

Original Article

A Comparison of Five Pain Assessment Scales for Nursing Home Residents with Varying Degrees of Cognitive Impairment

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Abstract

The aim of the study was to compare five different pain assessment scales for use with people with different levels of cognitive impairment who resided in nursing homes. The verbal rating scale, horizontal numeric rating scale, Faces pictorial scale, color analogue scale and mechanical visual analogue scale were presented in random order to 113 residents. Cognitive impairment was assessed using the Mini-Mental State Examination. The use of the verbal rating scale was the most successful with this group, completed by 80.5% overall, and 36% of those with severe cognitive impairment. Repeated explanation improved completion rates for all the scales. Consistency between scores on the five scales was good for those with none to moderate cognitive impairment and poor for those severely impaired. This study showed no difference in pain scores according to cognitive status. J Pain Symptom Manage 2004;27:196–205. © 2004 U.S. Cancer Pain Relief Committee. Published by Elsevier Inc. All rights reserved.

Key Words

Pain, pain assessment, aging, older people, cognitive impairment

Introduction

The proportion of older people in Western society is increasing and is expected to continue to do so for the foreseeable future.¹ Both pain and cognitive impairment are prevalent among older people, presenting serious health problems for this population. There is evidence that older people in institutions, many of whom

suffer pain and/or cognitive impairment, frequently have their pain both assessed and managed poorly.^{2,3}

It has only been in the past decade that the assessment of pain in older people has begun to be taken seriously. There are many gaps in our knowledge of how this might be achieved with such a heterogeneous population, since most pain assessment instruments have been designed and tested for younger adults. The question “Have you got any pain?” allows a simple, subjective response from the only person who knows the answer, but their response will be influenced by “a number of cultural, economic, social, demographic, and

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environmental factors, along with the person's unique history, situational factors, interpretation of the symptoms ... current psychological state, as well as physical pathology."⁴ The assessment of pain intensity in those who are cognitively intact is not straightforward, and for those with moderate to severe cognitive impairment it becomes even more complex.

The Extent of the Problem

Research suggests that the prevalence of substantial pain in North American nursing home residents ranges from 45% to 86.3%,⁵⁻¹⁰ while the prevalence of cognitive impairment in US nursing home residents has been reported to range from 37 to 47.7%.^{5,8,11} It seems highly likely, then, that a substantial proportion of these residents suffer both from pain and cognitive impairment.

There is little in the literature on the prevalence of pain and cognitive impairment in UK nursing home residents. Two UK studies have indicated that 38-57% of nursing home residents had moderate to severe dementia.^{12,13} The prevalence of chronic pain in older people has been estimated to be 37% among 65-75 year olds, rising to 43%-60% of those aged 75 or more^{14,15} and 37% in a sample of 68 nursing homes.¹⁶ It is highly likely, therefore, that many nursing home residents in the UK suffer both cognitive impairment and chronic pain.

Undertreatment of Pain

Pain in nursing home residents has been shown to be under-recognized and/or undertreated.^{5-7,9} Compounding this problem was evidence that residents who are cognitively impaired are less likely to receive treatment than if they are cognitively intact.^{8,17,18} Horgas and Tsai⁸ found that cognitively impaired residents were "prescribed and administered significantly less analgesic medication, both in number and in dosage of pain drugs than their more cognitively intact peers."

This undertreatment presents a considerable problem since the potential consequences of poor pain management are wide ranging and involve physiological, psychological and social functioning. These effects may include anxiety, depression, agitation, aggression, sleep disturbance, impaired mobility, constipation, incon-

tinence, the inability to enjoy recreational, religious and social activities and others.^{5,19-22}

Assessment of Pain in Those with Cognitive Impairment

Methods for the assessment of pain in those with cognitive impairment fall into two main categories: self-reported and observational. This paper is concerned with part of a wider study that examined both approaches, and focuses on the use of self-report instruments. There is ample evidence to suggest that many people with cognitive impairment are able to complete standard pain assessment scales. However, this literature is not conclusive about which of the commonly used scales are most appropriate.

Different types and combinations of scales have been tested by different authors, including the McGill Pain Questionnaire (including the PPI, a 6-point verbal rating scale), the 100mm horizontal visual analogue scale (VAS), numeric box scales, the Memorial Pain Card Subscale (verbal descriptors), the Rand Coop Chart (pictorial), the Philadelphia Pain Intensity Scale (a 5-point verbal rating scale), the Faces Pain Scale and other similar scales.²³⁻²⁹ In general, these studies tended to suggest that people with cognitive impairment found self-report instruments using written word cues were the easiest and visual analogue scales the least easy to complete. However, it is difficult to draw inferences about which scales are feasible for use at different levels of cognitive impairment when the Mini-Mental State Examination (MMSE) was not always the assessment method used, and when it was, it was used differently in different studies. Some used the standard four group cut-off points for the MMSE while others did not, some used the MMSE at the time of interview, some retrospectively. In addition, some of the studies did not use the pain scales in accordance with the original authors' instructions, further complicating interpretation of the findings.

Summary

The literature indicates that pain is not managed well in older people; that people with cognitive impairment receive poorer pain management than those without; and there appear to be negative health consequences associated with inadequate pain management. There is

as yet no well-validated method of assessing pain in this group, and, in particular, very little information is available to guide the assessment at different levels of cognitive impairment.

Most relevant studies have been undertaken in North America and there is a lack of research into the experience, assessment and management of pain in nursing home residents in the United Kingdom where the culture and delivery of services are different. It is difficult to draw clear conclusions from the existing studies, as they are not comparable in terms of aims, methods or analysis.

Studies have usually used at least three different pain scales, but very few studies have used the same number and combination of scales. Several studies have recommended the use of verbal rating scales, while others have supported the use of the numerical horizontal box scale and others. It is clear that scales improve the chances of identifying pain in this group, but which scales are most useful and at which levels of cognitive impairment requires further study.

Since the accurate assessment of pain is a prerequisite for successful pain management, the aim of the study reported here was to compare five pain assessment instruments in a sample of UK nursing home residents who had different levels of cognitive impairment.

Methods

Subjects

The 18 largest nursing homes within Leeds were considered for inclusion in the study. Three were excluded following consultation with Link Liaison Nurses, for reasons such as being under threat of closure, or having just changed owners. The remaining 15 were approached for consent from their manager/matron, and all participated in the study.

All residents in the 15 nursing homes were screened by nursing home staff for inclusion/exclusion criteria using eight questions requiring a yes/no response. The resident's date of birth and the contact details of the person who could provide assent, where possible, were recorded at this point.

Inclusion Criteria

1. Residents had resided in the same Nursing or Elderly Mentally Infirm Home for at

least two months. This allowed time for residents to have settled into the home and staff to get to know them.

2. English was residents' first language.

Exclusion Criteria

1. Residents were in the terminal or acute stages of any illness or were operationally defined as too ill, weak or frail to participate.
2. Residents had severely impaired hearing and sight, operationally defined as inability to participate even when using hearing and sight aids.
3. Residents were experiencing any distressing social circumstances, e.g., recent death of a close relative or friend.

Measures

Cognitive status was assessed using the MMSE30. Since little is known about the appropriateness of different methods of assessing pain intensity at different levels of cognitive impairment, a range of approaches was used. The scales selected, therefore, used words, numbers, pictures and colors. The Mechanical Visual Analogue Scale (MVAS) was included because it was reported to be a locally-favored instrument. This is a plastic version of a visual analogue scale, with a sliding pointer that the user moves to the position corresponding with their pain level.

The pain assessment instruments included: 1) Verbal Rating Scale (VRS): none, mild, moderate and severe; 2) Numerical Rating Scale (NRS): 1–10 horizontal scale; 3) Faces Pain Scale (FS): 7 faces^{30–32} 4) Color Pain Analogue Scale (CS): graduated from white to red, no pain to worst possible pain; and 5) Mechanical Visual Analogue Scale (MVAS).

Procedures

Ethics committee approval was obtained before commencement of the study. A careful approach to consent was developed, which sought the views of the residents first. Capacity to consent was determined using criteria from the Law Society and the British Medical Association.³³ Assent was sought only if they agreed to participate in the study, but could not demonstrate capacity to consent. Letters providing

information about the study were sent to the GP practices of participants with an offer of further information or a discussion if required. All information from participants was kept anonymous. The procedure was piloted, and then all data were collected by a community psychiatric nurse (BB), who was not familiar with the pain literature during this phase of the study.

Residents were asked whether they were in pain at that moment (yes/no) and then asked to complete the 5 pain assessment scales to score any pain experienced at that time. The scales were presented in random order (computer generated) and consistently in a large format, i.e., on 8x11 laminated cards (except MVAS). A record was made of the number of explanations required for each scale. Once all the pain assessments had been completed, residents were asked which scale they preferred to use. Any non-completion of scales was recorded along with a reason.

Results

First, the characteristics of the sample are presented, followed by the use and understanding of the pain scales and completion of pain scales according to residents' level of cognitive impairment.

Sample

Over the data collection period, 406 residents from the 15 different nursing homes were screened for possible inclusion in the study (Fig. 1). Of the final sample of 113, 100 were from general nursing homes and 13 from EMI (Elderly Mentally Infirm) homes. The subjects comprised 86 women and 27 men with a mean age of 84.5 (SD 9), ranging from 56 to 103. The 131 who were not included were unable to give consent, suggesting that our sample had excluded a large proportion of residents with dementia, communication difficulties and other conditions that prevented them from participating.

The mean MMSE score for the group was 15 (SD 9) with roughly equal proportions falling within each of the four accepted categories. These were 22 with no impairment (score 24–30); 24 with mild impairment (score 18–23); 31 with moderate impairment (score 10–17); and 28 with severe impairment (score 0–9).

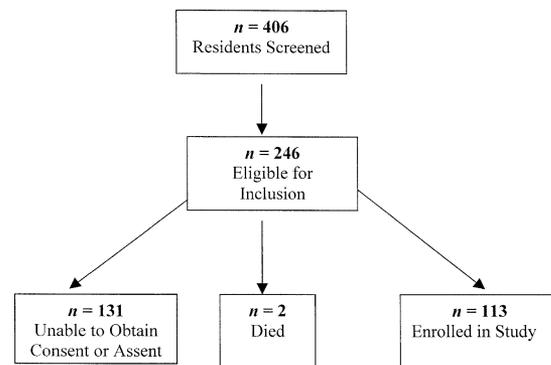


Fig. 1. Flow chart of recruitment into study.

Use and Understanding of the Pain Scales

The researcher noted the number of times each scale had to be explained to each resident before they were able to complete the pain scales. After completion or attempted completion, residents were asked which of the scales they preferred.

A tendency for the VRS to need fewest explanations may be seen (Fig. 2). The mean number of explanations for the VRS was 1.47 (median 1), while the CS needed most, with a mean of 1.89 (median 2). Where three explanations were needed, there was no obvious difference between the scales. Repeated explanation appeared to be important, since it increased significantly the number of scales which residents were able to complete. A Kruskal-Wallis test showed this to be the case for all scales: VRS ($\chi^2 = 27.2$, 3df, $P = 0.000$), NRS ($\chi^2 = 28.4$, 3df, $P = 0.000$), FS ($\chi^2 = 17.2$, 3df, $P = 0.001$), CS ($\chi^2 = 20.3$, 3df, $P = 0.000$) and MVAS ($\chi^2 = 22.8$, 3df, $P = 0.000$).

When asked which of the scales they preferred, this sample of residents did not show a clear preference, but the VRS was chosen slightly more often than the other scales at 15%, the Faces Scale was preferred by 11%, the CS by 11%, the NRS by 7% and the MVAS was least popular, chosen by only 2.7%.

MMSE Score and Use of Pain Scales

The ability of the residents to complete each of the scales is shown in Fig. 3. All of those with no impairment were able to complete the VRS and the NRS. A large majority of those with moderate cognitive impairment were able to use the VRS (97%) and the NRS (87%). There was a notable reduction in the ability to

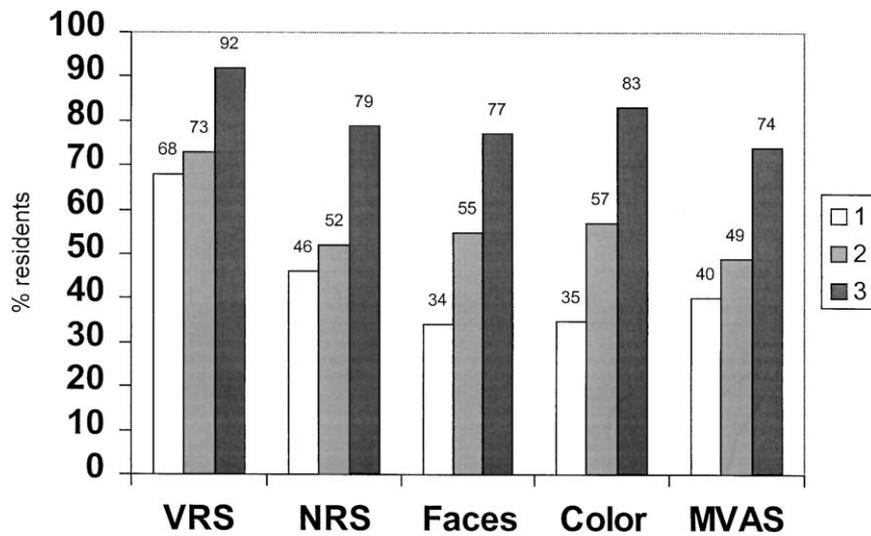


Fig. 2. Cumulative percentage of residents who had completed each type of scale after 1, 2 or 3 explanations. VRS = verbal rating scale; NRS = numeric rating scale; Faces scale; Color scale; MVAS = mechanical visual analogue scale.

use the scales among those with severe cognitive impairment, but the VRS remained the most successful scale, being completed by more than one-third of this group. The mean MMSE scores for those who did not complete each of the scales were: the VRS 2.3 (SD 3.6); the NRS 4.9

(SD 6.3); the Color scale 8.0 (SD 8.5); the Faces scale 9.2 (SD 8.8); and the MVAS 8.9 (SD 8.0).

A more detailed analysis of the four levels of impairment was then undertaken, first using the VRS scores. A Kruskal-Wallis test indicated that there was no significant difference in VRS

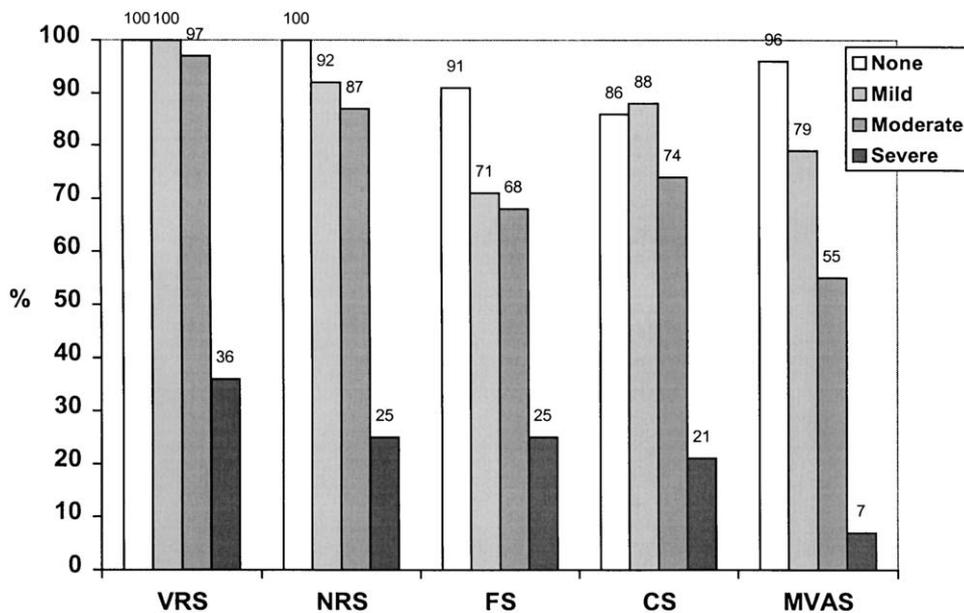


Fig. 3. Percentage of residents able to complete each scale according to level of cognitive impairment. VRS = verbal rating scale; NRS = numeric rating scale; FS = faces scale; CS = color scale; MVAS = mechanical visual analogue scale.

scores between the four impairment levels ($\chi^2 = 4.07, 3df, P = 0.25$). This was also the case for scores using the NRS ($\chi^2 = 0.26, 3df, P = 0.97$), the FS ($\chi^2 = 0.92, 3df, P = 0.82$), the CS ($\chi^2 = 1.37, 3df, P = 0.71$) and the MVAS ($\chi^2 = 4.6, 3df, P = 0.2$).

The number of pain scales completed (0–5), was plotted against the four levels of cognitive impairment (Fig. 4). This illustrates the tendency for more scales to be completed as the level of cognitive impairment decreased. While there is overlap between the confidence intervals for none, mild and moderate categories of impairment (means of 3.8 scales (moderate), 4.3 (mild) and 4.7 (none)), there is a step change for those with severe impairment, where a mean of only 1.4 scales was completed.

The consistency between scores given on the five pain scales may be illustrated using a table of simple Spearman correlations of the scores for each scale (Table 1). The highly significant correlations between all scales suggest that the scales may be consistent in measuring the same phenomenon, assumed to be pain. These correlations were then undertaken separately for each of the four levels of cognitive impairment, with correlation coefficients ranging from $\rho = 0.5$ ($P = 0.026$) to 0.68 ($P = 0.000$) where there was no impairment; $\rho = 0.62$ ($P = 0.01$) to 0.77 ($P = 0.000$) where there was mild impairment; $\rho = 0.38$ ($P = 0.07$) to 0.88 ($P = 0.000$) where there was moderate impairment; and $\rho = -0.09$ ($P = 0.85$) to 0.68 ($P = 0.13$) where

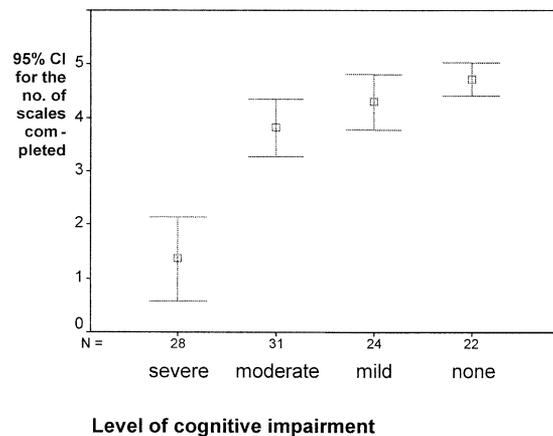


Fig. 4. Confidence intervals for the number of scales completed according to Mini-Mental State Examination score.

Table 1
Spearman Correlations Among the Five Pain Scales

	VRS	NRS	Faces	Color
NRS:				
Correlation coefficient	0.64			
N	81			
Faces:				
Correlation coefficient	0.62	0.67		
N	68	67		
Color:				
Correlation coefficient	0.53	0.64	0.72	
N	73	71	63	
MVAS:				
Correlation coefficient	0.59	0.7	0.71	0.67
N	68	67	64	63

Note: 2-tailed significance $P = 0.000$ for all correlations shown. VRS = verbal rating scale; NRS = numeric rating scale, MVAS = mechanical visual analogue scale.

there was severe impairment. Clearly, the correlations were far more variable at higher levels of impairment. All scales correlated significantly with each other at mild and no impairment. The VRS and CS were not correlated at moderate impairment, while no scale correlated significantly with any another for those who had severe cognitive impairment.

Discussion

The objectives of this study were met, having identified which of the scales used were most successful with nursing home residents. The VRS and NRS were the most frequently completed, while the analogue scales presented more difficulty, especially at higher levels of cognitive impairment. It is clear that those with none to moderate impairment are generally able to use pain scales, while those with severe impairment are a substantially different group which requires a different approach.

Choice of Scales

All of the pain intensity rating scales used in this study were easy to use in the clinical setting and could, with some training, be used by nursing home staff on a routine basis. Overall, the simple four-point verbal rating scale was the most easily understood of the scales used and was completed by 80.5% of this sample of nursing home residents, at all levels of cognitive impairment. The NRS was the second most successful scale, completed by 72.6%, but more than one-third of residents overall did not complete the CS, FS or MVAS. This is in keeping

with the US literature, which has suggested that simple verbal rating scales and horizontal numeric rating scales are the most appropriate for use with this group.^{25,27,28}

Overall then, the VRS and the NRS appeared to be the most suitable pain assessment instruments for use in nursing homes in the UK. In particular, the VRS appeared to be suitable for all but the most severely cognitively impaired. The analogue scales appeared to be conceptually more difficult to understand, and the MVAS was particularly problematic where manual dexterity was compromised. This corroborates earlier work which has suggested that visual analogue scales are not particularly suitable for this population.³⁴ Research to study the reliability of pain ratings (using VRS and other appropriate methods) in this group would further our knowledge of the use of pain assessment methods with those with cognitive impairment.

At higher levels of cognitive impairment, all scales required more frequent explanation. Not surprisingly, the number of scales completed tended to diminish as the level of cognitive impairment increased, with the severely impaired considerably less able to use the scales than the other three groups. The internal consistency between scores on the different pain scales was high, except for those with severe dementia, where there was no correlation between the five scales, suggesting that they cannot be used meaningfully by this group. It is therefore important to identify which other approaches to pain identification can be used at high levels of cognitive impairment.

The mean MMSE score for the 19.5% who were unable to complete the VRS was very low, at 2.3, showing that all but the most severely cognitively impaired were able to use this scale. The second most successful scale, the NRS, was not completed by 27% of residents, whose mean MMSE score was slightly higher, at 4.9. This is considerably greater cognitive impairment than that cited by Weiner et al.,⁹ who found that mean MMSE scores for residents unable to respond to the 0–10 scale were 13.1 and 12.0. Another study showed that 47% of a sample were able to complete the same scale despite a mean MMSE score of 12.1.²⁵ These variable outcomes are difficult to explain, but may have been due, in part at least, to the scales being presented and explained to nursing home residents differently. The repetition of explanation

on how to use each of the scales from the researcher may have been a key influence on the unusually high response rate among those with moderate/severe cognitive impairment. This has implications for the training of nurses and health care assistants in the assessment of pain.

Two pieces of evidence from the study might suggest that many of the cognitively impaired residents in the sample were able both to understand the purpose of the scales and score the intensity of their pain using them. The first is the highly significant correlations between the five scales, suggesting that they were measuring the same phenomenon. Only those with severe impairment appeared unable to comprehend the scales, as shown by the lack of correlation between the five scales for this group. It seems reasonable to assume that the scales were measuring pain for those with none to moderate cognitive impairment. The second finding was that cognitively impaired subjects' pain scores were not significantly different from those who were unimpaired. This latter finding is less convincing for those with severe cognitive impairment, since even though their scores did not differ from the others in the sample, the poor internal consistency of pain scoring within this group makes their understanding of the scales questionable. Nevertheless, these results do not support the argument that perceptions of pain are significantly diminished in those with cognitive impairments.

Finally, those with none, mild or moderate impairment were fairly similar in their ability to use the scales. Those with severe impairment, showed a notable reduction in the number of scales they could complete. At high levels of cognitive impairment, therefore, particular attention needs to be paid to the identification of pain by means other than self-report with formal scales.

Combining Approaches

A simple enquiry alone is unlikely to be adequate to assess pain in many nursing home residents. Older people may not voluntarily report their pain, due to belonging to a generation generally possessed of a more stoic attitude than younger people, and many are reluctant to 'bother' busy nursing staff. They may also under-report pain because they tend to use different language to describe how they feel, considering

it to be an ache, or soreness, or some other description which does not actually include the word 'pain.'

A more wide-ranging assessment is needed, then, following up the initial enquiry concerning the presence of pain with other types of assessment, formal scales and others. Kamel et al.²⁸ found that formal assessment scales were more effective than a general question about the presence of pain. The study reported here has shown that the VRS was the most clinically usable of the formal scales considered, but 64% of residents with severe cognitive impairment were unable to use it. Therefore, even though a clinically usable pain intensity scale, namely the VRS, has been identified, this is not sufficient alone and should probably be used as part of a broader approach to pain assessment. However, careful and repeated explanation of the scales may have produced the high response rates among those with greater cognitive impairment. The broad approach to pain assessment might well benefit from patient and repeated explanation of how to complete scales.

Weiner and colleagues⁹ developed their own Structured Pain Interview (SPI), which they used with a 0–10 pain scale. Residents were first asked, "Do you have any pain or discomfort today?," followed by the SPI (for example, "Do you have some pain or discomfort everyday or almost everyday? What about any aching or soreness?"). A positive response to either of these questions led to "What part of your body hurts the most today?" Responses to this question were aided with a pain map. The fact that 34% of residents in one home and 16% in the other answering positively to the SPI had also responded negatively to the question "Do you have any pain or discomfort today?" may illustrate the importance of the words used or the more flexible time frame allowed. However, as only 8% and 14% were unable to respond to the SPI because of "profound cognitive impairment," compared with 42% and 20% who were unable to respond to the 0–10 scale, the authors appear to have developed a useful short interview to complement a formal scale for identifying residents with chronic pain.

Other authors have developed instruments for use with the vulnerable group of older people suffering profound cognitive impairment. However, it appears to be the notion of

discomfort that has been most developed, encompassing both physical and emotional states, which are difficult to differentiate from one another and from the behaviors of those with severe dementia. These instruments include the DS-DAT, a discomfort scale for those with advanced dementia of the Alzheimer type;³⁵ the ADD, assessment of discomfort in dementia protocol;³⁶ and others. These approaches are very promising but are more oriented to researchers than to day-to-day use by clinicians and it may be that 'objective' behavioral scales would be simpler to use in practice settings.

Some useful work has already been done on behavioral expressions of pain, using facial expressions, body posture, movements and other indicators (e.g., Fuchs et al.,³⁷ Hadjistavropoulos,³⁸ Prkachin et al.,³⁹). For those with severe communication difficulties, this may be the most feasible approach to the identification of pain, although more research is needed to validate it. We have a data set of the cues from which formal and informal carers made inferences of pain associated with the quantitative data presented here, which we aim to use in the continued development of such an approach.

It is likely that a flexible combination of culturally appropriate questioning, simple structured pain assessment instruments, and behavioral cues may be the best way of assessing pain in this group. The study reported here could be built on through the development and testing of a pain assessment protocol for use in nursing homes and other settings that include cognitively impaired older adults. This might be based on a three-part approach, where careful questioning using culturally appropriate language is supplemented (if necessary) by the VRS and, in more difficult cases, some kind of behavioral assessment.

However, some pragmatism is also required. It should be remembered that many of the staff in nursing homes are carers with no professional training, and many have a heavy workload. Any validated pain assessment protocol, therefore, will need to be fairly brief and easy to use if it is to stand a chance of being integrated into practice. It may be more important simply to identify the presence of pain in a majority of residents using the VRS than to try to introduce a more complex and potentially effective approach that is not likely to be used at all.

Again, research is needed to clarify which kind of approach is likely to be the most successful ultimately, in terms of pain reduction.

Conclusion

This study has corroborated and extended the findings of North American research to older people in UK nursing homes. Key findings for practice include the need for individualized attention to pain in nursing home residents, and in particular the acknowledgment that residents do not always report pain in response to a simple enquiry, so carers may need to provide several and varied opportunities for them to express it. The simple verbal rating scale appeared to be the most successful formal pain assessment instrument for this group, including many of those with cognitive impairments. Repeated explanation of the scales appears to improve completion rates.

This study showed no difference in pain scores according to cognitive status. However, those with severe cognitive impairment had greater difficulty in completing pain scales than the others, indicating a need for a different approach to pain assessment for this group. A pragmatic and wide-ranging approach to the assessment of pain in this population, therefore, needs to be developed and tested.

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