
...to differentiate between different sources of residents' pain?	1.07* (1.01- 1.14)			
...to recognize when residents with dementia are in pain?		1.05* (1.00- 1.1)	1.02 (0.98- 1.05)	
... to use an observational pain scale for pain assessment in residents with dementia (e.g., PAINAD)?	1.07* (1.02- 1.13)	1.05* (1.00- 1.09)	1.01 (0.99- 1.04)	
...to use a standardized scale for residents' self-report of pain?	1.14* (1.03- 1.25)		1.01 (0.98- 1.04)	
...to document the relevant information about residents' pain situations completely?				1.02 (0.98- 1.05)

Note. OR= odds ratio, CI= confidence interval; * $p < 0.05$