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On-site electronic observational assessment tool for discomfort and pain

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ABSTRACT

Over the recent years pen–paper observational assessment scales have proven to be useful to monitor behaviour and responses of humans and animals. Observational assessment tools are typically applied for subjects who are not able to communicate directly.

For on-site observational assessment however it is hard to record and evaluate timing patterns of observed events using pen–paper scales. Although timing information is in many cases assumed highly valuable, only (videotaped) laboratory scales are able to benefit from this knowledge.

In the work described in this paper we digitize pen–paper assessment scales resulting in new functionalities capable to improve assessment scores. A study of on-site pain and discomfort assessment of severely demented elderly is presented. The resulting system is a mobile electronic device with a graphical user interface (GUI) on a touch screen. Moreover digital information is stored in a database improving administration, providing immediate feedback and allowing applications like: visualisation, statistical analysis and scientific research like data mining. The device allows easily registering and automatically interpreting complex timing patterns of behaviours and responses, on-site. This feature could be employed in the development of new more accurate observational assessment instruments.

1. Introduction

This paper presents research and development on a tool for digitalization of a pen–paper pain and discomfort observation scales. More specifically the tool is developed for demented elderly who are residents of a nursing home. Although computerized technology assessment has been deployed to diagnose dementia [1], electronic assessment of discomfort and pain for people with last stage of dementia has not been reported.

It is known that pain remains a persistent problem in the daily lives of many elderly. A recent Dutch study reports that 68% of the elderly living in a nursing home experienced pain [2]. This shows pain management is an important part of clinical care. To carry out adequate pain management one must first be able to assess pain. By definition pain is a personal and subjective experience [3,4]. Therefore pain is typically measured by letting the patient complete a self-report scale or interview the patient. This way of assessing pain is popular since it is simple and fast to use. A major

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Table 1 – Observational discomfort (pain) assessment scales for demented people.

Name	Score range	Nr indicators	Levels/indicator	Duration info[a]	Frequency info[b]	Observation time
DS-DAT [6]	0–27	9	3	Yes (quantitative)	Yes (quantitative)	Min 5 min
PACSLAC [7]	0–60	60	2	No	No	~5 min
PAINAD [8]	0–10	5	3	Yes (feeling)	Yes (feeling)	5 min
FPS-R [9]	0–10	1	6	No	No	Instant
PACSLAC-d [10]	0–24	24	2	No	No	2 min
ADD [11]	N/A	5 steps if potential pain is identified	N/A	No	No	'Considerable amount of time'
CNPI [12]	0–12	6	2	No	No	'Short and easy to use'
DOLOPLUS-2 [13,14]	0–30	10	4	Yes (qualitative)	Yes (qualitative)	'A few minutes'
NOPPAIN [15]	0–36	6	6	No	No	Min 5 min
PADE [16]	N/A	24	5	No	No	5–10 min
REPOS [17]	0–10	10	2	No	No	2 min

[a] *Duration info*: Indicates if the duration time of indicators needs to be observed.
[b] *Frequency info*: Indicates if the number of occurrences of an indicator needs to be observed.

disadvantage however arises when the individual has cognitive deficits and is not able to understand how to report [5]. To cope with this problem many behavioural/observational assessment scales are developed [6–17] (see Table 1). Note that observing pain is contradictory towards the definition of pain of being a subjective personal experience. Nevertheless observational pain assessment is proven to be valid and widely accepted in cases where self-report scales are not adequate. Using these scales boils down to observing many indicators at once and depending on the scale noting down their presence/absence, intensity, frequency and duration. Hence the assessment is done manually with highly trained observers using pen and paper. In contrast to videotaped assessment, it is obvious that for on-site pen/paper solutions keeping track of the presence/absence, intensity, frequency and duration of many indicators is difficult. This paper proposes an electronic tool able to effortlessly register the timing of many "simultaneous" indicator events. Other major downsides of pen/paper solutions are that they can be confusing (often only text is used to explain indicators), difficult to calculate, error sensitive (no constraining mechanisms, e.g. incomplete list, or the duration is not respected), incur administrative overhead to collect papers and data and require post processing to evaluate subjects over more sessions. Since the presented tool also registers accurate timing information of indicators events, new information and opportunities become available. For many assessment disciplines it is known or assumed that timing patterns contain very valuable information, but it is practically impossible to incorporate them when using classic pen/paper assessment instruments. Since the presented tool records and automatically interprets these intra/inter-indicator timing patterns, the tool could be employed to develop better scoring systems using this new information.

The presented electronic observational assessment tool, consists of a graphical user interface (GUI) on a touch screen. The touch screen allows recording indicator events as they occur at the very moment. Processing power can automatically determine timing features like frequency and duration. The same holds for the automatic computations of the total score.

For this specific target group (severe dementia) several discomfort and pain observational assessment scales have been developed. Table 1 shows an overview of possible scales for this target group. Table 1 shows the key properties of each scale in relation to the development of the electronic tool. As will become clear in the next sections, important properties are the number of indicators and type of information. Especially the number of levels, duration and frequency information have important implications on the design of the tool. For an in depth comparison (e.g. the validity) of the different assessment scales we refer to [18,19].

In general many cases exist where evaluation of behaviour, status, skills and attitudes of humans or animals needs to be performed. Specialized assessment scales exist and are employed for this task, e.g. a nurse observing a premature baby or a veterinarian observing a lame animal. Current on-site observational assessment instruments are paper checklists that are completed during or after an observation period. In all these cases similar electronic tools could be developed for these situations. Since accurate timing of indicators and processing power is available, the existing scales could be extended by adding classification to (complex) timing patterns.

2. Materials and methods

2.1. *Assessment scales*

From Table 1 we selected three scales in total. The first one is a pain assessment scale "Pain Assessment Checklist for Seniors with Limited Ability to Communicate" (PACSLAC) [7]. Literature compared various assessment scales for demented elderly [18,19] and confirms the validity of PACSLAC and is the advised scale [19] to assess pain. A second scale is the "Discomfort Scale – Dementia of Alzheimer Type" (DS-DAT) [6] scale and it assesses discomfort (not pain). Discomfort is described as "a negative emotional and/or physical state subject to variation in magnitude in response to internal or