



Review on Pain Assessment Tools for Elderly People with Dementia

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ABSTRACT

Pain is one of the most common symptoms that people with Dementia experience. It is often poorly recognized and undertreated in Dementia mainly in older adults. The main reason for this is that, as dementia progresses, the person's ability to communicate their needs becomes more difficult. There are a considerable number of pain assessment tools available for use with an elderly cognitive impaired population some are discussed here. PACSLAC is regularly pain assessed tool in dementia patients which is conducted in three phases in which Pain-related behaviors are listed, their reliability was mainly assessed and then focused on validation of the PACSLAC. NOPPAIN was developed as a pain screening tool for nursing assistants to assess the patients who are unable to communicate and it is made up of four parts. To assess both verbal and non-verbal dementia patients PAINAD assessment tool is used, mainly the patients with severe pain or those who cannot report the degree of pain. A new software system has been developed by using Artificial Intelligence which meets the need for a valid and more objective pain assessment system for people with dementia i.e, the PAINCHEK™ app that is compatible with android and ios smart devices. The benefits of this advanced tool include Automatisation, Empowering, Documenting and Supporting. This advanced tool has regulatory clearance in Australia and Europe.

Keywords: PACSLAC, NOPPAIN, PAINAD, PAINCHEK, Artificial intelligence.

INTRODUCTION

Pain in the elderly is often unrecognized and undertreated. Ineffective pain management can have a significant impact on the quality of life of older adults. Assessment of pain in older adults with dementia and communication disorders is especially challenging. As such pain problems often go undetected. Dementia patients are regularly assessed through the use of the Pain Assessment Checklist for Seniors with Limited Ability to communicate (PACSLAC)^{1,2}. Patients with Dementia who are unable to communicate their pain assessment can be done by using Instrument Non-Communicative Patient's Pain assessment (NOPPAIN) that evaluates by observing behaviors that express pain³. In the case of advanced dementia, we use the Pain Assessment Advanced Dementia scale (PAINAD). It is a more simple, valid and reliable instrument⁴. Recently we include Artificial intelligence in conjugation with pain behaviors to evaluate the presence and intensity of pain in Aged Residents with Dementia. So that they can continue to conduct pain assessments with PainCheck™ in between their clinical consultations⁵.

DISCUSSION

PACSLAC is a clinically useful observational tool, that is conducted in three phases:

PHASE 1: A list of pain-related behaviors are listed by the experienced researchers and an independent coder by interviewing professional caregivers of seniors with severe dementia.

A behavioral checklist was developed which is an initial version of the PACSLAC and checklist items (60) were arranged systematically related based 4 subscales.

Eg: Facial expressions, body movement, social /personality mood and physiological changes, specific vocalization of pain.

PHASE 2: Reliability of the checklist was mainly assessed here.

PHASE 3: Focused on more important validation of the PACSLAC⁶

Patients who are unable to communicate NOPPAIN was developed as a pain screening tool for nursing assistants (NA). The tool requires NAs to observe and rate pain intensity in addition to documenting behaviors indicating the presence of pain. The tool is made up of four parts 1) Self-report 2) NA observed pain behavior response to daily activities using a 6 –Point Likert scale 3) Identification of the location of the pain 4) Completion of verbal descriptor scale / Pain thermometer⁷. PAINAD is a reliable assessment tool used in both non-verbal and verbal dementia patients. This tool is used in patients with severe pain particularly useful in aphasic patients or those who cannot otherwise report the degree of pain. It results in a continuous score between 0 and 10 which indicates 0 as “no pain” and 10 as “severe pain”. It consists of 5 Items shown in table-1⁸. As discussed above there is an urgent need to develop a valid and more objective pain assessment system for people with Dementia.⁹ As such a new Software system has been developed i.e, The PainChek™. It compressed of the



following components a) Mobile Application (App) b) Web Admin portal (WAP) ¹⁰

PainChek™ is a point of care software application (App) that is compatible with Android and iOS smart devices. The tool uses automated facial recognition technology in real-time to identify nine facial micro-expressions called action

units (AU's) which are derived from the FACS. These facial AU's are validated indicators of the presence of pain¹¹. These data are combined with other non-facial pain cues such as vocalizations, movements, and behaviors inputted by the user to automatically calculate a pain severity score. The PainChek™ pain scale is composed of 42 items distributed across six domains (figure-1).

Table 1: Total scores range from 0 to 10 (based on a scale of 0 to 2 for five items), with a higher score indicating more severe pain (0="no pain" to 10="severe pain")

ITEM	0	1	2
Breathing independent of vocalization	Normal	Occasional labored breathing. Short period of hyperventilation	Noisy labored breathing. Long period of hyperventilation. Cheyne-stokes respirations
Negative vocalization	None	Occasional moan or groan. Low-level of speech with a negative or disapproving quality	Repeated troubled calling out. Loud moaning or groaning. Crying.
Facial expression	Smiling or inexpressive	Sad, frightened, frown	Facial grimacing
Body language	Relaxed	Tense. Distressed pacing. Fidgeting	Rigid. Fists clenched. Knees pulled up. Pulling or pushing away. Striking out
Consolability	No need to console	Distracted or reassured by voice or touch	Unable to console, distract or reassure

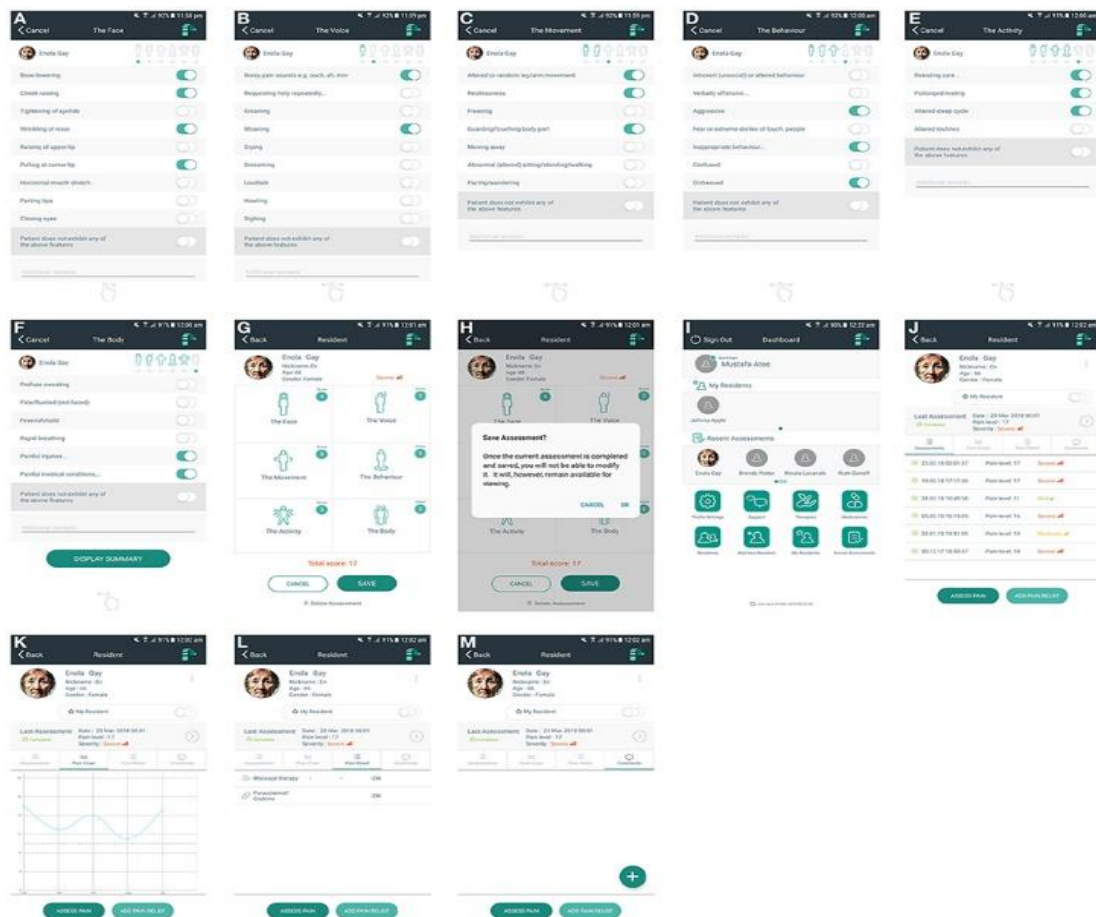


Figure 1: (A) PainChek™ pain assessment tool-The Face (Domain 1). (B) PainChek™ pain assessment tool-The Voice (Domain 2). (C) PainChek™ pain assessment tool-The Movement (Domain 3). (D) PainChek™ pain assessment tool-The Behavior (Domain 4). (E) PainChek™ pain assessment tool-The Activity (Domain 5). (F) PainChek™ pain assessment tool-The Body (Domain 6). (G) PainChek™ pain assessment tool-Summary screen. (H) PainChek™ pain assessment tool-Saving assessment. (I) PainChek™ App—"Dashboard" screen. (J) PainChek™ App—"Assessments" log. (K) PainChek™ App—"Pain Chart." (L) PainChek™ App—"Pain Relief" list. (M) PainChek™ App—"Comments" section.

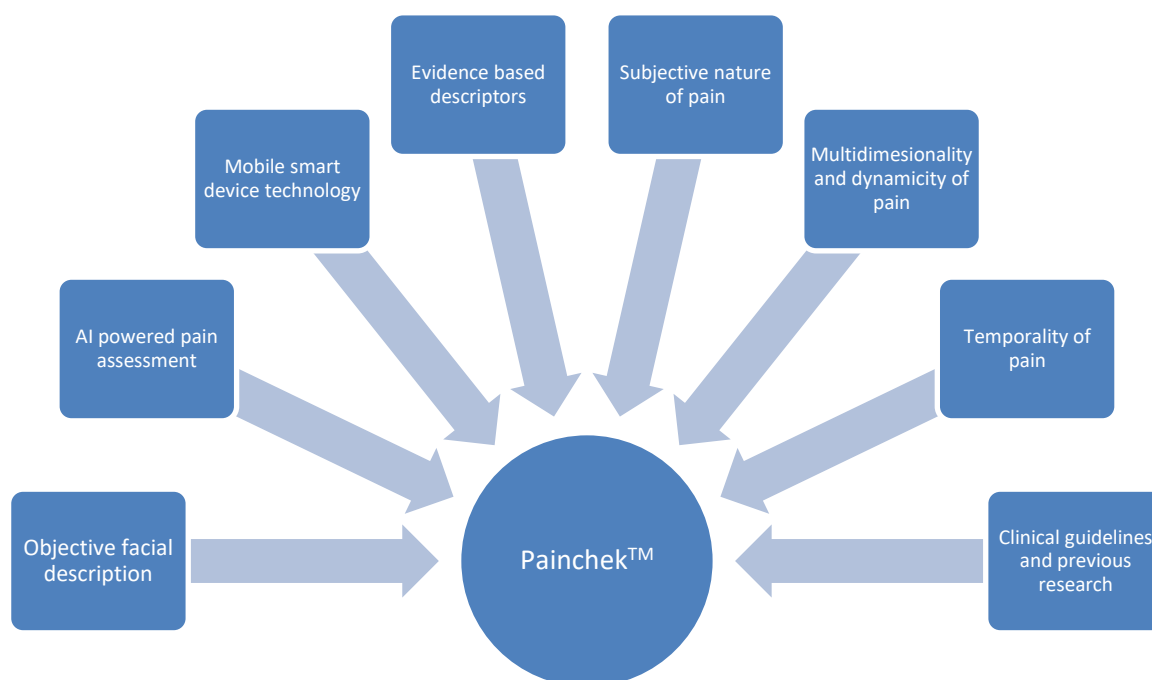


Figure 2: Conceptual Foundation of Painchek™ System

Using smart –device camera to capture a short video of a person’s face, the App automatically identifies the face in real-time, then maps the face to analyze facial expressions indicative of the presence of pain.¹² The PainChek Web Administration Portal is a secure website that allows administrators to manage patient data and activates new users. The WAP is a cloud-hosted web application that can be accessed via a dedicated URL using internet browsers.¹³

In designing the PainChek™ system, the following conceptualizations were considered (figure-2).^{14,15,16.}

CONCLUSION

There are a considerable number of pain assessment tools available for use with the elderly cognitive impaired population. We cannot at present recommend any particular tool for use in any clinical setting, due to the lack of comprehensive evidence on the reliability, validity, feasibility or clinical utility of any one particular tool. So Painchek™ is a comprehensive and evidence-based pain management system. It is considered as a valid and reliable pain assessment tool which is the world-first pain assessment medical device that uses artificial intelligence to assess and score pain levels in real. This novel approach has the potential to transform pain assessment in people who are unable to verbalize because it can be used by clinicians and carers in everyday clinical practice. Benefits of PainChek™ include:

- 1) Automates-Key assessment processes, saving time and reducing the risk of error.
- 2) Empowers-All caregivers to accurately assess and manage pain at the bedside and in the home environment.
- 3) Documents-Pain assessments for reporting, compliance and monitoring effectiveness of treatment.

4) Supports-The The healthcare providers to improve the quality of life for people in pain and provides a platform for optimizing healthcare treatment.

PainChek has regulatory clearance in Australia and Europe. Yet it is not developed in India and other countries. All the countries should allow PainChek to further increase visibility and accelerate future growth, in order to continue improving the quality of life for people with Pain.

REFERENCES

1. Cavalieri TA. Pain management in the elderly. *J Am Osteopath Assoc.* 102(9), 2002, 481–485.
2. Fuchs-Lacelle S, Hadjistavropoulos T, Lix L. Pain assessment as intervention: a study of older adults with severe dementia. *Clin J Pain.* 24(8), 2008, 697–707. DOI: [10.1097/AJP.0b013e318172625a](https://doi.org/10.1097/AJP.0b013e318172625a)
3. Araujo RS, Pereira LV. [Brazilian version of the Non-communicative Patient's Pain Assessment Instrument (NOPPAIN): conceptual, item, and semantic equivalence]. *Cadernos de Saude Publica.* 28(10), 2012 Oct, 1985-1992. DOI: 10.1590/s0102-311x2012001000016
4. Zwakhalen, S.M., Hamers, J.P., Abu-Saad, H.H. *et al.* Pain in elderly people with severe dementia: A systematic review of behavioural pain assessment tools. *BMC Geriatr* 6, 3, 2006. DOI: <https://doi.org/10.1186/1471-2318-6-3>
5. Atee, Mustafa & Hoti, Kreshnik & Hughes, Jeffery. (2018). PainChek™ Use in Clinical Practice: An Artificial Intelligence (AI) Assisted-pain Assessment Tool for Aged Care Residents with Dementia. 10.13140/RG.2.2.32887.16803
6. Fuchs-Lacelle S, Hadjistavropoulos T. Development and preliminary validation of the pain assessment checklist for seniors with limited ability to communicate (PACSLAC). *Pain Manag Nurs.* 5(1), 2004, 37–49. DOI: [10.1016/j.pmn.2003.10.001](https://doi.org/10.1016/j.pmn.2003.10.001)

7. Novello C, Ferrari R, Scacco C, Visentin M. La versione italiana della scala NOPPAIN: validazione in un contesto di formazione [The Italian version of NOPPAIN Scale: validation during education]. *Assist Inferm Ric.* 28(4), 2009, 198–205.
8. Warden, V, Hurley AC, Volicer, V. Development and psychometric evaluation of the Pain Assessment in Advanced Dementia (PAINAD) Scale. *J Am Med Dir Assoc*, Developed at the New England Geriatric Research Education & Clinical Center, Bedford VAMC, MA. 4, 2003, 9-15.
9. A Technical Note on the PainChek™ System: A Web Portal and Mobile Medical Device for Assessing Pain in People with Dementia Mustafa Atee, Kreshnik Hoti and Jeffery D. Hughes. TECHNOLOGY REPORT ARTICLE *Front. Aging Neurosci.*, 12 June 2018. <https://doi.org/10.3389/fnagi.2018.00117>
10. ARTG (2017). Australian Government, Department of Health, Therapeutic Goods Administration, eBS Australian Register of Therapeutic Goods (ARTG) Medicines. Public Summary: ePAT Technologies Ltd- Information system software, application program. Available online at: [https://www.ebs.tga.gov.au/servlet/xmlmillr6?dbid=ebs/PublicHTML/pdfStore.nsf&docid=CD49D725FBC4131ECA2581610042344A&agid=\(PrintDetailsPublic\)&actionid=1](https://www.ebs.tga.gov.au/servlet/xmlmillr6?dbid=ebs/PublicHTML/pdfStore.nsf&docid=CD49D725FBC4131ECA2581610042344A&agid=(PrintDetailsPublic)&actionid=1)
11. Kunz M, Scharmann S, Hemmeter U, Schepelmann K, Lautenbacher S. The facial expression of pain in patients with dementia. *Pain.* 133(1-3), 2007, 221–228. doi:10.1016/j.pain.2007.09.007
12. Pain Assessment in Dementia: Evaluation of a Point-of-Care Technological Solution Atee, Mustafa, Hoti, Kreshnik, Parsons, Richard, Hughes, Jeffery D. *Journal of Alzheimer's Disease*, vol. 60, no. 1, 2017, pp. 137-150. DOI: 10.3233/JAD-170375
13. Hoti K, Atee M, Hughes JD. Clinimetric properties of the electronic Pain Assessment Tool (ePAT) for aged-care residents with moderate to severe dementia. *J Pain Res.* 11, 2018, 1037-1044. <https://doi.org/10.2147/JPR.S158793>
14. Merskey, H., and Bogduk, N. (eds.) (1994). IASP Task Force on Taxonomy: Classification of Chronic Pain: Description of Chronic Pain Syndromes and Definition of Pain Terms. Seattle, WA: IASP Press.
15. Ridley, S. A. Uncertainty and scoring systems. *Anesthesia* 57, 2002, 761–767. <https://doi.org/10.1046/j.1365-2044.2002.02619.x>
16. Ekman, P., Friesen, W. V., and Hager, J. (1978). The Facial Action Coding System (FACS): A Technique for the Measurement of Facial Action. Palo Alto, CA: Consulting Psychologists Press.

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