Best Evidence Summaries of Topics in Mental Healthcare

BEST *in* MH *clinical question-answering service*

Question

In older adults with (moderate/severe) dementia/cognitive impairment what is the most effective non-verbal/observer-rated pain scale?

Clarification of question using PICTRO structure

Patients: adults with moderate to severe cognitive impairment / dementia
Index test: any diagnostic test
Comparator: any other diagnostic test
Target Condition: pain
Reference standard: Self report
Outcome: Sensitivity and specificity, validity and reliability.

Clinical and research implications

The studies identified by this evidence summary do not report adequate data to support the clinical effectiveness of observational pain assessment tools in older adults with dementia. As noted in the conclusions of the majority of studies, these tools are currently at the development stage and initial data on their psychometric properties and correlation with other methods of pain assessment support the need for further research. There is some evidence, from one small, poorly reported study, that the Pain Assessment in Advanced Dementia (PAINAD) scale may provide a sensitive method for detecting pain as the cause of observed behaviour, however, the high false-positive rate indicates that it frequently detects other sources of distress rather than pain.

What does the evidence say?

Number of included studies/reviews (number of participants)
We identified two systematic reviews[1,2] and three primary studies,[3-5] which met the inclusion criteria for this evidence summary. Both systematic reviews focused on evaluating the psychometric properties of various pain assessment tools for use in older adults with dementia. One review assessed 10 tools[1] and the other assessed 12 tools.[2] The primary studies varied in their design and objectives; all were observational studies. One study compared the psychometric properties of two pain assessment tools, the Checklist of Nonverbal Pain Behaviors (CNPI) and the Pain Assessment in Advanced Dementia (PAINAD) scale.[3] One study assessed the reliability of the Non-communicative Patient's Pain Assessment Instrument (NOPPAIN) and compared its results with self-reported pain intensity and observed pain scores (based on behavioural rating of a video taped activity-based

protocol).[4] The final study assessed the diagnostic performance of PAINAD to predict pain as the cause of observed behaviour (determined by a multi-component clinical assessment); this study also reported changes in PAINAD scores following individualised interventions.[5]

Main Findings

The evidence provided by the two systematic reviews was generally weak. The first review included the Abbey Pain Scale (Abbey), the assessment of discomfort in dementia (ADD) protocol, the checklist of nonverbal pain indicators (CNPI), the discomfort in dementia of the Alzheimer's type (DS-DAT) tool, the Doloplus 2, the Face, Legs, Activity, Cry, and Consolability Pain Assessment Tool (the FLACC), the Non-communicative Patient's Pain Assessment Instrument (NOPPAIN), the Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC), the Pain Assessment for the Dementing Elderly (PADE) tool and the pain assessment in advanced dementia (PAINAD) tool.[1] The highest scores on critical appraisal of psychometric properties were for DA-DAT and NOPPAIN (12 and 11 out of a possible maximum of 15, respectively); other tools scored between 3 and 9.[1] The second review included DOLOPLUS 2, L'Echelle Comportementa le pour Personne Agées (ECPA), L'échelle Comportementa le simplifiée (l'ECS), The Observational Behavior Tool, the Checklist of Non-Verbal Pain Indicators (CNPI), the Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC), the Pain Assessment in Advanced Dementia (PAINAD) tool, the Pain Assessment in Dementing Elderly (PADE) tool, the Rating Pain in Dementia (RaPID) tool, the Abbey Pain Scale (Abbey), the Non-Communicative Patient's Pain Assessment Instrument (NOPPAIN) and the Pain Assessment Tool for Use with Cognitive Impaired Adults.[2] The highest score for psychometric properties was 11 out of a possible maximum of 20 and was achieved by DOLOPLUS 2, ECPA, PACSLAC and PAINAD; other tools scored between 4 and 10.[2]

The primary study that compared the psychometric properties of CNPI and PAINAD appeared to indicate that, whilst both tools had moderate reproducibility, CNPI had better internal consistency and construct validity than PAINAD.[3] The study on the reliability of NOPPAIN indicated moderate to high inter- and intra-rater reliability (Kapa co-efficients between 0.70 and 1.0), as well as significant correlations between NOPPAIN scores and self-reported pain intensity ratings in cognitively intact patients and between NOPPAIN scores and behavioural observational scores in both cognitively impaired and cognitively intact patients.[4] The final study assessed the diagnostic performance of PAINAD to predict pain as the cause of observed behaviour (determined by a multi-component clinical assessment) and reported a sensitivity of 92% and a specificity of 61%.[5]

Authors Conclusions

Both systematic reviews concluded that observational tools for the assessment of pain in older adults with dementia are still under development and recommended further research.[1,2] One of the reviews[2] speculated that, based on currently available evidence, PACSLAC and DOLOPLUS2 are the most appropriate scales currently available. The primary study comparing CNPI and PAINAD concluded that both tools warrant further research, but should currently be applied cautiously when used in either research or clinical settings.[3] The study on the reliability of NOPPAIN concluded that it is an easy to use tool, which may be adequate for assessing pain indicators in older adults.[4] The final study, which assessed the diagnostic performance of PAINAD, concluded that it is a sensitive tool for detecting pain in patients with advanced dementia, but the high false-positive rate indicates that it frequently detects other sources of distress rather than pain.[5]

Reliability of conclusions/Strength of evidence

Both systematic reviews were of reasonable quality, but reported a low level of evidence. The cautious general conclusion of these reviews, that tools for the assessment of pain in older adults with dementia are still under development and further research is needed, would seem appropriate. Two small studies provided data on psychometric properties and correlations between pain assessment tools only.[3,4] The conclusions of the first of these studies were concordant with those of the two systematic reviews and appear appropriate.[3] The conclusion of the second study, that NOPPAIN is an easy to use tool, which may be adequate for assessing pain indicators in older adults is consistent with the reliability data presented, however, it should be noted that these data are derived from only one very small study.[4] Similarly, the conclusion of the final study, that PAINAD is a sensitive tool for detecting pain in patients with advanced dementia but is associated with a high false positive rate, is consistent with the data presented, but is based on one, small, poorly reported study.[5]

What do guidelines say?

NICE guideline CG42 recommends the use of observational pain assessment tools, however provides no guidance around the most effective.

The studies identified by this evidence summary do not report adequate data to support the clinical effectiveness of observational pain assessment tools in older adults with dementia. As noted in the conclusions of the majority of studies, these tools are currently at the development stage and initial data on their psychometric properties and correlation with other methods of pain assessment support the need for further research.

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References

Systematic Reviews

1. Herr K, Bjoro K, Decker S. Tools for assessment of pain in nonverbal older adults with dementia: a state-of-the-science review. Journal of Pain & Symptom Management 2006;31:170-92.

2. Zwakhalen SM, Hamers JP, Abu-Saad HH, Berger MP. Pain in elderly people with severe dementia: a systematic review of behavioural pain assessment tools. BMC Geriatrics 2006;

Primary Studies

3. Ersek M, Herr K, Neradilek MB, Buck G, Black B. Comparing the psychometric properties of the Checklist of Nonverbal Pain Behaviors (CNPI) and the Pain Assessment in Advanced Dementia (PAIN-AD) instruments. Pain Medicine 2010;11:395-404.

4. Horgas L, Nichols AL, Schapson A, Vietes K. Assessing pain in persons with dementia: Relationships among the Non-communicative Patient's Pain Assessment, self-report, and behavioral observations. Pain Management Nursing 2007;8:77-85.

5. Jordan A, Hughes J, Pakresi M, Hepburn S, O'Brien JT. The utility of PAINAD in assessing pain in a UK population with severe dementia. International Journal of Geriatric Psychiatry 2011;26:118-26.

Guidelines

National Institute for Health and Clinical Excellence (2006) Dementia. Supporting People with Dementia and Their Carers in health and Social Care CG 42.
http://www.nice.org.uk/nicemedia/live/10998/30318/30318.pdf

Results

Systematic Reviews

Author (year)	Search Date	Inclusion criteria	Number of included studies	Summary of results	Risk of bias
Herr (2006)	July 2004	For inclusion in this review, assessment tools were required to be: based on behavioural indicators of pain; developed for assessment of pain in nonverbal older adults with severe dementia, or evaluated for this use; available in English; have at least one published report of psychometric evaluation in English.	10 assessment tools were assessed in this review.	This review critically appraised tools for the assessment of pain in non-verbal older adults with dementia. Critical appraisal covered five key criteria: conceptualization; subjects; Administration; scoring and feasibility; reliability and validity. Tools were independently appraised against these criteria by three authors and supporting evidence was rated on a four point scale: 3 = available evidence is strong; 2 = available evidence supports need for further testing; 1 = available evidence is insufficient and/or tool revisions are needed; 0 = evidence is absent, giving a maximum total score of 15. Tool authors were consulted for additional data. A comparison of tool content with the behavioural pain indicators in the American Geriatrics Society (AGS) guidelines (facial expressions, verbalizations and vocalizations, body movements, changes in interpersonal	The aim of the review was stated and appropriate inclusion criteria were defined. Literature searches covered a range of sources. There was some restriction on the basis of language of publication, but this may have been appropriate if tools for use in English language

				interactions, changes in activity patterns or routines, mental status changes) was also provided. Ten assessment tools met inclusion criteria: Abbey Pain Scale (Abbey); assessment of discomfort in dementia (ADD) protocol; checklist of nonverbal pain indicators (CNPI); discomfort in dementia of the Alzheimer's type (DS-DAT); the Doloplus 2; the Face, Legs, Activity, Cry, and Consolability Pain Assessment Tool (the FLACC); Noncommunicative Patient's Pain Assessment Instrument (NOPPAIN); Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC); Pain Assessment for the Dementing Elderly (PADE); pain assessment in advanced dementia (PAINAD). Comparison to AGS guidelines: All ten tools assessed include items on facial expressions, verbalizations and vocalizations, and body movements. Abbey, ADD, Doloplus, PACSLAC and PADE include items on changes in interpersonal interactions and items on changes in activity patterns or routines. Only Abbey, ADD and PACSLAC include items on mental status changes.	settings were being sought. Included tools were independently assessed by multiple authors, reducing the potential for error and/or bias. Assessment of the methodological quality of included studies is of limited relevance to this review, since the aim is to assess the tools themselves. A clear summary of results was

				Critical appraisal scores: Scores ranged from 3 to 12 out of a possible maximum of 15. DS-DAT and NOPPAIN had the highest total scores (12 and 11, respectively); these two tools were also amongst those which included the fewest behavioural pain indicators. DS-DAT scored the maximum of 3 for conceptualisation, subjects and setting, and reliability, 2 for validity and 1 for administration, scoring and feasibility. NOPPAIN scored 3 for subjects and setting and 2 for all other criteria. FLACC was the lowest scoring tool, scoring 1 for subjects and setting, reliability and validity and 0 for other items.	provided, both in relation to critical appraisal and comparison with an existing standard.
Zwakhalen (2006)	Jan 2005	For inclusion in this review, assessment tools were required to: describe a tool for elderly patients with a form of dementia; have been used to measure pain through self-report or behavioural observation; be published in English, Dutch, German, or French; be other than case reports or secondary studies.	29 studies of 12 behavioural pain scales were included in this review.	This review aimed to identify pain assessment scales for elderly people with severe dementia and evaluate their psychometric properties and clinical utility. Tools were rated on a scale of 0 (lowest) to 2 (highest) on the following psychometric properties: origin of items (appropriateness for elderly people with dementia); number of participants; validity (content, criterion and construct I and construct II); homogeneity; reliability (inter- and intra-rater); feasibility (instructions, scoring interpretation and availability of English	The aim of the review was stated and appropriate inclusion criteria were defined. Literature searches covered a range of sources, including some

				version). The maximum total score was 20. Twelve assessment tools met inclusion criteria: DOLOPLUS 2; L'Echelle Comportementa le pour Personne Agées (ECPA); L'échelle Comportementa le simplifiée (l'ECS); The Observational Behavior Tool; Checklist of Non-Verbal Pain Indicators (CNPI); Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC); Pain Assessment in Advanced Dementia (PAINAD); Pain Assessment in Dementing Elderly (PADE); Rating Pain in Dementia (RaPID); The Abbey Pain Scale (Abbey); The Non-Communicative Patient's Pain Assessment Instrument (NOPPAIN); Pain Assessment Tool for Use with Cognitive Impaired Adults. The Discomfort Scale for Patients with Dementia of the Alzheimer Type (DS-DAT) was excluded because the concept of discomfort which it measures was judged to differ from the concept of pain. The Pain Assessment Tool in Confused Older Adults (PATCOA) was excluded because it was designed for use in a confused but cognitively intact sample of elderly people.	conference abstracts, and four European languages. Assessment was largely conducted by one reviewer with a small quality check (3 articles) undertaken by two reviewers. Assessment of the methodological quality of included studies is of limited relevance to this review, since the aim is to assess the tools themselves. A clear summary of

				Overall scores for the psychometric properties of pain assessment tools ranged from 4 to 11, out of a maximum of 20. Four tools scored 11:DOLOPLUS 2 scored 2 for number of participants and homogeneity, 0 for criterion validity and 1 for all other items; ECPA scored 2 for construct I validity, homogeneity and inter-rater reliability, 0 for criterion validity and intra-rater reliability and 1 for all other items; PACSLAC scored 2 for origin of items, participant number, content validity and homogeneity, 0 for inter- and intra-rater reliability and criterion validity and 1 for all other items; PAINAD scored 2 for construct I and II validity, inter-rater reliability and feasibility, 0 for number of participants, criterion validity and intra-rater reliability. The lowest observed score of 4 was associated with l'ECS, the Observational Behavior Tool, and the Pain Assessment Tool for Use with Cognitive Impaired Adults. No data on the clinical utility of pain assessment scores were reported.	results on the psychometric properties of tools was provided.

DTAs ** Searches for primary studies were conducted from the search dates within the included systematic reviews.

Author (year)	**Inclusion criteria**	**Number of participants**	**Summary of results**	**Risk of bias**
Ersek	Participants: over 65 years and	N = 60	Aim: to compare the psychometric properties of two	It was

(2010)	resident in participating nursing homes; had experienced moderate to severe pain (self-report or surrogate report) within the week prior to baseline; life expectancy of at least 6 months. Only participants who were nonverbal or unable to provide reliable self-report of pain were video taped and included in the study. *Index Test 1:* checklist of Non-verbal Pain Behaviours (CNPI) *Index Test 2:* Pain Assessment in Advanced Dementia (PAIN-AD) *Reference standard:* Not applicable; the study is not a DTA study. *Target condition:* Pain *Outcome:* reliability and validity		common observational pain assessment tools used in persons with dementia. Floor effects were assessed by dichotomising items and scores, at rest and with movement, into "no pain" (score 0) and "pain present" (score >0). Internal consistency, for each tool, was assessed using Cronbach's alpha. Inter-rater reliability, between two researchers, was assessed detection of pain presence (Cohen's kappa) and for total score (intra-class correlation coefficient (ICC)). Construct validity: Discriminant validity was assessed, for each tool, comparing scores during rest and movement. Convergent validity was assessed by calculating the correlation between each of the two tools and the Pittsburgh Agitation Scale (PAS); previous research has shown significant associations between pain and agitation in older adults with advanced dementia. The mean age of participants was 89 ± 6.8 years, 88% were female, 93% were white, and 68% were educated to high school level or less. CNPI: The mean total scores of raters 1 and 2 were 0.9 ± 2.0 and 0.8 ± 1.7 for rest and 1.9 ± 2.2 and 2.0 ± 1.6 for movement. Cronbach's alpha coefficients for total CNPI at rest were 0.97 and 0.92, and 0.74 and 0.90 with movement, indicating good	unclear whether participant selection involved consecutive or random sampling. The index tests were clearly described. Reference standard and threshold selection criteria are not applicable as this is not a DTA study. Completion of all study instruments and videotaping occurred within 3

			internal consistency. Inter-rater agreement for presence of pain was moderate for rest ((0.43 (95% CI: 0.16 to 0.68)) and fair for movement ((0.25; 95% CI: 0.06 to 0.47)). The ICC was 0.70 (95% CI: 0.33 to 0.94) for rest and 0.65 (95% CI: 0.38 to 0.82) for movement. These results indicate moderate reproducibility. Construct validity was supported by a significant difference in the number of items observed with movement compared to at rest ($p < 0.001$) and a significant association between PAS and CNPI for movement $p < 0.01$), but not rest. PAINAD: The mean total scores of raters 1 and 2 were 0.2 ± 0.6 and 0.4 ± 1.0 for rest and 1.7 ± 2.1 and 2.4 ± 2.1 for movement. Cronbach's alpha coefficients for total CNPI at rest were -0.04 and 0.73, and 0.70 and 0.72 with movement, indicating poor to acceptible internal consistency. Inter-rater agreement for presence of pain was fair for rest ((0.31 (95% CI: 0.00 to 0.61)) and moderate for movement ((0.54; 95% CI: 0.30 to 0.72)). The ICC was 0.24 (95% CI: 0.02 to 0.58) for rest and 0.80 (95% CI: 0.65 to 0.89) for movement. These results indicate fair to moderate reproducibility. Construct validity was supported by a significant difference in the number of items observed with movement compared to at rest ($p < 0.001$) and a significant association between PAS and PAINAD for movement $p < 0.001$); one rater also showed a significant association between PAS and PAINAD for rest ($p < 0.04$).	days. And all participants appear to have been assessed with both tools and included in the analyses.
Horgas	*Participants:* The participants in this	N = 40 (20 cognitively	Aim: to evaluate reliability of the NOPPAIN tool used by	The principal

(2007)	study formed part of a larger study, where inclusion criteria were: age ≥ 65 years; fluent in English; able to stand up from a chair (with assistance if required). The participants were also diagnosed with osteoarthritis in the lower body, and assessed to have adequate vision and hearing to complete the interview. Participants had already completed pain interviews and a videotaped activity-based pain assessment protocol. Participants were excluded if they were acutely ill, had abnormal vital signs relative to their baseline, or were on bed rest. *Index Test 1:* The non-communicative Patient's Pain Assessment Instrument (NOPAIN) *Reference Standard*: Not applicable; the study is not a DTA study. *Target Condition:* Pain *Outcome:* reliability and validity	impaired & 20 cognitively intact).	nurses and to compare NOPPAIN ratings with self-report and other behavioural rating procedures. After completing a brief, standardised training program for NOPPAIN, two undergraduate nursing students independently completed NOPPAIN assessments for all study participants, based on 190 minute video tapes. The two raters were blind to participants' cognitive status. Reliability was assessed using percent agreement and kappa coefficients for dichotomous variables percent agreement, intra-class correlation coefficients (ICC) and alpha coefficients for scale variables. Each rater re-scored tapes after one week to assess intra-rater reliability. The relationship between NOPPAIN scores, self reported pain intensity (structured interview), and observed pain scores (video taped activity-based protocol) was assessed using correlation analyses. The mean age of participants was 83 years (range 65 to 96 years), and the majority (77.5%) were female. Most (95%) were white and 50% were not educated above high school level. At least one NOPPAIN indicator was observed in most (95%) study participants. The mean number of pain indicators observed was 2 out of 6 (range 0 to 5). The most frequently observed indicators were bracing (90%) and pain noises (≈ 43%). Inter-rater reliability: Across the 6 behaviours, Kappa coefficients ranged from 0.72 to 1.0 for the presence of the	investigator randomly selected 20 cognitively impaired and 20 cognitively intact study participants (no further details reported). The index tests were clearly described. Reference standard and threshold selection criteria are not applicable as this is not a DTA study. The time between self-reported

			pain behaviour, and for intensity ratings, ICCs ranged from 0.72 to 1.0. Intra-rater reliability: Average Kappa coefficients for presence of pain indicators were 0.7 and 0.86 for raters 1 and 2, respectively and ICCs for pain intensity were comparable. Correlation analyses: There were no significant correlations between NOPPAIN and self-reported pain in cognitively impaired (MMSE ≤ 23) participants. However, for cognitively intact participants, NOPPAIN scores correlated with self-reported pain on both the verbal descriptor scale (VDS), $r = 0.66$, $p < 0.001$, and a numeric rating scale (0-5), $r = 0.66$, $p < 0.001$. In cognitively impaired participants, NOPPAIN behavioural ratings and behavioural observation scores were significantly correlated on five of the six indicators assessed (pain faces, rubbing, restlessness, pain words and pain noises). In cognitively intact participants, NOPPAIN behavioural ratings and behavioural observation scores were significantly correlated on three of the six indicators assessed (bracing, pain faces and restlessness).	pain intensity and behavioural observations and NOPPAIN scoring was not reported. All participants appear to have received all assessments.
Jordan (2011)	*Participants:* The diagnosis for the participants was required to meet DSM-IV criteria for dementia, or McKeith criteria for dementia with Lewy bodies, with advanced rating of the disease as shown by the clinical dementia rating (CDR) of three. The participants were also required to be unable to communicate verbally in a	N =79 (131 met initial inclusion criteria, 2 were transferred elsewhere, 9 died and consent was not given for 41).	Aim: to assess the utility of PAINAD in the identification and management of pain in UK nursing home residents with severe dementia. The participants in the study were observed by two observers on three occasions for approximately 5 minutes at a time of rest, a meal time and a time of intervention (e.g. bathing). PAINAD was completed by one	It was unclear whether participant selection involved consecutive or random

	reliable or consistent manner. *Index Test:* PAINAD *Reference Standard:* Initial verification of existing pain took place through a number of methods. (a) a review of medical, psychiatric and nursing notes; (b) information gleaned from discussion with relatives during the assent procedure; (c) judgements based upon observations on three occasions by a doctor specializing in palliative medicine (AJ) and a nurse familiar with the patient (AJ had been qualified for about 10 years during this study, with 6 years' experience post-membership of the Royal College of Physicians, which included about 19 months of geriatric medicine followed by 4 years specializing in palliative medicine); (d) a discussion after the observations between the doctor and the nurse; (e) a physical examination if necessary and appropriate; (f) repeated observations if required; and (g) further discussion with other nursing and medical professionals if necessary. *Target Condition:* Pain *Outcome:* Sensitivity and specificity.		observer on each occasion, the other observer completed a new distress tool (DisDAT). A decision was made on whether any observed behaviour was due to pain or other cause (see description of reference standard). Patients classified as being in pain by the reference standard entered the intervention phase of the study (P group), as did those not classified as being in pain but scoring > 2 on PAINAD (FP group). Interventions for both groups were individual and they continued for as long as seemed necessary or feasible. Patients were monitored weekly and formal re-assessment (as at baseline) was undertaken at 1 and 3 months. The mean age of study participants was 82 ± 8.14 years, and 72% were female. Dementia diagnoses were: Alzheimer's disease 53%; vascular dementia 29%; mixed vascular dementia and Alzheimer's disease 11%; Lewy-body dementia 4%. Twelve participants, out of 13 with pain, scored > 2 on PAINAD (sensitivity 92%) and 40 participants, out of 66 without pain, scored ≤ 2 on PAINAD (specificity 61%). Response to intervention: In the P group, a significant change in the PAINAD score was seen between baseline an 1 month, for the intervention observation, but not for the at rest and eating observations; no significant change was seen between 1 and 3 months, for any observation. In the FP group, a significant change in the PAINAD score was seen between baseline an 1 month, for the at rest and intervention	sampling. The index tests and reference standard were clearly described and the index test (PAINAD) threshold was based on published data. PAINAD appeared to have been conducted before reference standard assessments and it was not clear whether those assessing pain status (reference

			observations, but not for the eating observation; no significant change was seen between 1 and 3 months, for any observation.	standard) were aware of PAINAD results. The time between PAINAD and reference standard assessments was not clear, but all participants appear to have undergone all initial assessments.

Risk of Bias: SRs

Author (year)	Risk of Bias				
	Inclusion criteria	Searches	Review Process	Quality assessment	Synthesis
Herr (2006)	☺	☺	☺	NA	☺
Zwakhalen (2006)	☺	☺	☹	NA	☺

DTA Studies

Study	RISK OF BIAS			
	PATIENT SELECTION	INDEX TEST	REFERENCE STANDARD	FLOW AND TIMING
Ersek (2010)	?	☺	NA	☺
Horgas (2007)	☺	☺	NA	?
Jordan (2011)	?	☺	?	?

☺ Low Risk ☹ High Risk ? Unclear Risk NA Not Applicable

Search Details

Source	Search Strategy	Number of hits	Relevant evidence identified
Guidelines			
NICE	Dementia AND pain	61	0
Primary studies			
PsycINFO	5. PsycINFO; (sensitivity OR specificity).ti,ab; 72092 results. 6. PsycINFO; (pretest ADJ probability).ti,ab; 24 results. 7. PsycINFO; (pre-test ADJ probability).ti,ab; 14 results. 8. PsycINFO; (post-test ADJ probability).ti,ab; 16 results. 9. PsycINFO; "predictive value*".ti,ab; 5109 results. 10. PsycINFO; "likelihood ratio*".ti,ab; 1165 results. 11. PsycINFO; TEST VALIDITY/; 48184 results. 12. PsycINFO; 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11; 120996 results. 14. PsycINFO; dementia.ti,ab; 38716 results. 15. PsycINFO; exp DEMENTIA/; 47100 results. 16. PsycINFO; alzheimer*.ti,ab; 35299 results. 17. PsycINFO; ALZHEIMER'S DISEASE/; 28359 results. 18. PsycINFO; COGNITIVE IMPAIRMENT/; 18985 results. 19. PsycINFO; "cognitive* impair*".ti,ab; 18880 results. 25. PsycINFO; pain.ti,ab; 58410 results. 27. PsycINFO; 14 OR 15 OR 16 OR 17 OR 18 OR 19; 78789 results. 28. PsycINFO; 12 AND 25 AND 27; 83 results.	83	5
EMBASE	33. EMBASE; (sensitivity OR specificity).ti,ab; 763380 results. 34. EMBASE; (pretest ADJ probability).ti,ab; 1051 results. 35. EMBASE; (pre-test ADJ probability).ti,ab; 596 results. 36. EMBASE; (post-test ADJ probability).ti,ab; 402 results. 37. EMBASE; "predictive value*".ti,ab; 80448 results. 38. EMBASE; "likelihood ratio*".ti,ab; 9534 results. 39. EMBASE; SENSITIVITY AND SPECIFICITY/; 184970 results. 40. EMBASE; DIAGNOSTIC ACCURACY/; 168284 results. 41. EMBASE; 33 OR 34 OR 35 OR 36 OR 37 OR 38 OR 39 OR	250	

	40; 1000014 results. 43. EMBASE; dementia.ti,ab; 79789 results. 44. EMBASE; exp DEMENTIA/; 205025 results. 45. EMBASE; alzheimer*.ti,ab; 105481 results. 46. EMBASE; ALZHEIMER'S DISEASE/; 112283 results. 47. EMBASE; COGNITIVE IMPAIRMENT/; 84751 results. 48. EMBASE; "cognitive* impair*".ti,ab; 38964 results. 49. EMBASE; 43 OR 44 OR 45 OR 46 OR 47 OR 48; 294242 results. 50. EMBASE; pain.ti,ab; 482951 results. 51. EMBASE; PAIN/; 175639 results. 52. EMBASE; PAIN ASSESSMENT/; 61195 results. 53. EMBASE; 50 OR 51 OR 52; 545975 results. 54. EMBASE; 41 AND 49 AND 53; 259 results. 55. EMBASE; 43 OR 44 OR 45 OR 46 OR 47; 288242 results. 56. EMBASE; 41 AND 53 AND 55; 250 results.		
MEDLINE	61. MEDLINE; (sensitivity OR specificity).ti,ab; 657652 results. 62. MEDLINE; (pretest ADJ probability).ti,ab; 784 results. 63. MEDLINE; (pre-test ADJ probability).ti,ab; 349 results. 64. MEDLINE; (post-test ADJ probability).ti,ab; 310 results. 65. MEDLINE; "predictive value*".ti,ab; 61093 results. 66. MEDLINE; "likelihood ratio*".ti,ab; 7696 results. 67. MEDLINE; SENSITIVITY AND SPECIFICITY/; 257105 results. 68. MEDLINE; 61 OR 62 OR 63 OR 64 OR 65 OR 66 OR 67; 844700 results. 70. MEDLINE; dementia.ti,ab; 58952 results. 71. MEDLINE; exp DEMENTIA/; 108763 results. 72. MEDLINE; alzheimer*.ti,ab; 80484 results.	99	

	73. MEDLINE; "cognitive* impair*".ti,ab; 27432 results. 77. MEDLINE; ALZHEIMER DISEASE/; 60754 results. 78. MEDLINE; MILD COGNITIVE IMPAIRMENT/; 849 results. 79. MEDLINE; 70 OR 71 OR 72 OR 73 OR 77 OR 78; 163079 results. 80. MEDLINE; pain.ti,ab; 363118 results. 81. MEDLINE; PAIN/; 103041 results. 82. MEDLINE; 80 OR 81; 395446 results. 83. MEDLINE; 68 AND 79 AND 82; 99 results.		
Summary	**NA**	**NA**	