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Pain and its consequences in dementia: Observing the complex relationship between pain, behaviour and ADL in nursing home residents

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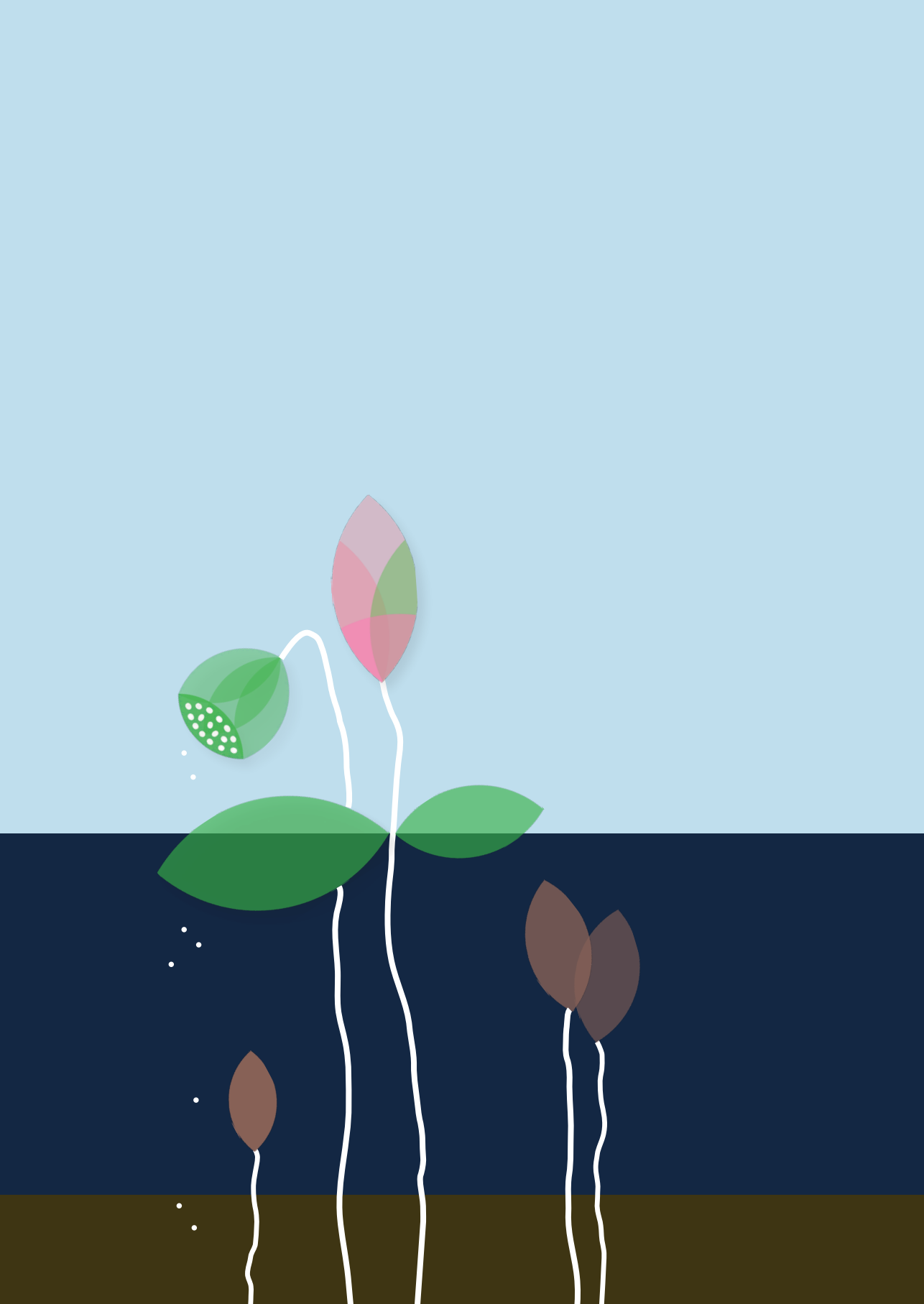
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PART II

Pain Assessment in Impaired Cognition: PAIC

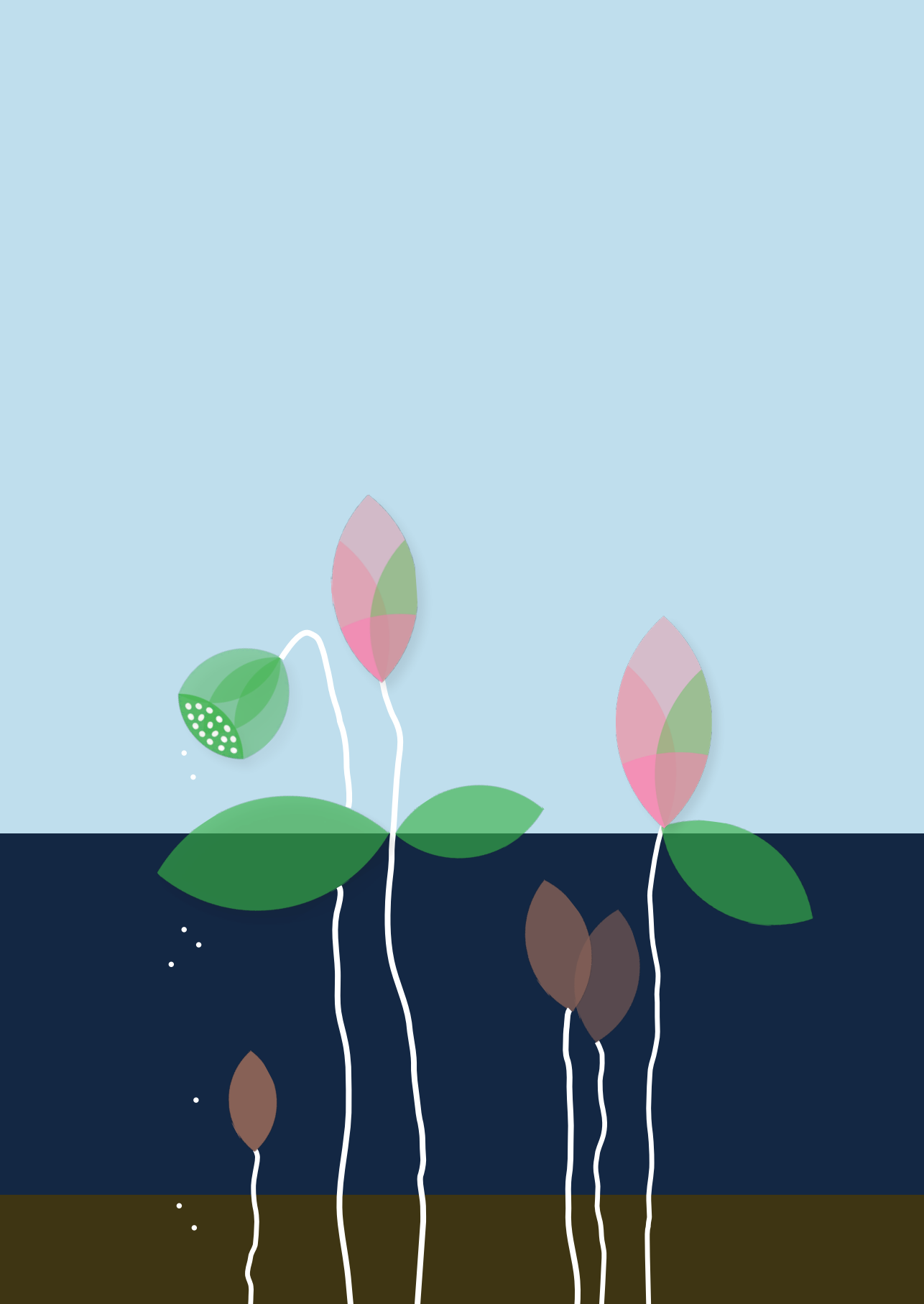


CHAPTER 5

Pain assessment in impaired cognition (PAIC): content validity of the Dutch version of a new and universal tool to measure pain in dementia

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Abstract

Objectives

Detection and measurement of pain in persons with dementia by using observational pain measurement tools is essential. However, the evidence for the psychometric properties of existing observational tools remains limited. Therefore, a new meta-tool has been developed: Pain Assessment in Impaired Cognition (PAIC), as a collaborative EU action. The aim is to describe the translation procedure and content validity of the Dutch version of the PAIC.

Methods

Translation of the PAIC into Dutch followed the forward-backward approach of the Guidelines for Establishing Cultural Equivalence of Instruments. A questionnaire survey was administered to clinical nursing home experts (20 physicians and 20 nurses) to determine whether the PAIC items are indicative of pain and whether items are specific for pain, or for other disorders (anxiety disorder, delirium, dementia, or depression). To quantify content validity, mean scores per item were calculated.

Results

Eleven items were indicative of pain, for example: 'frowning', 'freezing', and 'groaning'. Fifteen items were considered to be pain-specific, for example, 'frowning', 'curling up', and 'complaining'. There were discrepancies between the notion of pain characteristics according to nurses and physicians, especially in the facial expressions domain.

Discussion

Within the body movement domain, PAIC items correspond well with the clinical experience of the physicians and nurses. However, items in the facial expressions and vocalizations domain need further study with respect to item reduction. Also, differences were revealed in the notion of pain characteristics between physicians and nurses, suggesting the need for more interdisciplinary education on pain in dementia.

Keywords:

content validity, dementia, education, nursing home, observational pain measurement tool, pain

Introduction

Detection of pain in persons with dementia is challenging due to loss of ability to communicate and to the diverse presentation of pain.¹ Therefore, in these individuals, observational pain measurement tools play an important role in the detection and measurement of pain. However, in clinical practice, it is often difficult to distinguish pain-related behaviour from behavioural symptoms related to other disorders, such as anxiety disorder, delirium, depression, or to dementia-related behaviours.

Over the years, many observational pain measurement tools have been developed, including: PAINAD², PACSLAC³, and MOBID-2⁴. However, a systematic review of systematic reviews showed that there is limited evidence for the reliability, validity, feasibility, or clinical utility of these tools; the authors concluded that no specific available tool can be recommended for use in clinical practice.⁵ Moreover, nurses do not always use observational pain tools⁶ and often prefer to rely on their intuition and feelings.⁷ However, the non-use of observational pain measurement tools is a barrier to adequate pain management in persons with dementia.⁸ Therefore, observational pain measurement tools are an essential addition to pain assessment, especially in persons with dementia living in a nursing home. Consequently, there is a need for more evidence-based observational pain measurement. In light of these findings, the EU-COST action TD 1005 program Pain Assessment in Patients with Impaired Cognition, especially Dementia, developed a meta-tool: Pain Assessment in Impaired Cognition (PAIC).⁹ The EU-COST action TD 1005 was a 4-year EU initiative (2010-2014), which combined knowledge of experimental and clinical researchers with that of clinical experts, including developers of (some of the) other observational pain measurement tools. One of the aims of the EU-COST action was for the PAIC to become a universal meta-tool, which 1) comprises the best elements of existing observational instruments, and 2) can be used in both daily practice and research.

The PAIC consists of three domains of possible indicators for pain: 'facial expressions', 'body movements', and 'vocalizations' (Appendix 1). These carefully chosen domains were based on research by the American Geriatric Society (AGS).^{9,10} The 36 PAIC items were systematically selected based on 12 existing assessment tools, expert opinion, previous research, and the AGS criteria.⁹ These 36 individual items are the main focus of the present study.

In the Netherlands, healthcare workers in nursing homes, such as elderly care physicians (ECPs) and nurses, are likely to be target users of the PAIC. Therefore, the PAIC items should represent/reflect the notion of pain in persons with dementia as perceived by ECPs and nurses. Different notions of pain characteristics might lead to suboptimal communication between physicians and nurses¹¹ and hinder adequate pain assessment and treatment. The aim of this study was to describe the translation and evaluation of the content validity of all individual items of the Dutch version of the meta-tool PAIC. It is important to investigate whether all items are indicative of pain¹² and whether potential users of the PAIC (ECPs and nurses) consider the different items to be pain-specific, or more specific for other disorders (e.g., delirium, dementia, depression, or anxiety disorder).

Material and Methods

Translation

Dutch version of the PAIC

Translation into Dutch followed the forward-backward approach of the Guidelines for Establishing Cultural Equivalence of Instruments.¹³ Forward translation from English into Dutch was performed by two independent translators whose native language is Dutch. The professional translator had no medical background and the second translator was a general practitioner with English as a second language. Both forward translations were compared and combined into one common version. The common forward translation was translated back into English by an independent professional translator whose native language is English and who was experienced in translating measurement instruments. The second back translator was a pediatric nursing oncology consultant, familiar with the development and translation of measurement instruments. Both back translations were compared and combined, and the final English version was then compared with the original English version. Discrepancies were discussed until consensus was achieved. Finally, the resulting Dutch version was tested during a ‘think aloud’ test¹² among nurses working in nursing homes. In this ‘think aloud’ test three nurses (experienced in the care for persons with dementia) were asked to think out loud while filling out the PAIC. Each nurse rated five video-recordings of persons with dementia. All these persons were admitted to a psychogeriatric ward and filmed during their morning care and mealtime. The goal of this test was to look for cues that indicated where the clarity or translation of the items was inadequate, whether the scoring system used was understandable, and whether there were situations in which rating was not possible.

Content validity

Participants

A questionnaire to assess content validity of the PAIC was administered to potential users, that is, nursing home staff who comprised ECPs (n=20) and nurses (n=20) working in seven different nursing home organizations in the Netherlands. All participants had experience in working with persons with dementia at psychogeriatric wards of a nursing home; henceforth, these ECPs and nurses are referred to as ‘clinical experts’.

Questionnaire

The questionnaire consisted of five general questions: 1) What is your profession? 2) What is your age? 3) Do you feel competent to estimate if a person with dementia is in pain? 4) Are pain measurement tools used in your organization? and 5) How often do you use a pain measurement tool?

Next, the clinical experts were asked their opinion about the different items per domain of the PAIC. They were asked whether they considered an item to be indicative of pain, responding on a 4-point Likert scale, that is, 1) no, definitely not; 2) no, probably not; 3) yes, probably; and 4) yes, definitely.

They were also asked to indicate whether the different items were most specific for pain or for one of the other disorders such as anxiety disorder, delirium, dementia, or depression. The clinical experts were explicitly asked to indicate only one disorder per item.

Statistical analyses

Descriptive statistics were used to describe the demographic characteristics of the participants. Data were expressed as means with standard deviation (SD), or medians with interquartile range (IQR), as appropriate.

For the interpretation of content validity of the different items, the sum score was calculated. The 4-point scale was recoded into the following scores: 'No, definitely not': -1, 'No, probably not': -0.5, 'Yes, probably': 0.5, and 'Yes, definitely': 1.

An item was considered indicative for pain if the mean score was >0.50 . To visualize disorder specificity, the items were displayed in three different bar charts, representing each domain of the PAIC. An item was considered pain-specific, or specific for another disorder, if at least 50% of the clinical experts indicated the item to be pain-specific.

The analyses were first conducted for all clinical experts together and then for the ECPs and nurses separately.

Analyses were performed with IBM SPSS Statistics version 20.0 for Windows.

Results

Translation

The PAIC has been translated and culturally adapted for the Netherlands (Appendix 2). In the 'think aloud' test, all items of the Dutch version of the PAIC were found useful in detecting pain and also relatively easy to score in the clinical setting. The few criticisms made were related to semantics and to the interpretation of some items. For example, nurses questioned whether the item 'opened mouth' referred to the active movement of opening the mouth, or whether the item referred to the static state in which the mouth was already open.

Clinical experts

The clinical experts consisted of 20 ECPs and 20 nurses (Table 1). The majority was female (80%), and the total mean score on 'feeling competent to assess pain in persons with dementia' was 7.5 (SD 1.3) on a 1-10 Likert scale, on which higher scores indicate a higher level of competence. ECPs and nurses felt equally competent to estimate pain in persons with dementia, that is, median 7.0 (IQR 6.5-8.1) and 7.6 (IQR 7.0-9.4), respectively.

Of the clinical experts, 72% indicated that some form of pain measurement tool was implemented in their organization but was hardly used; only 14% used such a tool once or twice a month.

Compared to ECPs, nurses less often used a pain measurement tool. For example, no nurse used a tool monthly (or more) compared with 45% of the ECPs.

Table 1. Characteristics of the clinical experts

Characteristics	Elderly care physicians	Nurses	Total
Gender, female	(n=20) 12 (60%) (n=20)	(n=20) 20 (100%) (n=16)*	(n=40) 32 (80%) (n=36)*
Feeling competent to assess pain in patients with dementia (Likert scale 0-10)	7.0 (IQR 6.5-8.1)	7.6 (IQR 7.0-9.4)	7.5 (SD 1.3)
Implementation of pain measurement instrument in nursing home			
○ Yes	17 (85%)	9 (56 %)	26 (72%)
○ No	3 (15%)	7 (44 %)	10 (28%)
How often do you use pain measurement instruments in daily practice?			
○ Never	3 (15%)	8 (50%)	11 (31%)
○ < 1 x month	8 (40%)	8 (50%)	16 (44%)
○ 1-2 x month	5 (25%)	-	5 (14%)
○ 1 x week	3 (15%)	-	3 (8%)
○ Almost daily	1 (5%)	-	1 (3%)

Note: *Lower n due to missing items. Abbreviations: IQR, interquartile range.

PAIC items indicative of pain

Table 2 presents the scores of all the clinical experts together, and ECPs and nurses separately, on how indicative the PAIC items are to detect pain. For each item the mean (SD) of sumscores is presented.

Facial expressions

Of the 15 facial expression items, ‘pained expression’ and ‘frowning’ had the highest mean score: 0.90 (SD 0.20) and 0.54 (SD 0.41), respectively (Table 2). Five items had a mean score below zero, with the lowest mean scores of -0.45 (SD 0.54) and -0.50 (SD 0.56) for ‘empty gaze’ and ‘seeming disinterested’, respectively, indicating that these items were considered less indicative of pain.

In the subgroup of ECPs, the items 'pained expression' and 'frowning' were also considered indicative of pain. This was also true for the subgroup of nurses, although the item 'frowning' did not reach the level of >0.50 . Additionally, nurses also considered 'tightened lips' 0.53 (SD 0.61), 'looking tense' 0.53 (SD 0.50) and 'looking frightened' 0.55 (SD 0.58) to be indicative of pain.

Body movements

In the body movements domain, as none of the items scored below zero, all items were considered indicative of pain. Five items had a mean score >0.50 : 'freezing' (0.65, SD 0.36), 'curling up' (0.69, SD 0.37), 'guarding' (0.65, SD 0.41), 'rubbing' (0.54, SD 0.42), and 'limping' (0.68, SD 0.42).

Subgroup analyses showed no difference between ECPs and nurses compared to the whole sample, with the exception of the item 'pacing'. On average, nurses considered 'pacing' to be probably indicative of pain, as opposed to ECPs who considered the item to be probably not indicative of pain.

Vocalizations

Four items of the vocalizations domain had mean scores >0.50 : 'complaining', 'groaning', and 'crying', with the highest mean score of 0.90 (SD 0.29) for the item 'using pain-related words'. This applied to both subgroups of the clinical experts.

Two items were considered not indicative of pain: 'repeating words' -0.26 (SD 0.53) and 'mumbling' -0.18 (SD 0.55). The only item with low mean scores assigned by both ECPs and nurses was 'repeating words': -0.33 (SD 0.52) and -0.20 (SD 0.55), respectively.

Table 2. Scoring of PAIC items on question indicative of pain and on question specific for pain

	Clinical experts (n=40)		ECPs (n=20)		Nurses (n=20)	
	Indicative of pain (mean, SD) ^a	Specific for pain ^b	Indicative of pain (mean, SD) ^a	Specific for pain ^b	Indicative of pain (mean, SD) ^a	Specific for pain ^b
Facial expressions						
Pained expression	0.90 (0.20)	X	0.88 (0.22)	X	0.93 (0.18)	X
Frowning	0.54 (0.41)	X	0.58 (0.18)	X	0.50 (0.56)	
Narrowing eyes	0.27 (0.52)	X	0.45 (0.36)	X	0.13 (0.60)	X
Closing eyes	-0.05 (0.61)		-0.20 (0.55)		0.10 (0.64)	
Raising upper lip	0.15 (0.58)	X	0.11 (0.54)	X	0.20 (0.62)	X
Opened mouth	-0.23 (0.62)		-0.40 (0.50)		-0.05 (0.69)	
Tightened lips	0.41 (0.52)	X	0.30 (0.41)	X	0.53 (0.61)	X
Clenched teeth	0.41 (0.52)	X	0.45 (0.36)	X	0.36 (0.66)	X
Empty gaze	-0.45 (0.54)		-0.60 (0.35)		-0.29 (0.65)	
Seeming disinterested	-0.50 (0.56)		-0.75 (0.26)		-0.24 (0.67)	
Pale face	-0.27 (0.61)		-0.50 (0.41)		-0.02 (0.70)	X
Teary eyed	0.13 (0.63)		0.00 (0.58)		0.25 (0.66)	X
Looking tense	0.44 (0.48)		0.35 (0.46)		0.53 (0.50)	
Looking sad	0.10 (0.68)		-0.08 (0.54)		0.29 (0.77)	
Looking frightened	0.49 (0.58)		0.41 (0.58)		0.55 (0.58)	
Body movements						
Freezing	0.65 (0.36)	X	0.70 (0.25)		0.60 (0.45)	X
Curling up	0.69 (0.37)	X	0.78 (0.26)	X	0.60 (0.44)	
Clenching hands	0.41 (0.47)		0.45 (0.36)		0.38 (0.56)	
Resisting care	0.19 (0.49)		0.17 (0.49)		0.23 (0.53)	
Pushing	0.33 (0.58)		0.20 (0.55)		0.45 (0.60)	
Guarding	0.65 (0.41)	X	0.68 (0.37)	X	0.63 (0.46)	X
Rubbing	0.54 (0.42)	X	0.53 (0.41)	X	0.55 (0.44)	X
Limping	0.68 (0.42)	X	0.63 (0.46)	X	0.73 (0.38)	X
Restlessness	0.23 (0.57)		0.08 (0.46)		0.38 (0.56)	
Pacing	0.09 (0.62)		-0.05 (0.58)		0.23 (0.64)	

Table 2. Scoring of PAIC items on question indicative of pain and on question specific for pain
(continued)

	Clinical experts (n=40)		ECPs (n=20)		Nurses (n=20)	
	Indicative of pain (mean, SD) ^a	Specific for pain ^b	Indicative of pain (mean, SD) ^a	Specific for pain ^b	Indicative of pain (mean, SD) ^a	Specific for pain ^b
Vocalizations						
Using offensive words	0.23 (0.55)		0.13 (0.54)		0.34 (0.55)	
Using pain-related words	0.90 (0.29)	X	0.89 (0.21)	X	0.90 (0.35)	X
Repeating words	-0.26 (0.53)		-0.33 (0.52)		-0.20 (0.55)	
Complaining	0.64 (0.36)	X	0.65 (0.24)	X	0.63 (0.46)	
Shouting	0.03 (0.58)		-0.05 (0.58)		0.10 (0.58)	
Mumbling	-0.18 (0.55)		-0.35 (0.46)		0.00 (0.58)	
Screaming	0.26 (0.53)		0.15 (0.56)		0.38 (0.48)	
Groaning	0.71 (0.32)	X	0.66 (0.37)	X	0.75 (0.26)	X
Crying	0.60 (0.40)		0.53 (0.41)		0.68 (0.37)	X
Gasping	0.35 (0.57)	X	0.35 (0.54)		0.35 (0.61)	X
Sighing	0.14 (0.58)		0.10 (0.58)		0.18 (0.59)	X

Notes: ^aMean score >0.50 considered content valid. ^bWhen marked with an 'X', at least 50% of clinical experts rated the item as specific for pain. Bold entries indicate PAIC items indicative of pain as well as specific for pain.

Abbreviations: PAIC, Pain Assessment in Impaired Cognition, ECP, elderly care physician.

PAIC items specific for pain

Figures 1-3 show whether the clinical experts considered the different items of the PAIC to be pain-specific, or more specific for other disorders. An item was considered specific for a disorder when (at least) 20 out of 40 clinical experts rated it as such. Furthermore, Table 2 also shows which items were considered specific for pain. An item was considered specific for a disorder when (at least) 50% of the clinical experts and (at least) 50% of the ECPs and nurses rated it as such (marked with 'x').

Facial expressions

The clinical experts indicated six items to be pain-specific: 'pained expression', 'frowning', 'narrowing eyes', 'raising upper lip', 'tightened lips', and 'clenched teeth' (Figure 1). The remaining items were indicated to be more specific for one of the other disorders: anxiety disorder, depression, and dementia. For example, the items 'looking tense' and 'looking frightened' were indicated to be most specific for anxiety disorder, the items 'opened mouth' and 'empty gaze' for dementia, and the item 'looking sad' for depression. Facial expressions were seldom found to be specific for delirium.

Subgroup analyses showed that ECPs rated some items to be more specific for depression (Appendix 3 and 4). Especially, the items 'closing eyes', 'seeming disinterested', 'teary

eyed’, and ‘looking sad’ were considered to be most specific for depression. On the other hand, nurses only indicated ‘looking sad’ to be most specific for depression. Additionally, nurses indicated the item ‘pale face’ to be pain-specific, whereas ECPs indicated the item to be most specific for anxiety disorder. Both ECPs and nurses considered the item ‘empty gaze’ not to be pain-specific at all; this item was found to be most specific for dementia.

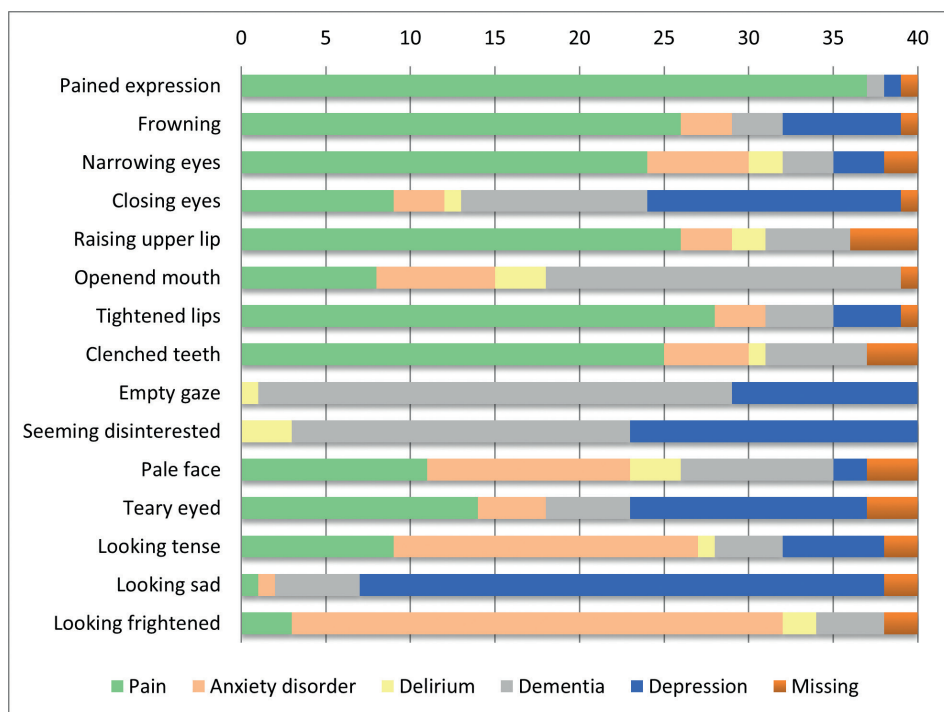


Figure 1. Facial expressions considered pain-specific or specific for other disorders by the clinical experts (n=40).

Body movements

Of the 10 items in the body movements domain, half were indicated to be pain-specific: ‘freezing’, ‘curling up’, ‘guarding’, ‘rubbing’, and ‘limping’ (Figure 2). The item ‘pacing’ was indicated to be most specific for dementia itself, as was the item ‘restlessness’. The items of the body movements domain were often considered not to be specific for the disorders delirium and depression.

There was a substantial agreement between ECPs and nurses. They indicated most of the body movements to be most specific for pain and dementia (Appendix 3). Furthermore, both ECPs and nurses indicated that some items were specific for an anxiety disorder, for example, ‘resisting care’ and ‘clenching hands’. According to ECPs and nurses, depression was almost never related to the items of the body movements domain.

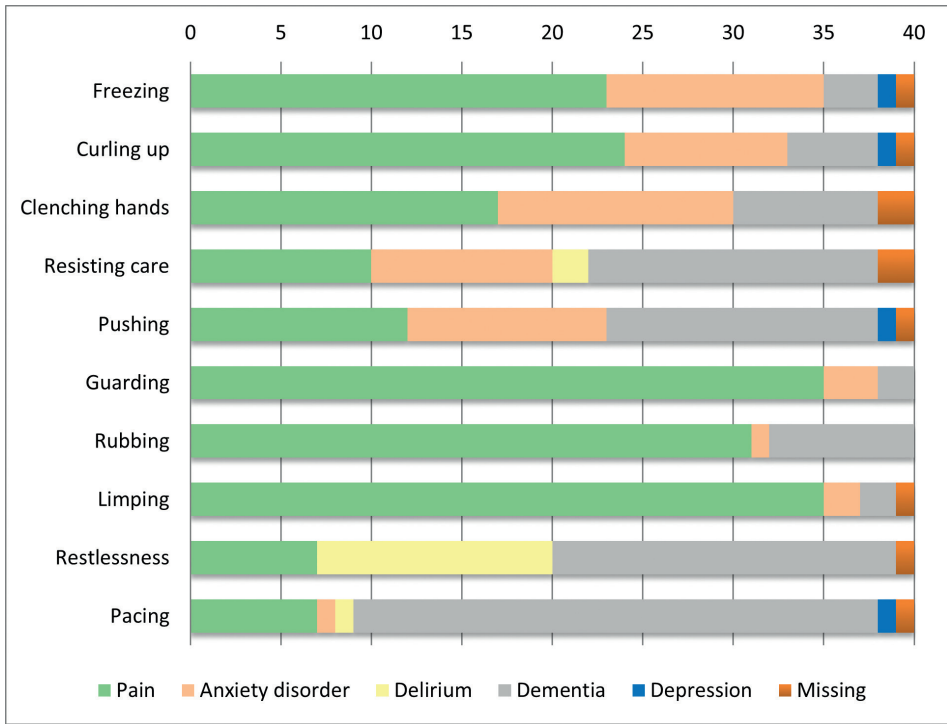


Figure 2. Body movements considered pain-specific or specific for other disorders by the clinical experts (n=40)

Vocalizations

The items 'using pain-related words', 'complaining', 'groaning', and 'gasping' were indicated to be most pain-specific (Figure 3); however, the item 'complaining' was also considered specific for depression. The clinical experts indicated five items to be most specific for dementia: 'using offensive words', 'repeating words', 'shouting', 'mumbling', and 'screaming'.

'Crying' and 'sighing' were found to be specific for depression, but were also considered pain-specific. Overall, the items of the vocalizations domain were not often found to be specific for the disorder delirium

The item 'pain-related words' was considered to be definitely pain-specific and not specific for one of the other disorders. This also applied on the subgroup level (Appendix 3).

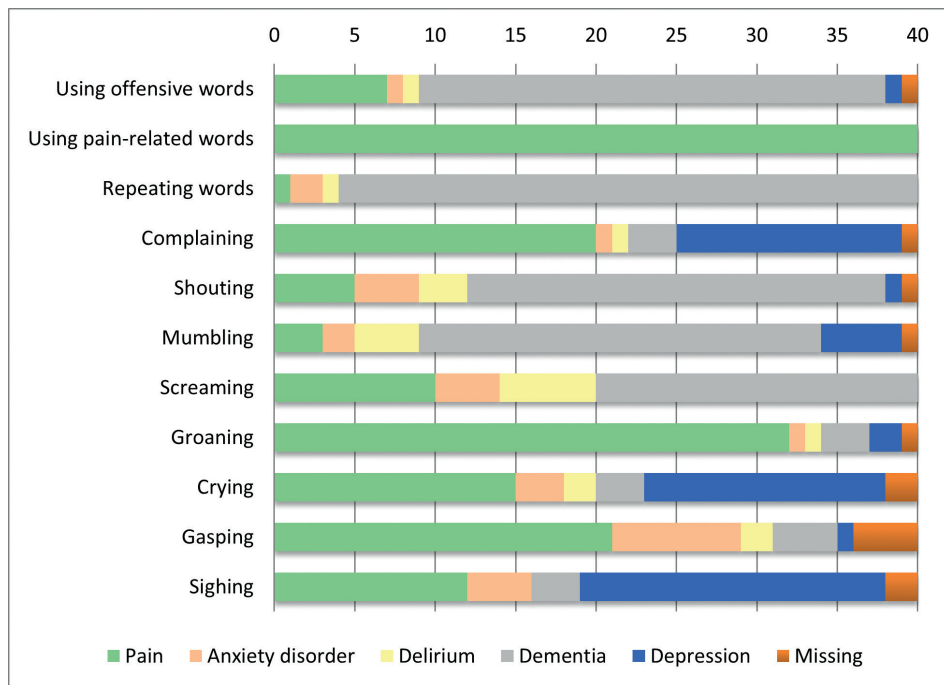


Figure 3. Vocalizations considered pain-specific or specific for other disorders by the clinical experts (n=40)

Discussion

In this study, the PAIC was translated into Dutch and content validity was examined. Overall, the study suggests that especially the items of the body movements domain correspond well with the clinical experience of the ECPs and nurses in Dutch nursing homes and showed good content validity. Compared with the body movements domain, lower content validity was shown for a number of items of the facial expressions domain and, to a lesser extent, for items of the vocalizations domain.

In total, 11 items (30.6%) had mean scores of >0.50 and were considered most definitely indicative of pain: 'pained expression', 'frowning', 'freezing', 'curling up', 'guarding', 'rubbing', 'limping', 'using pain-related words', 'complaining', 'groaning', and 'crying'.

However, six items with lower scores may still be promising, as they were found to be most pain-specific: 'clenched teeth', 'tightened lips', 'raising upper lip', 'narrowing eyes', 'gasping', and 'complaining'. The remaining items were found to be most specific for one of the other disorders, that is, anxiety disorder, delirium, depression, or dementia. More importantly, 10 items were considered indicative of pain as well as specific for pain: 'pained expression', 'frowning', 'freezing', 'curling up', 'guarding', 'rubbing', 'limping', 'using pain related words', 'complaining', and 'groaning'. This suggests that these items fit most with the opinion of the clinical experts and are, therefore, promising items in the measurement of pain.

Surprisingly, of the 11 items considered indicative of pain by ECPs and nurses, only two belonged to the facial expressions domain. Also, according to ECPs, several items of the facial expressions domain are more specific for depression or an anxiety disorder. This is remarkable because the items included in the PAIC were carefully selected by an expert panel from existing observational pain measurement instruments⁹. Based on that selection procedure, one would expect more items of the facial expressions domain to have good content validity. Even more striking is that, in an experimental setting, facial expressions are found to be most specific for pain, especially in persons with dementia.¹⁴⁻¹⁶ Thus, this might suggest that the translation from bench to bedside does not fit the clinical notion of expressions of pain.

Additionally, there was a discrepancy between items considered indicative of pain and items considered pain-specific. For example, the items 'narrowing eyes', 'raising upper lip', 'clenched teeth', and 'tightening lips' had mean scores below 0.50; although they were considered less indicative of pain, they were considered more pain-specific compared to the other disorders (Table 2 and Figure 1). Interestingly, compared to ECPs, nurses found more items indicative of pain and also more items specific for pain.

These findings reveal not only a discrepancy between items being indicative of pain, but also a discrepancy between the notion of pain characteristics in dementia according to nurses and ECPs. This might be due to a lack of education of healthcare workers in the nursing home on pain assessment and management of persons with dementia.¹⁷ Moreover, a lack of training and education can present a barrier to adequate pain management.⁸ A lack of empirical evidence regarding which symptoms and behaviours are really related to pain might also play a role in this discrepancy. Since pain is an individual and personal experience, which is influenced by training and experience, healthcare workers may not think alike when identifying signs and symptoms of pain in persons with dementia.¹⁸ This discrepancy adds to the already difficult challenge of identifying pain in persons with dementia.

It is most important that nurses and physicians speak the same language and recognize the same items as pain indicators to achieve adequate pain management, especially since nurses play a key role in the care for and monitoring of symptoms in persons with dementia.

Interestingly, such discrepancies did not exist for the items of the body movements domain. First, there were no major discrepancies between items being indicative of pain versus items being pain-specific. In other words, all those items considered most definitely indicative of pain were also considered most pain-specific. Second, this domain showed hardly any differences between the nurses' and ECPs' notion of pain characteristics. The mean scores of nurses and ECPs separately did not differ, except for the item 'pacing' which ECPs rated with a mean score of -0.05 (SD 0.58) compared to 0.23 (SD 0.64) by nurses. In both groups, 'pacing' was found most specific for dementia.

Regarding the items of the vocalizations domain, the clinical experts indicated four items most definitely indicative of pain: 'crying', 'groaning', 'complaining', and 'using pain-related words'. Of those items, 'groaning', 'complaining', and 'using pain-related words' were also found to be most pain-specific. No major discrepancies were found between nurses and ECPs on items of the vocalizations domain. Surprisingly, despite the high mean score of the item 'crying' (0.60, SD 0.40), the clinical experts indicated 'crying' to be less pain-specific compared to the other disorders. In fact, the item 'crying' was also found to be

specific for depression. Furthermore, the item 'gasping' had a low mean score on being indicative of pain (0.35, SD 0.57), but was indeed considered pain-specific. Moreover, more than half of the items were found to be less indicative of pain and, remarkably, several items of the vocalizations domain were indicated to be also specific for dementia. This might suggest that nurses and ECPs do not interpret most of the vocalization items as an evident expression of pain.

A possible explanation for the overall agreement between nurses and ECPs on the items of the body movements and vocalizations domain, might be that pain-related body movements and vocalizations are more easily recognized than facial expressions of pain,^{19 20} which require more specific training and education.²¹ However, a recent study by Lautenbacher et al., showed that nurses caring for persons with dementia already focus on certain facial expressions like 'narrowed eyes' and 'frowning', without specific training.²² Again, this emphasizes the need for additional, improved, and interdisciplinary education on pain recognition in dementia.²³

Strengths and limitations

The strength of the present study is that the content validity was examined separately among ECPs and nurses. It is important that the content of a measurement instrument contains the views and beliefs of the potential users. This is also called 'user-centeredness' and is considered an important part of developing and testing a new measurement instrument.²⁴ Ultimately, this will contribute to better psychometric properties and feasibility of implementation of observational instruments, such as the PAIC.

Furthermore, our sample size was larger compared to other studies investigating psychometric properties of observational pain measurement tools.⁵ A larger sample size provides more solid results in terms of content validity.

A possible limitation is that content validity is a subjective assessment and no standardized procedures are available to investigate this. Moreover, most studies investigating observational pain tools do not report on content validity, despite that this is an important part of psychometrics, also with respect to feasibility of implementation.^{5 25} When content and face validity are missing, this might be a good reason not to use that specific measurement instrument.¹²

Additionally, in this study, the clinical experts were asked to indicate whether the items of the PAIC were most specific for pain, or for one of the other (fixed) disorders. They could indicate only one disorder per item, for example, anxiety disorder, delirium, dementia, depression, or pain. However, because these preselected disorders may not fully represent the opinion of the experts, some crucial information could have been missed. For example, one could suggest that the item 'pale face' is specific for Parkinson's disease, whereas this could not be indicated as such.

Furthermore, the items of the PAIC in this study were not assessed on prevalence in persons with dementia who experience pain; rather, the potential users of the PAIC were asked their clinical opinion about the items. However, the potential users of this study were considered clinical experts with considerable experience in the care for persons with dementia. Furthermore, we did not ask the clinical opinion of health care assistants or

nursing auxiliaries as they could play an important role in the recognition of a change in behaviour. They could provide additional information on possible cues for pain. Finally, since this study concerns validating the Dutch version of the PAIC, it is possible that, due to differences in culture and training, the results may not be generalizable to other countries.

Clinical implications

Besides establishing the content validity of the PAIC, this study also has clinical implications. For example, the study sheds light on the opinion of physicians and nurses regarding the cues used to decide whether a person with dementia is in pain. The study also reveals important differences of opinion between physicians and nurses. This information suggests that educational shortcomings may exist (especially interdisciplinary education) among healthcare workers in nursing homes. The study also provides insight into the empirical performance of the PAIC.

Due to its solid scientific basis, the PAIC seems a promising assessment tool.⁹ However, a lack of empirical evidence and of interdisciplinary education on pain in dementia could be a barrier to adequate pain management and treatment. Therefore, in addition to aiming to create the most valid/reliable assessment tool to measure pain in persons with dementia, it is also important to provide education on pain in dementia and training in the use of observational pain measurement tools. Also, considering that implementation of an observational pain measurement tool does not necessarily lead to better care²⁶, a constant flow of education should be available to maintain a certain level of awareness to ensure adequate management of pain.²⁷⁻²⁹ This validity study reveals, in particular, the need for more education in facial expressions.

Future directions PAIC

The first step in testing the Dutch version of the new, universal, meta-tool PAIC, was to examine the content validity of a wide range of individual items. To improve and refine the PAIC, item reduction is needed. For this, especially the facial expressions domain and (to a lesser extent) the vocalizations domain need additional study. The next important step is to examine content validity in other countries, so that the PAIC can become an internationally agreed upon observational measurement tool. Also, by investigating content validity in a larger population, factor analyses can be used to determine which items correlate with each other.¹² For example, if the different domains of the PAIC cluster together, a decision could be made to measure pain using the domain that corresponds most with the clinical experience and, therefore, is the easiest to score. Based on the present study, the body movements domain would be the most suitable to measure pain in persons with dementia. It might also be worthwhile to investigate if solely those items with good content validity (e.g., both indicative of pain and specific for pain) are sufficient for the measurement of pain in persons with dementia. In that case, this study suggests that the PAIC could be reduced from 36 items to only 10 items. However, although a shorter measurement tool might offer more advantages (e.g., easier to use, less time-consuming) with regard to

feasibility, clinical utility, and implementation in clinical/research settings, further testing using, for example factor analyses is needed.

Conclusion

This study shows that the Dutch version of the PAIC has overall good content validity but that differences exist in the notion of pain characteristics between nurses and physicians working in nursing homes. This important information indicates a need for more, interdisciplinary, education on pain in dementia. However, before implementing the PAIC in clinical and research settings, it is necessary to further test the reliability, clinical utility, and feasibility. Additionally, investment in more education of physicians and nurses might be required to accomplish more successful management of pain in persons with dementia.

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Disclosure

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References

1. Achterberg WP, Pieper MJ, van Dalen-Kok AH, et al. Pain management in patients with dementia. *ClinIntervAging* 2013;8:1471-82. doi: 10.2147/CIA.S36739 [doi];cia-8-1471 [pii]
2. Warden V, Hurley AC, Volicer L. Development and psychometric evaluation of the Pain Assessment in Advanced Dementia (PAINAD) scale. *JAmMedDirAssoc* 2003;4(1):9-15. doi: 10.1097/01.JAM.0000043422.31640.F7 [doi];S1525-8610(04)70258-3 [pii]
3. Fuchs-Lacelle S, Hadjistavropoulos T. Development and preliminary validation of the pain assessment checklist for seniors with limited ability to communicate (PACSLAC). *Pain ManagNurs* 2004;5(1):37-49. doi: S152490420300122X [pii]
4. Husebo BS, Strand LI, Moe-Nilssen R, et al. Mobilization-Observation-Behavior-Intensity-Dementia Pain Scale (MOBID): development and validation of a nurse-administered pain assessment tool for use in dementia. *J Pain Symptom Manage* 2007;34(1):67-80. doi: 10.1016/j.jpainsymman.2006.10.016
5. Lichtner V, Dowding D, Esterhuizen P, et al. Pain assessment for people with dementia: a systematic review of systematic reviews of pain assessment tools. *BMC Geriatr* 2014;14:138. doi: 10.1186/1471-2318-14-138
6. Manias E. Complexities of pain assessment and management in hospitalised older people: a qualitative observation and interview study. *Int J Nurs Stud* 2012;49(10):1243-54. doi: 10.1016/j.ijnurstu.2012.05.002
7. Parke B. Gerontological nurses' ways of knowing. Realizing the presence of pain in cognitively impaired older adults. *J Gerontol Nurs* 1998;24(6):21-8.
8. McAuliffe L, Nay R, O'Donnell M, et al. Pain assessment in older people with dementia: literature review. *J Adv Nurs* 2009;65(1):2-10. doi: 10.1111/j.1365-2648.2008.04861.x
9. Corbett A, Achterberg W, Husebo B, et al. An international road map to improve pain assessment in people with impaired cognition: the development of the Pain Assessment in Impaired Cognition (PAIC) meta-tool. *BMC Neurol* 2014;14(1):229. doi: 10.1186/s12883-014-0229-5
10. AGS PoPPIOP. The management of persistent pain in older persons. *JAmGeriatrSoc* 2002;50(6 Suppl):S205-S24. doi: jgs5071 [pii]
11. Peisah C, Weaver J, Wong L, et al. Silent and suffering: a pilot study exploring gaps between theory and practice in pain management for people with severe dementia in residential aged care facilities. *Clin Interv Aging* 2014;9:1767-74. doi: 10.2147/CIA.S64598
12. De Vet HC, Terwee CB, Mokkink LB, et al. Measurement in medicine: a practical guide: Cambridge University Press 2011.
13. Ohrbach R, Bjorner J, Jezewski M, et al. Guidelines for establishing cultural equivalency of instruments. *New York: University at Buffalo* 2009
14. Kunz M, Scharmann S, Hemmeter U, et al. The facial expression of pain in patients with dementia. *Pain* 2007;133(1-3):221-28. doi: S0304-3959(07)00516-7 [pii];10.1016/j.pain.2007.09.007 [doi]
15. Kunz M, Mylius V, Scharmann S, et al. Influence of dementia on multiple components of pain. *European Journal of Pain* 2009;13(3):317-25.
16. Oosterman JM, Zwakhalen S, Sampson EL, et al. The use of facial expressions for pain assessment purposes in dementia: a narrative review. *Neurodegenerative disease management* 2016;6(2):119-31.

17. Zwakhalen SM, Hamers JP, Peijnenburg RH, et al. Nursing staff knowledge and beliefs about pain in elderly nursing home residents with dementia. *Pain Research and Management* 2007;12(3):177-84.
18. Craig KD. The social communication model of pain. *Canadian Psychology/Psychologie canadienne* 2009;50(1):22.
19. Closs SJ, Cash K, Barr B, et al. Cues for the identification of pain in nursing home residents. *International journal of nursing studies* 2005;42(1):3-12.
20. Beach PA, Huck JT, Miranda MM, et al. Effects of Alzheimer Disease on the Facial Expression of Pain. *Clin J Pain* 2016;32(6):478-87. doi: 10.1097/ajp.000000000000302 [published Online First: 2015/09/18]
21. Oosterman JM, van Harten B, Weinstein HC, et al. Pain intensity and pain affect in relation to white matter changes. *Pain* 2006;125(1-2):74-81.
22. Lautenbacher S, Sampson EL, Pahl S, et al. Which Facial Descriptors Do Care Home Nurses Use to Infer Whether a Person with Dementia Is in Pain? *Pain Med* 2016 doi: 10.1093/pm/pnw281
23. Burns M, McIlfratrick S. Nurses' knowledge and attitudes towards pain assessment for people with dementia in a nursing home setting. *International journal of palliative nursing* 2015;21(10):479-85.
24. Long F. Reviewing and selecting outcome measures for use in routine practice. *Journal of Evaluation in Clinical Practice* 1998;4:4,339-50.
25. Zwakhalen SM, Hamers JP, Berger MP. The psychometric quality and clinical usefulness of three pain assessment tools for elderly people with dementia. *Pain* 2006;126(1-3):210-20. doi: S0304-3959(06)00353-8 [pii];10.1016/j.pain.2006.06.029 [doi]
26. Zwakhalen SM, van't Hof CE, Hamers JP. Systematic pain assessment using an observational scale in nursing home residents with dementia: exploring feasibility and applied interventions. *J Clin Nurs* 2012;21(21-22):3009-17. doi: 10.1111/j.1365-2702.2012.04313.x
27. Long CO. Pain management education in long-term care: It can make a difference. *Pain Management Nursing* 2013;14(4):220-27.
28. Ghandehari OO, Hadjistavropoulos T, Williams J, et al. A controlled investigation of continuing pain education for long-term care staff. *Pain Res Manag* 2013;18(1):11-8.
29. Jansen BW, Brazil K, Passmore P, et al. Exploring healthcare assistants' role and experience in pain assessment and management for people with advanced dementia towards the end of life: a qualitative study. *BMC Palliat Care* 2017;16(1):6. doi: 10.1186/s12904-017-0184-1

Appendix 1. PAIC-36 – English version

Facial Expressions

Please record the appearance of the facial expressions described in the table below according to **how visible** they are in the person you are observing

FACIAL EXPRESSIONS	Meaning of items	Degree of visibility				Not scored A. Item is not clear B. Situation is unsuitable C. Physical status of person not suitable for scoring D. Other [describe]
		Not at all	Slight degree	Moderate degree	Great degree	
Pained expression	facial display of pain	0	1	2	3	
Frowning	lowering and drawing brow together	0	1	2	3	
Narrowing eyes	narrowed eyes with tension around the eyes	0	1	2	3	
Closing eyes	<u>not</u> just blinking	0	1	2	3	
Raising upper lip	upper lip raised, nose may be wrinkled	0	1	2	3	
Opened mouth	the lips are parted, jaw is dropped	0	1	2	3	
Tightened lips	lips are pressed together and appear more narrow	0	1	2	3	
Clenched teeth	teeth are pressed together with tension	0	1	2	3	
Empty gaze	Eyes do not reflect any emotion or thinking activity ("blank expression")	0	1	2	3	
Seeming disinterested	face does not reflect any interest in the environment	0	1	2	3	
Pale face	pale skin colour	0	1	2	3	
Teary eyed	watery eyes	0	1	2	3	
Looking tense	facial display of strain or worry	0	1	2	3	
Looking sad	facial display of unhappiness, sorrow or low mood	0	1	2	3	
Looking frightened	facial display of fear, alarm or heightened anxiety	0	1	2	3	

Appendix 1. PAIC-36 – English version

Body movements

Please record the occurrence of the body movements described in the table below according to **how visible** they are in the person you are observing

BODY MOVEMENTS	Meaning of items	Degree of visibility				Not scored A. Item is not clear B. Situation is unsuitable C. Physical status of person not suitable for scoring D. Other [describe]
		Not at all	Slight degree	Moderate degree	Great degree	
Freezing	sudden stiffening, avoiding movement, holding breath	0	1	2	3	
Curling up	curling up the body tightly, pulling in arms and legs	0	1	2	3	
Clenching hands	tensing hands, making fists, grabbing objects tightly	0	1	2	3	
Resisting care	resisting being moved or resisting care, being uncooperative	0	1	2	3	
Pushing	actively pushing somebody or something away	0	1	2	3	
Guarding	protecting affected body part, holding body part, avoiding touch, moving away	0	1	2	3	
Rubbing	tugging or massaging affected body part	0	1	2	3	
Limping	avoiding pain while walking in an unbalanced way	0	1	2	3	
Restlessness	fidgiting, wringing hands, rocking back and forth	0	1	2	3	
Pacing	wandering restlessly back and forth (might also be in a wheelchair)	0	1	2	3	

Appendix 1. PAIC-36 – English version

Vocalizations

Please record the vocalizations described in the table below according to **how audible** they are in the person you are observing

VOCALIZATION	Meaning of items	Not scored			
		Not at all	Slight degree	Moderate degree	Great degree
Using offensive words	cursing, swearing, or using foul language	0	1	2	3
Using pain-related words	using pain words, like “ouch”, “ow”, or “that hurts”	0	1	2	3
Repeating words	repeating words or phrases again and again (not stuttering)	0	1	2	3
Complaining	expressing being unhappy, sick, uncomfortable, and/or in pain	0	1	2	3
Shouting	using a loud voice to express words	0	1	2	3
Mumbling	uttering words and/or sounds indistinctly	0	1	2	3
Screaming	using a loud and/or high-pitched voice to express sounds	0	1	2	3
Groaning	making a deep, inarticulate sound	0	1	2	3
Crying	whimpering, sobbing, wailing, or weeping	0	1	2	3
Gasping	breathing sharply, laboriously, and/or loudly	0	1	2	3
Sighing	taking in and letting out a long, loud breath	0	1	2	3

Appendix 2: PAIC – Dutch version

Gezichtsuitdrukkingen

Noteer het voorkomen van de gezichtsuitdrukkingen beschreven in de onderstaande tabel op basis van **hoe duidelijk** ze aanwezig zijn bij de persoon die u observeert.

GEZICHTS-UITDRUKKINGEN	Betekenis items	Helemaal niet	Geringe mate	Gemiddelde mate	Hoge mate
Gepijnigde uitdrukking	Gezichtsuitdrukking van pijn	0	1	2	3
Fronsen	Wenkbrauwen omlaag bewegen en samentrekken	0	1	2	3
Ogen vernauwen	Oogleden samenknijpen, met spanning rond de ogen	0	1	2	3
Ogen sluiten	Ogen actief sluiten, niet alleen knipperen	0	1	2	3
Bovenlip omhoog trekken	Bovenlip omhoog omhoog getrokken, huid rond neus kan plooiën	0	1	2	3
Geopende mond	Lippen en kaken van elkaar	0	1	2	3
Samengeperste lippen	Lippen zijn samengeperst en lijken smaller	0	1	2	3
Op elkaar geklemd tanden	Tanden en kiezen zijn op elkaar geklemd met spanning in de kaken	0	1	2	3
Lege blik	Ogen laten geen enkele emotie of actieve gedachtegang zien, "uitdrukkingsloos"	0	1	2	3
Ongeïnteresseerde blik	Gezicht laat geen enkele interesse in de omgeving zien	0	1	2	3
Bleek gezicht	Bleke huidskleur	0	1	2	3
Betraande ogen	Waterige ogen (meer dan normaal)	0	1	2	3
Gespannen uitdrukking	Gezichtsuitdrukking is gespannen, bezorgd	0	1	2	3
Verdrietige uitdrukking	Gezichtsuitdrukking is droevig, neerslachtig of niet gelukkig	0	1	2	3
Er angstig uitzien	Gezichtsuitdrukking is angstig, gealarmeerd, of geeft verhoogde ongerustheid weer	0	1	2	3

Niet gescoord
a = Item is onduidelijk
b = Situatie is ongeschikt
c = Fysieke toestand cliënt is niet geschikt om te scoren
d = Anders:.....

Appendix 2: PAIC – Dutch version

Lichaamsbewegingen

Noteer het voorkomen van de lichaamsbewegingen beschreven in de onderstaande tabel op basis van **hoe duidelijk** ze aanwezig zijn bij de persoon die u observeert.

LICHAAMS BEWEGINGEN	Betekenis items	Niet gescoord			
		Helemaal niet	Geringe mate	Gemiddelde mate	Hoge mate
Verstarren	Plotselinge verstijving, vermijden van beweging, adem inhouden	0	1	2	3
Ineenkrimpen	Lichaam stevig oprullen, armen en benen intrekken	0	1	2	3
Gebalde handen	Handen gespannen, vuisten maken, voorwerpen stevig vastgrijpen	0	1	2	3
Verzetten tegen zorg	Verzetten tegen verplaatsing of zorg, niet meewerken	0	1	2	3
Duwen	Actief iemand of iets wegduwen	0	1	2	3
Beschermen	Aangedaan lichaamsdeel beschermen, lichaamsdeel vasthouden, aanraking vermijden, afwenden	0	1	2	3
Wrijven	Aanraken of masseren van het aangedane lichaamsdeel	0	1	2	3
Strompelen	Pijn vermijden door op een ongebalanceerde manier te lopen	0	1	2	3
Rusteloosheid	Friemelen, in de handen knijpen, heen en weer wiegen	0	1	2	3
Ijsberen	Rusteloos heen en weer lopen; kan ook in een trippelrolstoel zijn	0	1	2	3

Niet gescoord
a = Item is onduidelijk
b = Situatie is ongeschikt
c = Fysieke toestand cliënt is niet geschikt om te scoren
d = Anders:.....

Appendix 2: PAIC – Dutch version

Stemgeluiden

Noteer het voorkomen van de stemgeluiden beschreven in de onderstaande tabel op basis van **hoe hoorbaar** ze zijn bij de persoon die u observeert.

STEMGELUIDEN	Betekenis items	Helemaal niet	Geringe mate	Gemiddelde mate	Hoge mate	Niet gescoord a = Item is onduidelijk b = Situatie is ongeschikt c = Fysieke toestand cliënt is niet geschikt om te scoren d = Anders:.....
Beledigende taal gebruiken	Vloeken, schelden, onbehoorlijke taal gebruiken	0	1	2	3	
Pijngerelateerde woorden gebruiken	Pijnwoorden gebruiken zoals 'auw', 'ahh' of 'dat doet pijn'	0	1	2	3	
Herhalen van woorden	Keer op keer herhalen van woorden of zinnen (niet stotteren)	0	1	2	3	
Klagen	Aangeven/zeggen ongelukkig, ziek oncomfortabel te zijn en/of pijn te hebben	0	1	2	3	
Roepen	Hard stemgeluid gebruiken om iets te zeggen	0	1	2	3	
Mompelen	Woorden en/of geluiden onduidelijk uitspreken	0	1	2	3	
Schreeuwen	Hard en/of hoog stemgeluid gebruiken om geluiden te uiten	0	1	2	3	
Kreunen	Een laag, onsamenhangend geluid maken	0	1	2	3	
Huilen	Jammeren, snikken, weeklagen of wenen	0	1	2	3	
Naar lucht happen	Scherp, moeizaam en/of luid ademhalen	0	1	2	3	
Zuchten	Inademen en lang, nadrukkelijk uitademen	0	1	2	3	

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Appendix 3: Figures doctors vs. nurses

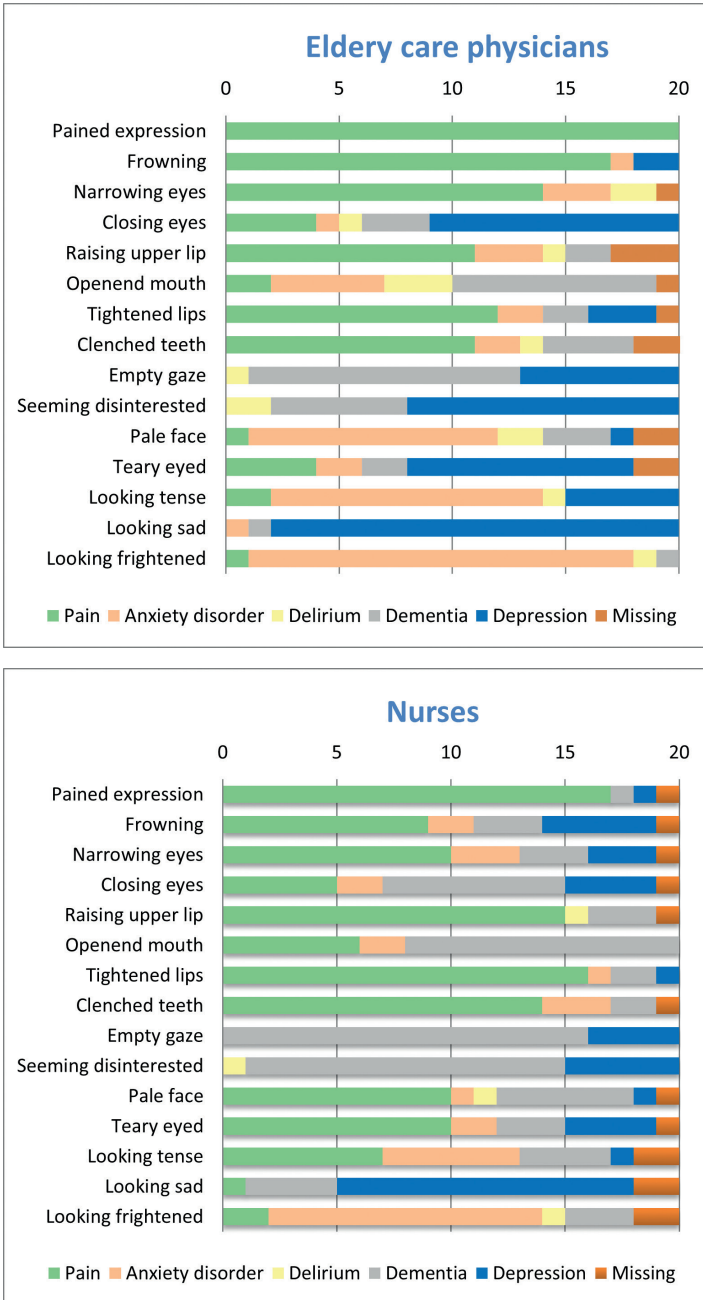


Figure 4. Facial expression specific for pain or other disorders: Elderly care physicians & nurses

Appendix 3: Figures doctors vs. nurses

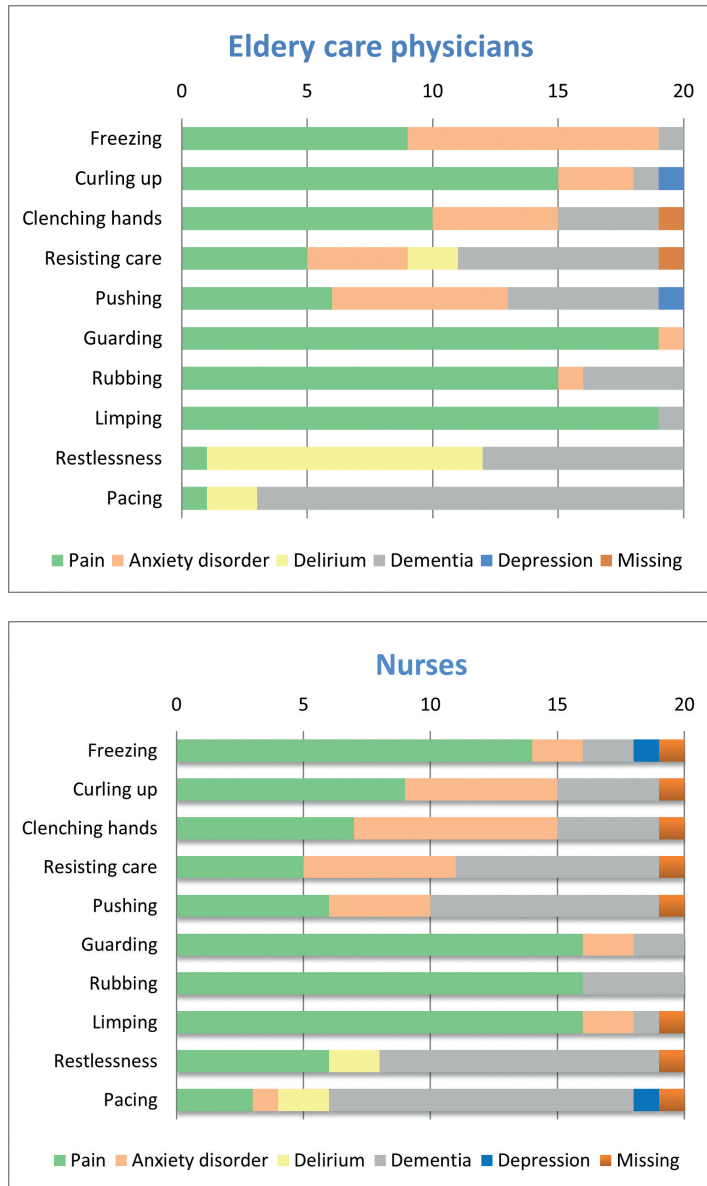


Figure 5. Body movements specific for pain or other disorders: Elderly care physicians & nurses

Appendix 3: Figures doctors vs. nurses

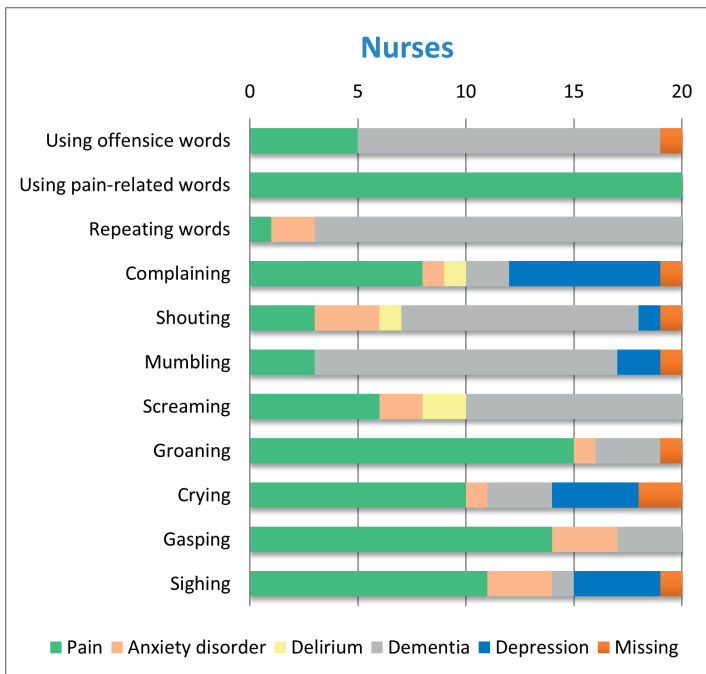
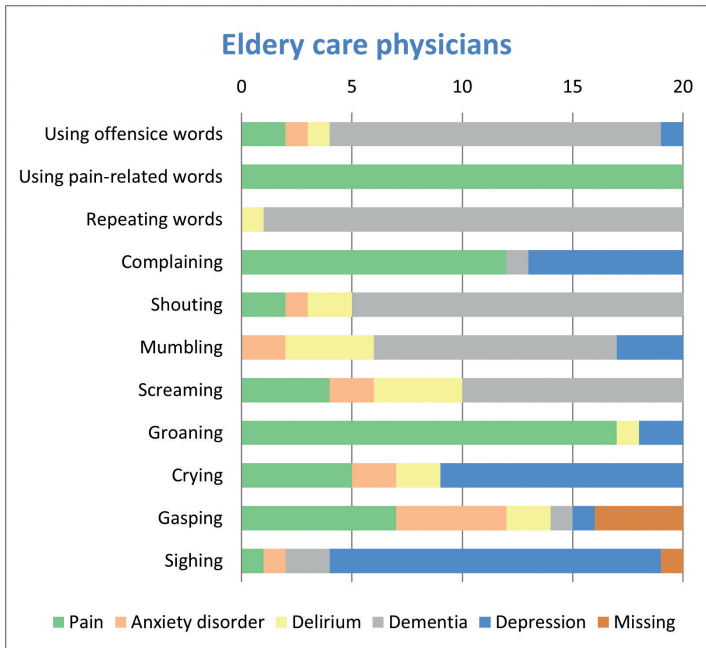


Figure 6. Vocalizations specific for pain or other disorders: Elderly care physicians & nurses

Appendix 4: Table 3-5

Table 3. Scoring of PAIC-items on question indicative of pain: Clinical experts

	Clinical experts (n=40)					Mean (SD) ^a
	No (n)		Yes (n)		Missing	
	Definitely not (= -1.0)	Probably not (= -0.5)	Probably (= 0.5)	Definitely (= 1.0)		
Facial expressions						
Pained expression	-	-	8	32		0.90 (0.20)
Frowning	-	4	25	11		0.54 (0.41)
Narrowing eyes	1	9	26	4		0.27 (0.52)
Closing eyes	2	21	13	4		-0.05 (0.61)
Raising upper lip	1	14	20	4	1	0.15 (0.58)
Opened mouth	4	25	5	5	1	-0.23 (0.62)
Tightened lips	1	6	23	8	2	0.41 (0.52)
Clenched teeth	2	4	25	7	2	0.41 (0.52)
Empty gaze	10	23	4	2	1	-0.45 (0.54)
Seeming disinterested	14	19	4	2	1	-0.50 (0.56)
Pale face	7	19	9	2	3	-0.27 (0.61)
Teary eyed	4	11	21	4		0.13 (0.63)
Looking tense	-	7	24	9		0.44 (0.48)
Looking sad	4	13	15	7	1	0.10 (0.68)
Looking frightened						0.49 (0.58)
Body movements						
Freezing	1	6	15	14	4	0.65 (0.36)
Curling up	-	2	19	19		0.69 (0.37)
Clenching hands	1	5	28	6		0.41 (0.47)
Resisting care	1	8	22	-	9	0.19 (0.49)
Pushing	1	10	20	9		0.33 (0.58)
Guarding	-	3	19	18		0.65 (0.41)
Rubbing	-	4	24	11	1	0.54 (0.42)
Limping	-	3	17	20		0.68 (0.42)
Restlessness	-	14	20	6		0.23 (0.57)
Pacing	1	18	15	6		0.09 (0.62)

Table 3. Scoring of PAIC-items on question indicative of pain: Clinical experts (*continued*)

	Clinical experts (n=40)					Mean (SD)*
	No (n)		Yes (n)		Missing	
	Definitely not (=1.0)	Probably not (=0.5)	Probably (=0.5)	Definitely (=1.0)		
Vocalizations						
Using offensive words	-	13	21	5	1	0.23 (0.55)
Using pain-related words	-	1	5	33	1	0.90 (0.29)
Repeating words	3	27	8	2		-0.26 (0.53)
Complaining	-	2	23	15		0.64 (0.36)
Shouting	2	17	19	2		0.03 (0.58)
Mumbling	3	23	13	1		-0.18 (0.55)
Screaming	1	10	25	4		0.26 (0.53)
Groaning	-	1	20	18	1	0.71 (0.32)
Crying	-	3	23	14		0.60 (0.40)
Gasping	2	7	23	8		0.35 (0.57)
Sighing	-	17	18	5		0.14 (0.58)

Table 4. Scoring of PAIC-items on question indicative of pain: Elderly care physicians versus nurses

	Elderly care Physician (n= 20)					Nurses (n= 20)					p-value	
	No		Yes		Missing	No		Yes		Missing		
	Def. not	Prob. not	Prob.	Def.		Mean (SD)	Def. not	Prob. not	Prob.			Def.
Facial expressions												
Pained expression	-	-	5	15	0.88 (0.22)	-	-	3	17	0.93 (0.18)		0.44
Frowning	-	-	17	3	0.58 (0.18)	-	4	8	8	0.50 (0.56)		0.57
Narrowing eyes	-	2	16	2	0.45 (0.36)	1	7	10	2	0.13 (0.60)		0.05
Closing eyes	1	13	5	1	-0.20 (0.55)	1	8	8	3	0.10 (0.64)		0.12
Raising upper lip	-	8	10	1	0.11 (0.54)	1	6	10	3	0.20 (0.62)		0.61
Opened mouth	3	14	2	1	-0.40 (0.50)	1	11	3	4	-0.05 (0.69)	1	0.06
Tightened lips	-	4	16	-	0.30 (0.41)	1	2	7	8	0.53 (0.61)	2	0.19
Clenched teeth	-	2	16	2	0.45 (0.36)	2	2	9	5	0.36 (0.66)	2	0.60
Empty gaze	6	13	1	-	-0.60 (0.35)	4	10	3	2	-0.29 (0.65)	1	0.07
Seeming disinterested	10	10	-	-	-0.75 (0.26)	4	9	4	2	-0.24 (0.67)	1	0.003
Pale face	4	13	2	-	-0.50 (0.41)	3	6	7	2	-0.02 (0.70)	2	0.02
Teary eyed	1	9	9	1	0.00 (0.58)	3	2	12	3	0.25 (0.66)		0.21
Looking tense	-	4	14	2	0.35 (0.46)	-	3	10	7	0.53 (0.50)		0.26
Looking sad	1	10	9	-	-0.08 (0.54)	3	3	6	7	0.29 (0.77)	1	0.10
Looking frightened	-	4	7	5	0.41 (0.58)	4	2	8	9	0.55 (0.58)		0.47
Body movements												
Freezing	-	-	12	8	0.70 (0.25)	-	2	10	8	0.60 (0.45)		0.39
Curling up	-	-	9	11	0.78 (0.26)	-	2	10	8	0.60 (0.44)		0.14
Clenching hands	-	2	16	2	0.45 (0.36)	1	3	12	4	0.38 (0.56)		0.62
Resisting care	-	6	12	2	0.17 (0.49)	1	2	10	7	0.23 (0.53)		0.73

	Elderly care Physician (n= 20)						Nurses (n= 20)						
	No			Yes			No			Yes			
	Def. not	Prob. not	Prob.	Def.	Mean (SD)	Missing	Def. not	Prob. not	Prob.	Def.	Mean (SD)	Missing	p-value
Pushing	-	7	11	2	0.20 (0.55)		1	3	9	7	0.45 (0.60)		0.18
Guarding	-	1	10	9	0.68 (0.37)		-	2	9	9	0.63 (0.46)		0.71
Rubbing	-	2	13	5	0.53 (0.41)		-	2	11	6	0.55 (0.44)	1	0.84
Limping	-	2	9	9	0.63 (0.46)		-	1	8	11	0.73 (0.38)		0.46
Restlessness	-	9	10	1	0.08 (0.46)		-	5	10	5	0.38 (0.56)		0.09
Pacing	1	10	8	1	-0.05 (0.58)		-	8	7	5	0.23 (0.64)		0.16
Vocalizations													
Using offensive words	-	8	11	1	0.13 (0.54)		-	5	10	4	0.34 (0.55)	1	0.22
Using pain-related words	-	-	4	15	0.89 (0.21)	1	-	1	1	18	0.90 (0.35)		0.95
Repeating words	3	12	5	-	-0.33 (0.52)		-	15	3	2	-0.20 (0.55)		0.46
Complaining	-	-	14	6	0.65 (0.24)		-	2	9	9	0.63 (0.46)		0.83
Shouting	1	10	8	1	-0.05 (0.58)		1	7	11	1	0.10 (0.58)		0.42
Mumbling	2	14	4	-	-0.35 (0.46)		1	9	9	1	0.00 (0.58)		0.04
Screaming	1	6	12	1	0.15 (0.56)		-	4	13	3	0.38 (0.48)		0.18
Groaning	-	1	10	8	0.66 (0.37)	1	-	-	10	10	0.75 (0.26)		0.38
Crying	-	2	13	5	0.53 (0.41)		-	1	10	9	0.68 (0.37)		0.24
Gasping	1	3	13	3	0.35 (0.54)		1	4	10	5	0.35 (0.61)		1.00
Sighing	-	9	9	2	0.10 (0.58)		-	8	9	3	0.18 (0.59)		0.69



Table 5. Scoring of PAIC-items on question pain-specific: Elderly care physicians versus nurses

	Elderly care Physician (n=20)					Nurses (n=20)						
	Anxiety disorder	Delirium	Dementia	Depression	Pain	Missing	Anxiety disorder	Delirium	Dementia	Depression	Pain	Missing
Facial expressions												
Pained expression	-	-	-	-	20	-	-	1	1	17	1	1
Frowning	1	-	-	2	17	-	2	3	5	9	1	1
Narrowing eyes	3	2	-	-	14	3	3	3	3	10	1	1
Closing eyes	1	1	3	11	4	2	-	8	4	5	1	1
Raising upper lip	3	1	2	-	11	3	-	3	-	15	1	1
Opened mouth	5	3	9	-	2	1	2	12	-	6	-	-
Tightened lips	2	-	2	3	12	1	1	2	1	16	-	-
Clenched teeth	2	1	4	-	11	2	3	2	-	14	1	1
Empty gaze	-	1	12	7	-	-	-	16	4	-	-	-
Seeming disinterested	-	2	6	12	-	-	-	1	14	5	-	-
Pale face	11	2	3	1	1	2	1	1	6	1	10	1
Teary eyed	2	-	2	10	4	2	2	-	3	4	10	1
Looking tense	12	1	-	5	2	-	6	-	4	1	7	2
Looking sad	1	-	1	18	-	-	-	4	4	1	2	2
Looking frightened	17	1	1	-	1	1	12	1	3	-	2	2
Body movements												
Freezing	10	-	1	-	9	2	2	2	1	14	1	1
Curling up	3	-	1	1	15	6	-	4	-	9	1	1
Clenching hands	5	-	4	-	10	1	8	4	-	7	1	1
Resisting care	4	2	8	-	5	1	9	-	8	-	5	1

	Elderly care Physician (n=20)					Nurses (n=20)						
	Anxiety disorder	Delirium	Dementia	Depression	Pain	Missing	Anxiety disorder	Delirium	Dementia	Depression	Pain	Missing
Body movements												
Pushing	7	-	6	1	6		4	-	9	-	6	1
Guarding	1	-	-	-	19		2	2	-	-	16	
Rubbing	1	-	4	-	15		-	4	-	-	16	
Limping	-	-	1	-	19		2	1	-	-	16	1
Restlessness	-	11	8	-	1		-	2	11	-	6	1
Pacing	-	2	17	-	1		1	2	12	1	3	1
Vocalizations												
Using offensive words	1	1	15	1	2		-	-	14	-	5	1
Using pain-related words	-	-	-	-	20		-	-	-	-	20	
Repeating words	-	1	19	-	-		2	-	17	-	1	
Complaining	-	-	1	7	12		1	1	2	7	8	1
Shouting	1	2	15	-	2		3	1	11	1	3	1
Mumbling	2	4	11	3	-		-	-	14	2	3	1
Screaming	2	4	10	-	4		2	2	10	-	6	
Groaning	-	1	-	2	17		1	-	3	-	15	1
Crying	2	2	-	11	5		1	-	3	4	10	2
Gasping	5	2	1	1	7	4	3	-	3	-	14	
Sighing	1	-	2	15	1	1	3	-	1	4	11	1