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Résumé

Une comparaison des outils d'évaluation de la douleur utilisés auprès des personnes âgées

Sharon Kaasalainen et Joan Crook

Le but de cette recherche consistait à étudier les propriétés psychométriques (fiabilité de test-retest, coefficient d'objectivité, critère de validité concourante) de trois outils d'évaluation verbale de la douleur (échelle des visages douloureux, échelle d'évaluation numérique, *Present Pain Intensity Scale*) et d'une échelle d'évaluation comportementale de la douleur utilisée auprès des personnes âgées. On a fait appel à un modèle de mesures répétées pour vérifier la fiabilité et la validité de ces outils chez quatre groupes de participants atteints de déficience intellectuelle à des degrés divers, constituant un échantillon stratifié non aléatoire de 130 résidents en soins de longue durée. Les résultats confirment la fiabilité de test-retest et le coefficient d'objectivité de l'échelle d'évaluation comportementale pour tous les degrés de déficience intellectuelle, tout en révélant que la fiabilité des outils d'évaluation verbale diminuait en fonction du degré de déficience intellectuelle; cependant, la majorité des personnes âgées montrant une déficience légère à modérée avaient été en mesure de compléter au moins l'une de ces évaluations. Ces conclusions sont analysées à la lumière de leurs implications pour la pratique clinique et la recherche.

Mots clés : personnes âgées, déficience intellectuelle, évaluation de la douleur, soins de longue durée

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A Comparison of Pain-Assessment Tools for Use with Elderly Long-Term-Care Residents

Sharon Kaasalainen and Joan Crook

The purpose of this study was to examine the psychometric properties (test-retest and interrater reliability, criterion concurrent validity) of 3 verbal pain-assessment tools (Faces Pain Scale, Numerical Rating Scale, Present Pain Intensity Scale) and a behavioural pain-assessment scale for use with an elderly population. The study used a repeated-measures design to examine the reliability and validity of the tools across 4 groups of participants with varying levels of cognitive impairment using a non-random stratified sample of 130 elderly long-term-care residents. The findings support the test-retest and interrater reliability of the behavioural pain-assessment tool across all levels of cognitive impairment, whereas the same measures of reliability for the verbal-report tools decreased with increasing cognitive impairment; however, the majority of elderly with mild to moderate cognitive impairment were able to complete at least 1 of these tools. The findings are discussed in relation to their clinical and research implications.

Keywords: elderly, cognitive impairment, pain assessment, long-term care

Background

Research findings indicate that pain is a serious problem in the elderly population (Desbiens, Mueller-Rizner, Connors, Hammel, & Wenger, 1997; Kaasalainen et al., 1998; Ross & Crook, 1998). However, limited research has been done on the psychometric properties of pain-assessment methods for the elderly, especially those with cognitive impairment. For the elderly with cognitive impairment, pain assessment is further complicated by their limited communication abilities. Inaccurate assessment of pain intensity in this group can lead to unnecessary pain and suffering, which may compromise their remaining limited abilities. Reliable and clinically feasible methods of assessing pain are desperately needed so that pain can be managed appropriately.

According to Marzinski (1991), the tragedy of dementia includes the possibility that the non-verbal elderly will be unable to communicate their pain, which may lead to unnecessary suffering. For those elderly with dementia or cognitive impairment, the task of pain measurement can be quite complex. The pain-assessment methods described in the lit-

erature are varied and often exclude the elderly with dementia. Some methods focus on verbal or self-reports of pain while others involve the use of non-verbal assessment. Elderly persons who are capable of verbally reporting their pain in a reliable and valid fashion should have their voice heard. For those who are not capable of doing so, behavioural-observation methods should be employed to ensure that their pain is recognized.

Studies have found that patients with mild to moderate cognitive impairment can report their pain verbally (Chibnall & Tait, 2001; Ferrell, Ferrell, & Rivera, 1995; Parmelee, Smith, & Katz, 1993). The Present Pain Intensity (PPI) scale, the Numerical Rating Scale (NRS), and the Faces Pain Scale (FPS) may be the preferred tools for use with the elderly (Chibnall & Tait; Ferrell et al.; Herr & Mobily, 1993; Herr, Mobily, Kohout, & Wagenaar; 1998; Parmelee et al.). Jensen, Bradley, and Linton (1989) suggest that the elderly have particular difficulty using the visual analogue scale because it requires abstract thinking.

Non-verbal or behavioural-observation methods of pain assessment are particularly helpful for use with individuals who are unable to communicate their pain, such as those with severe dementia. Feldt (2000) developed the Checklist of Nonverbal Pain Indicators (CNPI) to assess pain in the elderly with and without cognitive impairment in an acute-care setting following a recent hip fracture. Initial testing supports the reliability and validity of the CNPI for use in this particular setting but further testing is needed to support its use in long-term care. Residents in long-term care are plagued with chronic pain on a daily basis, and chronic pain can be more difficult to assess than acute-pain episodes in hospital settings.

The Pain Assessment in the Communicatively Impaired (PACI) tool has recently been developed (Middleton et al., 2003) for use in long-term care. It incorporates three of the four facial movements used to depict pain as identified by Prkachin (1992) as well as specific body movements (e.g., guarding, rubbing/touching) and sounds (e.g., moan, yell, grunt, cry) that have been associated with pain. There is evidence of strong reliability (Kappa = 0.74 - 0.85) and validity (Middleton et al.). This tool is a promising means of assessing pain in the elderly with cognitive impairment.

In summary, the elderly with dementia represent a unique group of individuals with whom little pain research has been conducted. However, pain-assessment approaches are beginning to be explored with this population in an attempt to produce feasible and accurate measurements. Once reliable and valid methods of pain assessment are established, unnecessary suffering among the elderly with cognitive impairment can be avoided and their quality of life improved.

The purpose of this study was to examine, within the elderly population, the psychometric properties of three self-report pain-assessment tools that have been developed for use with other populations (e.g., children, adults) as well as a behavioural-observation tool. The rationale for this approach is to provide: (1) support for the use of pain-assessment tools with acceptable psychometric properties that are feasible for use in clinical settings, and (2) direction for the future education of direct-care staff about pain assessment in the elderly.

Method

This study utilized a repeated-measures design involving four groups of elderly participants: (1) cognitively intact, (2) mildly cognitively impaired, (3) moderately cognitively impaired, and (4) extremely cognitively impaired. It examined the reliability (i.e., test-retest, interrater) and validity (i.e., criterion concurrent) of four different pain-assessment scales across all four groups of elderly participants.

Sample

Data were collected at a 240-bed long-term-care facility in urban southwestern Ontario, Canada. Inclusion criteria were: at least 65 years of age and a resident of a long-term-care facility for more than 3 months. Residents were excluded if they had significant hearing or visual impairment or were non-English-speaking. A non-random stratified sample of 130 participants was used: 20 in the cognitively intact group, 30 in the mild cognitively impaired group, and 40 each in the moderate and extremely impaired groups.

Instrumentation

The Global Deterioration Scale (GDS) was used to group residents according to their stage of dementia. Specifically, residents were screened and classified according to their clinical phase of cognitive decline (Reisberg, Ferris, deLeon, & Crook, 1982). The GDS covers seven stages, ranging from no cognitive decline to very severe cognitive decline. These seven stages were collapsed into four clinical phases of cognitive decline (i.e., none, mild, moderate, extreme). The four groups were analyzed separately.

Three different verbal pain-assessment scales and a behavioural-observation measure were used to assess pain. The PACI (Middleton et al., 2003), which is a behavioural-observation tool, was developed to assess pain in the non-verbal elderly or those with cognitive impairment. It has seven items; three measure specific facial movements or expressions (i.e., brow lower, eyelid tighter, cheek raise), two measure body movements

(i.e., guarding, rubbing/touching), and two measure sounds and words that have been associated with pain. Each item has a dichotomous response (yes/no) with a possible range of scores from 0 (no pain) to 7 (high pain). The PACI tool appears to be a reliable and valid measure of pain in the elderly (Middleton et al.).

The FPS, which is a set of seven schematic faces, was originally developed for use with children (Bieri, Reeve, Champion, Addicoat, & Ziegler, 1990) but later modified slightly for use with the elderly (Herr et al., 1998). Participants in this study were asked to choose the one face in the FPS that best depicted their level of pain at that moment. Herr et al. found evidence of strong construct validity and strong test-retest reliability ($r = 0.94$, $p = 0.01$) of the FPS within an elderly population.

The PPI, which is a subscale of the McGill Pain Questionnaire (Melzack, 1987), is a self-report six-point word-number scale used to measure pain intensity at the moment and ranges from 0 (no pain) to 5 (excruciating pain). This scale was also enlarged and bolded for use with an elderly population. Ferrell et al. (1995) found that, out of five different pain-assessment scales, the PPI had the highest completion rate (65%) among the elderly and also provided evidence of concurrent validity with the other scales ($r = 0.54$–0.72).

The NRS measures pain ranging from 0 (no pain) to 10 (worst possible pain). This scale was enlarged and bolded for use with an elderly population. The NRS has been shown to produce reliable responses for different stimulus-response functions for pain-sensation intensity and to provide consistent measures of both experimental and clinical pain intensity (Price, Bush, Long, & Harkins, 1994).

Procedure

The study was approved by a university ethical review board in southwestern Ontario. The investigator and research assistant were trained to use the PACI in a correct and consistent manner. The training involved watching a 5-minute video that described in detail each of the pain behaviours included in the PACI. Initial interrater reliability using the PACI was acceptable (ICC = 0.80–0.92).

Residents were screened before being asked to participate in the study to ensure that they met the inclusion criteria. If the resident was unable to provide verbal/written consent as determined by the investigator and/or expert clinical nurse, proxy consent was obtained.

Consenting residents were then approached for data collection. The investigator and the research assistant conducted the pain-measurement procedure twice — at Time 1 and at Time 2 — during the same event but 48 hours apart. These interviews took place in the morning since

pain is generally worse when residents awaken in the morning (Ferrell & Osterweil, 1990).

First, the investigator and the research assistant measured the resident's pain independently during a naturally occurring, movement-exacerbated painful event (e.g., transfer from bed to chair, performing ADLs). This event was chosen to elicit a pain response because it is representative of the normal, day-to-day kind of pain that is most frequently experienced by long-term-care residents. It seems prudent to use the most common pain events in instrument testing so that future intervention studies (e.g., use of analgesics, staff development, non-pharmacological strategies) can be designed to address the pain events or experiences that are unique and typical in this population and setting. Moreover, movement-exacerbated pain events have been recommended for use in pain-measurement studies with the elderly, especially those who live in long-term-care facilities, as other pain events that often take place in these settings (e.g., flu shots, venipuncture) have been shown to elicit a poor pain response (Hadjistavropoulos, LaChapelle, MacLeod, Snider, & Craig, 2000; Middleton et al., 2003). Previous testing of the PACI has shown that it is a valid measure of movement-exacerbated pain in long-term-care; therefore, the PACI was deemed an appropriate measure for use in this study (Middleton et al.).

The PACI was completed over a 2-minute interval before the verbal reports of pain, to blind the investigator and the research assistant to the verbal-report scores for pain. Immediately following the behavioural assessment, residents were asked to rate their pain using the FPS, the PPI, and the NRS. They were given at least 30 seconds to respond to each scale before the next scale was presented. If, at the end of the 30 seconds, the resident did not respond, he or she was considered unable to respond to that particular scale. The scales were administered in random order to each resident to control for the effect of order.

Results

The mean age varied slightly across groups, ranging from 81.75 in Group 1 (cognitively intact) to 86.20 in Group 2 (mild cognitive impairment). The majority (60–67%) of the participants were women. The majority of the participants had been previously employed in the labour market, and in Group 3 (moderate cognitive impairment) almost one half (43%) had been homemakers. All of the participants were Caucasian.

The most common diagnoses in all four groups were dementia, arthritis, and history of fracture. In Group 3 and Group 4 (extreme cognitive impairment), all had a diagnosis of dementia. In Group 1, over two thirds (69%) had a diagnosis of arthritis. In all four groups, over 10% had

Table 1 ***Maximum, Minimum, Mean, and Standard Deviation of Pain Scores and Percentage of Residents "In Pain" Using Four Pain Scales***

	PACI-1[a] 0–7	PACI-2[b] 0–7	FPS 0–6	PPI 0–5	NRS Range 0–10
All Groups					
Mean	1.89	1.46	2.18	1.69	3.74
SD	1.88	1.69	1.90	1.47	3.05
"In pain"	67%	56%	73%	69%	77%
Group 1: Intact					
Maximum	4.00	4.00	6.00	5.00	10.00
Minimum	0.00	0.00	0.00	0.00	0.00
Mean	1.20	1.00	1.90	1.50	4.00
SD	1.20	1.17	1.89	1.28	3.25
"In pain"	65%	55%	70%	75%	80%
Group 2: Mild					
Maximum	6.00	5.00	6.00	4.00	10.00
Minimum	0.00	0.00	0.00	0.00	0.00
Mean	2.00	1.53	2.50	1.70	3.60
SD	1.94	1.80	1.74	1.37	2.87
"In pain"	67%	53%	83%	70%	77%
Group 3: Moderate					
Maximum	7.00	7.00	6.00	5.00	10.00
Minimum	0.00	0.00	0.00	0.00	0.00
Mean	1.78	1.43	2.10	1.80	3.75
SD	1.99	1.85	2.13	1.73	3.18
"In pain"	62%	47%	57%	62%	70%
Group 4: Extreme					
Maximum	7.00	6.00	⋆	⋆	⋆
Minimum	0.00	0.00	⋆	⋆	⋆
Mean	2.25	1.68	⋆	⋆	⋆
SD	1.94	1.67	⋆	⋆	⋆
"In pain"	72%	67%	⋆	⋆	⋆

[a]First rater, [b]Second rater
⋆Participants unable to complete measure

a history of fracture. The percentage of those with a history of depression ranged from 15% (n = 3) in Group 1 to 28% (n = 11) in Group 2.

For all of the participants (N = 130), the pain reports on average were low (Table 1). The percentage of participants "in pain" (i.e., scores > 0) according to their verbal reports (i.e., FPS, PPI, NRS) ranged from 69% to 77%. However, the behavioural reports of residents "in pain" that were scored by two raters were lower (i.e., PACI-1: 67%; PACI-2: 56%).

For those participants with no cognitive impairment or with mild or moderate impairment, the behavioural reports of pain did not reach the maximum possible score, whereas their verbal reports of pain did reach the maximum possible score. Finally, both of the raters' behavioural reports of residents "in pain" were highest for Group 4 (extreme cognitive impairment).

The intraclass correlations (ICCs) for the PACI were moderate to strong for all groups (0.62 to 0.78) and the error variance (s^2_{error}) remained relatively constant across all groups (Table 2). The ICCs for the three verbal-report scales were moderate to strong for the cognitively

Table 2 ***Test-Retest Reliability: Source of Variance and Intraclass Correlation Coefficient for the Four Pain-Assessment Tools***

	Group (Level of Cognitive Impairment)			
Pain Scale	**1 (Intact)**	**2 (Mild)**	**3 (Moderate)**	**4 (Extreme)**
PACI				
$\sigma^2_{subject}$	1.39	2.75	2.22	1.71
σ^2_{error}	0.38	0.48	0.28	0.33
ICC	0.78	0.70	0.73	0.62
FPS				
$\sigma^2_{subject}$	2.91	1.36	1.68	⋆
σ^2_{error}	0.53	1.46	3.49	⋆
ICC	0.84	0.39	0.32	⋆
PPI				
$\sigma^2_{subject}$	0.87	0.81	1.29	⋆
σ^2_{error}	0.71	1.22	1.21	⋆
ICC	0.55	0.40	0.51	⋆
NRS				
$\sigma^2_{subject}$	9.31	3.67	5.23	⋆
σ^2_{error}	1.45	5.89	5.92	⋆
ICC	0.87	0.38	0.45	⋆

⋆Participants unable to complete measure

intact group (FPS: ICC = 0.84; PPI: ICC = 0.55; NRS: ICC = 0.87) but decreased for the other groups. In addition, the error variances were low for the cognitively intact group (FPS: s^2_{error} = 0.53; PPI: s^2_{error} = 0.71; NRS: s^2_{error} = 1.45) but increased with increasing cognitive impairment. The error variances for the PPI were lower than for the FPS and NRS for Group 2 (s^2_{error} = 1.22) and Group 3 (s^2_{error} = 1.21).

Interrater reliability for the PACI was high for all groups (ICC = 0.82–0.88). The group with mild cognitive impairment had the highest subject variance ($s^2_{subject}$ = 2.75). The error variance for the PACI was low across all groups (s^2_{error} = 0.28-0.48).

The Pearson *r* correlations of the PACI with the three verbal-report scales (FPS, PPI, NRS) were low to moderate (Table 3). For the cognitively intact group, all of these correlations were moderate and significant (FPS: $r = 0.66$, $p < 0.001$; PPI: $r = 0.62$, $p < 0.01$; NRS: $r = 0.65$, $p < 0.01$). For the mildly impaired group, none were significant at the $p < 0.05$ level. For the moderately impaired group, the PACI correlated moderately and significantly with the FPS ($r = 0.63$, $p < 0.001$) and PPI ($r = 0.64$, $p < 0.001$). However, the correlation between the PACI and NRS for those with moderate impairment was low and nonsignificant ($r = 0.30$, $p < 0.12$).

Table 3 ***Criterion Concurrent Validity: Pearson r Correlations and Level of Significance Between the PACI and Each of the Three Verbal Pain Scales***

	Group (Level of Cognitive Impairment)			
Pain Scale	**1 (Intact)**	**2 (Mild)**	**3 (Moderate)**	**4 (Extreme)**
PACI				
r =	0.66	0.30	0.63	*
p <	0.001	0.10	0.001	*
PPI				
r =	0.62	0.32	0.64	*
p <	0.01	0.10	0.001	*
NRS				
r =	0.65	0.23	0.30	*
p <	0.01	0.22	0.12	*

*Participants unable to complete measure

Discussion

The rates of residents "in pain" ranged from 56% to 77% depending on the tool used. These rates of pain in the elderly are high and are similar to those found in other studies (Desbiens et al., 1997; Ferrell & Osterweil, 1990; Simons & Malabar, 1995). These findings indicate that pain is prevalent and a serious problem for residents of long-term-care facilities.

For most groups, the behavioural reports of pain using the PACI did not reach the maximum possible score, whereas the verbal reports of pain did reach the maximum possible score. It appears that the PACI may not be a good measure of pain intensity. One explanation for this may be that some elderly persons are incapable of expressing their pain using certain behaviours due to physical limitations such as paralysis, contractures, or even the immobilizing effects of the pain itself. As well, LeResche (1984) postulates that facial expressions of pain may be blunted due to the physical face changes that occur with age.

Although the PACI may not be a good measure of pain intensity for all elderly persons, it appears capable of detecting the majority of those who are in pain. Among elderly persons with extreme cognitive impairment, the PACI can detect pain in those who are incapable of reporting their pain verbally. Without the measurement of pain using behavioural indices, the majority of pain in this vulnerable population would go unnoticed. In addition, the ICCs for the test-retest reliability of the PACI were moderate to strong for all groups and the error variances remained relatively constant across all groups. These degrees of reliability of the PACI across all levels of cognitive impairment are acceptable for clinical settings. Thus, it seems prudent to use the PACI, despite its limitations, to measure pain in those elderly with extreme cognitive impairment so that attempts can be made to manage their pain therapeutically.

As expected, test-retest reliability for the three verbal-report scales was moderate to strong for elderly persons with no cognitive impairment but decreased for the other groups. Similarly, error variances were low for those with no cognitive impairment but increased with increasing cognitive impairment. These findings indicate that the level of cognitive impairment decreases the reliability of verbal reports of pain.

Test-retest reliability for both the NRS and the FPS was strong for residents without cognitive impairment but declined considerably for those with mild and moderate impairment, suggesting that these tools may not be good choices for use with these two groups. However, the test-retest reliability of the PPI appears to be slightly better for those residents with mild to moderate levels of cognitive impairment. This finding indicates that the PPI may be a better choice of tool for use with these

residents, as it is also easier to apply. This finding is congruent with the findings of previous studies that have compared a verbal descriptor scale with other types of tools used with an elderly population (Feldt, Ryden, & Miles, 1998; Ferrell et al., 1995; Herr & Mobily, 1993; Parmelee et al., 1993).

It may be that the PPI is a more reliable measurement of pain for those with mild to moderate cognitive impairment, because these people retain their ability to use words to describe their pain longer than their ability to use numbers or abstract tools such as the FPS. Perhaps scales such as the PPI, which has different terms for qualifying pain, is particularly helpful for older persons since it allows them to use more words to describe their pain and to reserve the word "pain" for severe discomfort (Heye, 1997). Although language skills diminish with the onset of dementia, a simple tool that uses few words, such as the PPI, may afford the elderly a way to express their pain accurately and in a personal and meaningful way.

The high interrater reliability for the behavioural observation tool (i.e., PACI) and low error variances across all groups of elderly residents support the use of the PACI to assess for pain in clinical settings. Interestingly, however, the correlations of the behavioural-observation tool (i.e., PACI) with the three verbal-report scales (FPS, PPI, NRS) were low to moderate. These correlations were lower than expected and suggest that the PACI was measuring a slightly different dimension of pain compared to the verbal-report scales. Hadjistavropoulos et al. (2000) also found that self-reports of pain using a coloured visual analogue scale did not correlate with a behavioural-observation measure (i.e., FACS). They suggest that each measure taps very different parameters of the pain experience when used with the elderly, implying that a comprehensive assessment of pain should include both self-report and behavioural indices.

It is worth noting the nonsignificant correlations between the PACI and all three verbal-report scales for the residents with mild cognitive impairment. These may be due to the low subject variance. This group of participants appeared to be more homogeneous in their pain ratings; they had the lowest amount of subject variance, which could account for the poor and nonsignificant correlations between the PACI and each of the verbal-report scales. According to Mitchell (1979), an instrument will have a lower reliability when used with a homogeneous group. Therefore, future research is needed to address the reliability and validity of these pain-assessment tools on a more heterogeneous group of residents with mild cognitive impairment.

There are limitations to the present study. First, all of the participants were Caucasian, so the findings cannot be generalized to elderly residents

from different racial backgrounds. Also, the type of activities that were performed (i.e., ROM, walking) appear to have induced low amounts of pain in general, which resulted in relatively low subject variances. The reliability of the tools used could be improved by increasing the magnitude of the variance between subjects (Streiner & Norman, 1995). Thus, future research is needed to test the reliability of these pain-assessment scales, especially the PACI, using situations that elicit more variation in pain responses in the elderly, such as hip fractures and surgical procedures, along with ROM and walking activities.

In summary, the findings of this study support the use of a behavioural-observation tool (i.e., PACI) for use in clinical settings. This tool is particularly useful for detecting pain in elderly persons with extreme cognitive impairment. For those with no cognitive impairment or with mild impairment, the use of verbal reports of pain appear reliable and accurate. However, it is recommended that elderly persons with moderate cognitive impairment be assessed using both behavioural and verbal-report methods, since the reliability of verbal reports of pain decreases for this group. For those with moderate cognitive impairment, the PPI seems to be a more appropriate and reliable tool than the FPS or the NRS to assess for pain using verbal-report scales. If more research attention is devoted to this vulnerable population, pain management will be improved and unnecessary suffering avoided.

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Authors' Note

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