Title Healthcare professionals' reports of the cues used to identify cancer pain in older people with delirium: a qualitative-quantitative content analysis

Running title

Pain assessment in patients with delirium

Authors:

Carol A. Graham[1*,2] MD; Gabriela Chaves[1] PhD; Rebecca Harrison [3*,4] BSc; Lynn Gauthier[1*,5] PhD; Rinat Nissim[6] PhD; Camilla Zimmermann[6,7] MD, PhD, FRCPC; Vincent Chan[3,8] MD, FRCPC; Gary Rodin[6, 7, 9] MD, FRCPC; Bonnie Stevens[10, 11] PhD; Lucia Gagliese[1,3*,6*,8,9,12] PhD;

[1]School of Kinesiology and Health Science, York University, Toronto, Canada.

[2]University of Queensland School of Medicine, University of Queensland, Herston, Australia;

[3]Department of Anesthesia and Pain Management, University Health Network, Toronto, Canada;

[4]Current affiliation Michael G. DeGroote School of Medicine, McMaster University, Hamilton, Canada;

[5]Department of Family and Emergency Medicine, Faculty of Medicine, Université Laval; l'Équipe de recherche Michel-Sarrazin en oncologie psychosociale et soins palliatifs, CHU de Québec-Université Laval Research Center, oncology division; Université Laval Cancer Research Center; Québec, Québec, Canada

[6]Department of Psychosocial Oncology & Palliative Care and Campbell Family Research Institute, Princess Margaret Cancer Centre, University Health Network, Toronto, ON, Canada.

[7]Departments of Medicine, of Anesthesia[8] and Psychiatry[9], University of Toronto, Toronto Ontario Canada

[10]Lawrence S Bloomberg Faculty of Nursing, University of Toronto, Toronto, Canada

[11]The Hospital for Sick Children, Toronto, Canada

[12]Department of Anesthesia and Pain Management, Mount Sinai Hospital, Sinai Health System, Toronto, Canada

*Indicates former affiliation

Corresponding author:

Lucia Gagliese

School of Kinesiology and Health Science, York University,

Toronto, Ontario, Canada, M3J 1P3. E-mail: gagliese@yorku.ca.

Number of tables: 2

Number of figures: 3

Number of references: 21

Number of words: 3,213

Abstract

Context: Healthcare professionals (HCP) currently judge pain presence and intensity in patients with delirium despite the lack of a valid, standardized assessment protocol. However, little is known about how they make these judgements. This information is essential to develop a valid and reliable assessment tool. **Objectives:** to identify pain cues that HCP report utilizing to judge pain in patients with delirium and to examine whether the pain cues differ based on patient cognitive status and delirium subtype. **Methods:** Mixed qualitative-quantitative design. Doctors and nurses were recruited. All participants provided written informed consent and prior to the recorded interview, demographic information was collected. Participants were asked to describe their practices and beliefs regarding pain assessment and management with older patients who are cognitively intact or who have delirium. Interviews were transcribed verbatim by Wordwrap and coded for pain cues. Coded data were imported into SPSS to conduct bivariate analyses. **Results:** The pain cue *self-report* and *agitation* were stated more often by the HCP s for intact and delirium patients, respectively. Considering the subtypes of delirium, the HCP s stated *yelling* χ^2 (2, N = 159) = 11.14, p=0.004, when describing pain in hyperactive than in hypoactive and mixed delirium patients; and significantly more HCP s stated *grimace* χ^2 (2, N = 159) = 6.88, p=0.03, when describing pain in hypoactive than hyperactive and mixed patients. **Conclusion:** This study outlines how HCP report conducting pain assessment in patients with delirium and, also, specify pain behaviour profiles for the subtypes of delirium.

Keywords: Cancer pain; Older people; Delirium; Pain assessment.

Introduction

Despite the high prevalence of both pain and delirium at the end of life, little is known about their co-occurrence. Pain is “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (1). Moderate to severe pain is present in 70% of patients with advanced cancer, and 83% at the end of life (2, 3). Delirium is an acute disturbance of consciousness and awareness (4) that develops in up to 88% of patients with advanced cancer (5). Patients with delirium can be classified into three subtypes; (i) *hyperactive* which presents with hallucinations, delusions, agitation and disorientation, (ii) *hypoactive* which presents with confusion and sedation, and (iii) *mixed* in which patients display characteristics of both subtypes (4,6). Varied presentations and patients’ altered level of consciousness complicate pain assessment.

Healthcare professionals (HCP) currently judge pain presence and intensity in patients with delirium despite the lack of a valid, standardized assessment protocol. In a review of chart notations by Gagliese et al. (7), HCP’s pain judgements were based primarily on patient self-report, despite the possibility that the validity of these self-reports could be compromised by the delirium. When self-report was not possible, HCP relied on observation of pain cues such as vocalizations and facial expressions. Thus, it is important to gain a better understanding of how HCP currently assess pain in these patients in order to develop a method that is valid and reliable.

Interestingly, judgements based on patient behaviour were more likely than judgements based on self-report to indicate that patients were experiencing pain. This may arise from the previously documented tendency of HCP to attribute symptoms of delirium, especially agitation, to pain (8). In other words, delirium may look painful. However, if this were the case, one would expect a slightly different repertoire of pain cues to be noted for patients experiencing hyperactive versus hypoactive delirium, due to their different behavioural manifestations. Unfortunately, the two previous studies that assessed pain in patients with delirium either did not include patients with hypoactive presentation (8) or may have under-represented hyperactive and mixed presentations (7), making it impossible to draw conclusions about pain across these delirium subtypes.

As noted by Gagliese et al. (7), many of the chart notations reviewed in that study lacked any description of the cues HCP used in their pain assessments. In addition, the chart notations may have been incomplete. Therefore, while these two preliminary studies clearly suggest that HCP use behavioural cues to judge pain in patients with delirium, the full repertoire of cues used, how they differ across delirium subtypes, how they are distinguished from symptoms of delirium, and whether they are valid and reliable indicators of pain remains unknown.

As part of a larger study of pain assessment in older patients with delirium at the end of life, we interviewed HCP with experience in their care. Similar analysis of qualitative interviews have previously been used successfully to quantify and develop lists of cues that caregivers report using when judging pain in other populations of people with limitations in verbal self-report, including older people with dementia (9), babies (10), and children with cerebral palsy (11). The specific objectives of the current study were to identify pain cues that HCP report utilizing to judge pain in patients with delirium and to examine whether the pain cues differed based on patient cognitive status and delirium subtype.

Methods

Study Design and Setting

This study is a qualitative content analysis with subsequent quantitative analysis of qualitative content, which we refer to as qualitative-quantitative content analysis. This is part of a larger mixed qualitative-quantitative study examining HCP beliefs and judgements of pain in older cancer patients with delirium at the end of life. This study aimed to build on the findings of a recent chart review by Gagliese et al. (7) that looked at how pain was assessed in patients with delirium. For the present analysis, we report only on the demographic data of the sample and the quantitative-qualitative data concerning pain assessment. This method of qualitative-quantitative content analysis of transcripts has been used previously in the development of pain scales in similar populations. (9, 11, 12). Consolidated criteria for reporting qualitative research (COREQ) were followed to ensure standardized reporting (13).

The study was conducted at three University Health Network (UHN) hospitals (Toronto General Hospital, Princess Margaret Hospital and Toronto Western Hospital) in Toronto, Ontario, Canada.

This study received ethics approval from the Research Ethics Boards of the University Health Network (UHN) and York University.

Study Sample

A convenience sample of doctors and nurses with appointments at UHN were recruited using sign-up sheets and flyers posted on site, email notices and in-services. They were asked to contact the research team via email, telephone or pager. Inclusion criteria were physician or nurse; age ≥ 18 years, English fluency sufficient to provide consent and complete the study, and experience in pain assessment in palliative care, oncology or geriatric medicine settings.

Data Collection and measures

Demographic Data

HCP s attended an individual data collection meeting. All participants provided written informed consent. Prior to the interview, demographic information was collected, including age, gender, education, job title and specialty, years of professional experience, years of experience with geriatric, oncology, palliative care, and cognitively impaired patients, and history of specialized training in pain assessment and management. Participants also completed the Davis Empathic Concern Scale (14) and the Pain Catastrophizing Scale (15) (data for these measures will be reported separately).

Qualitative Data

HCP then participated in an audio-recorded, one-on-one, semi-structured interview conducted by Research Assistant 1(RA1) (to clarify the contributions of various research assistants, each is referred to as RA followed by a unique numeric identifier) that lasted approximately 1 hour. Prior to beginning data collection, RA1, an advanced level research associate, completed training in qualitative research interviewing. The participants had no relationship with RA1 prior to the interviews and were reimbursed for their time.

Initial interview guides were developed based on the previous chart review (7), literature review and research team discussion (Appendix 1). Participants were asked to describe their beliefs regarding pain assessment and management with older patients who are cognitively intact and patients with delirium. Participants were also asked to describe how they know older patients in the following categories are in pain: patients who are cognitively intact, patients with delirium in general, patients with hyperactive delirium, patients with hypoactive delirium and patients with mixed delirium. HCP were prompted for more detail when necessary. The DSM 4 (4) criteria for delirium and its subtypes, the current criteria when the data were collected, were supplied to each HCP during the interview, Interviews were conducted until no new pain cues were stated by participants and we determined saturation was achieved (reference).

Interviews were transcribed verbatim by a third-party dictation company and reviewed for accuracy by RA1. Transcripts were then coded for pain cues using the qualitative analysis software Nvivo (16). Content analysis was utilized to code the transcripts for cues indicating pain or no pain. All 53 transcripts were coded by the first author (C.G.) and 18.8% were coded by 2 other research assistants (RA2, RA3). Discrepancies between transcripts were discussed until agreement was reached and the resulting coding tree was applied to the remaining transcripts. This resulted in a comprehensive list of all the pain cues described by HCP s.

The comprehensive list of cues was categorized into themes independently by C.G., the PI (L.G.) and a fourth research assistant (RA4), who was not involved in the initial coding. Discrepancies in the categorization of cues were resolved through discussion until consensus was reached on the categorization of each cue. After categorization, similar cues were collapsed. This resulted in a more succinct checklist of categorized cues, referred to as the preliminary checklist. This checklist was not provided to the interview participants for feedback.

Two research assistants who had not read the transcripts previously (RA4, RA5), used the preliminary checklist to independently score each transcript 5 times, once for each patient group: 1) “Patients who are Cognitively Intact” (INT); 2) “Patients with Delirium” (DEL); 3) “Patients with Hyperactive Delirium” (HYPER); 4) “Patients with Hypoactive Delirium” (HYPO); and 5) “Patients with Mixed Delirium” (MIX). After scoring, discrepancies between RA4 and RA5 in the coding were resolved through discussion. The frequency of each cue stated per patient group was tabulated, and items mentioned by ≥10% of HCP were retained (10) in a preliminary cue profile for each delirium subtype. This cut-off has been used previously as the criterion for retention in the development of pain cue checklists for other populations with impaired ability to verbally report pain (10).

Quantitative data

Statistical Package for the Social Sciences (SPSS), version 24 was used to calculate descriptive data for the experience and demographic variables. Coded data were imported into SPSS to conduct bivariate analyses.

Despite not being retained in the preliminary cue profiles, cues that were stated by <10% of HCP (10) in any one patient subgroup were included in the quantitative frequency analyses of cues between patient subgroups. The pain cue profiles were compared between the patient groups INT and DEL. To determine whether cues were more prevalent for a specific patient group, the proportions of HCP s who stated each cue were compared between INT and DEL using Chi-square tests.

Differences in retained pain cues between delirium subgroups HYPER, HYPO and MIX were also identified. To determine the difference in these cue profiles Chi-square tests were performed. The significance of 0.05 was considered for all performed analysis, except for the post-hoc analysis, for which the Bonferroni correction was applied and the significance level of 0.008 was considered.

Results

Participant Characteristics

Eighty-two HCP inquired about participation. Ten (8.3%) contacted the research staff then failed to respond to further contact attempts. Twelve (14.6%) were deemed ineligible due to insufficient English. Sixty interviews were scheduled; of these, 2 (3.3%) HCP s did not show up for the interview and 5 (8.3%) cancelled their interviews. Fifty-three interviews were conducted by RA1. Table 1 summarizes participants' characteristics.

Qualitative analyses

Fifty-three transcripts were coded for pain cues by the first author and 10 were also coded by two research assistants. Two hundred and sixteen pain cues were identified from the transcripts and made up the initial list of pain cues.

These 216 pain cues were discussed and placed into thirteen categories by C.G. and L.G. These categories emerged from the data on organization of the pain cues into similar groups. They were as follows: *verbal communication, appearance, aggression, agitation, restlessness, mental status, activity level/loss of function, medical, social interactions, affective, analgesic trial, change,* and *evoked cues*. "*Evoked cues*" was defined as pain cues displayed in response to a potentially painful activity, such as moving or being touched. C.G. and L.G. then independently categorized the 216 cues into these 13 categories, after which overlapping cues were discussed and collapsed. For example, the cues "yelling", "screaming", "shouting" and "calling out" were collapsed into "yelling/screaming"; the cues "cannot get out of bed", "cannot participate in physiotherapy", "inability to do daily activities", "inability to move" were collapsed into "Inability to move or complete an activity"; and the cues "abusive", "aggressive", "biting", "fighting", "hitting", "kicking", "lashing out" and "pushing" were collapsed into one cue, “aggression”. The resulting preliminary checklist contained 111 pain cues organized in 13 categories.

The preliminary checklist was used to score transcripts by patient group (INT, DEL, HYPER, HYPO, MIX). The frequency of each individual cue by each patient group was calculated and was used to develop the preliminary cue profile for each patient group. (Table 2) .

Twelve pain cues were retained in the cue profile for the category INT. These cues were: *asking for help, self-report, moaning/groaning, yelling/screaming, grimacing, guarding, crying, agitation, impaired ability to move or complete an activity, does not want to move or complete an activity, change in general and evoked cues.*

Twenty-six pain cues were retained in the cue profile for the category DEL. These cues include each of the 12 cues retained for INT. Additional cues specific to DEL were: *Furrowed brow, favouring a body part, holding a body part, tense, aggression, restlessness, confusion, inability to move or complete an activity, increased heart rate, increased blood pressure, withdrawn, not interested in interaction, improvement with analgesic trial, and change in a pain cue.*

Figure 1 displays pain cues stated by delirium subtype and demonstrates the overlap of cues between subtypes. Thirteen pain cues were retained in the cue profile for HYPER, 9 pain cues for HYPO and 9 pain cues for MIX. Common cues stated for all 3 subtype profiles were: *moaning/groaning, grimacing, guarding, agitation,* and *evoked cues.* Cues that were retained in HYPER but not HYPO were: *yell/scream, aggression, restless, confusion, change in a cue,* and *change in general.* Cues that were retained in HYPO but not HYPER were*: tense and* *withdrawn*. All cues retained for MIX were retained for HYPER. Cues that were retained in MIX but not HYPO were: *yelling/screaming*, *aggression*, *restless*, and *change in general*.

Quantitative analyses

All coded cues were used in the quantitative frequency analyses between patient groups. There were several differences in the frequency with which cues were stated for patients who were cognitively intact versus those with delirium (figure 2). The pain cue *self-report* was stated more often for INT than for DEL χ^2 (1, N = 106) = 22.56, p<0.001. The following pain cues were stated with a different frequency for DEL compared to INT: *Moaning/groaning* χ^2 (1, N = 106) = 9.60, p=0.002, *yelling* χ^2 (1, N = 106) = 6.23, p=0.013, grimace χ^2 (1, N = 106) = 4.67, p=0.031 *agitation* χ^2 (1, N = 106) = 16.41, p<0.001, *restlessness* χ^2 (1, N = 106) = 11.78, p=0.001, *analgesic trial* χ^2 (1, N = 106) = 9.64, p=0.002 and *evoked cues* χ^2 (1, N = 106) = 5.91, p=0.015. The remaining cues did not differ between these two patient groups.

Figure 3 shows the frequency of HCP stating each pain cue for each delirium subtype. Significantly more HCP s stated *yelling* χ^2 (2, N = 159) = 11.14, p=0.004, *aggression* χ^2 (2, N = 159) = 13.92, p=0.001, and *agitation* χ^2 (2, N = 159) = 19.95, p<0.001, when describing pain in HYPER than in HYPO and MIX. Significantly more HCP s stated *grimace* χ^2 (2, N = 159) = 6.88, p=0.03, *does not want to move* χ^2 (2, N = 159) = 6.44, p=0.04, and *evoked cues* χ^2 (2, N = 159) = 7.99, p=0.018 when describing pain in HYPO than HYPER and MIX. HCP did not describe pain cues in MIX significantly more than the other delirium subtypes.

Discussion

This is the first study to interview HCP about the behaviours and methods they use to determine the presence of pain in patients with delirium and across the delirium subtypes compared to patients who are cognitively intact in the inpatient palliative care setting. In summary we found that HCP used a variety of behaviours to judge pain, identified different pain cue profiles for patients with delirium compared to patients who are cognitively intact, and recognized different pain cues for patients with each of the different subtypes of delirium. The categories the HCP most frequently mentioned as pain cue was self-report, for "Patients who are Cognitively Intact", followed by agitation, for "Patients with Delirium". Considering the subtypes of delirium, the most frequently mentioned pain cues were agitation and evoked cues for hyperactive and hypoactive delirium, respectively.

For patients with delirium, it is possible that agitation, restlessness and aggression are due to the delirium itself rather than pain (8, 17-20). If these behaviours are judged to reflect pain in patients with delirium, this could inflate estimates of pain prevalence and have consequences including inappropriate medication, which could worsen cognitive impairment and lead to other medical complications (21). Conversely, if these cues are misattributed to the patient's delirium for patients who are in pain, then pain could be underestimated, leading to the very serious circumstance of pain under-treatment, which has been associated with cognitive impairment, suffering, and poorer quality of death and dying (22-24). It has been suggested that clinicians should err on the side of caution when unsure whether non-verbal patients are in pain, and administer analgesics (17, 18). This would minimize patient suffering and potentially prevent poor outcomes caused by inadequate pain management if pain is present. However, as delirium can be caused or worsened by polypharmacy (21), caution is in order. Future research should continue to examine how to distinguish behavioural cues of pain from the symptoms of delirium and the implications of this overlap for both patient assessment and treatment.

With these difficulties distinguishing pain from delirium, pain assessment is further complicated as self-report may not be the most reliable approach in patients with delirium. However, a recent chart review found that for a large majority of days analyzed, HCP s' assessments of pain in patients with delirium were based on patient self-report (7). This study did not compare the method of assessment for patients with delirium and patients who were cognitively intact. Although self-report remains the gold standard in assessment of pain in all patients and is recommended for those with limited ability to communicate verbally (17), the validity and reliability of self-report for pain in patients with delirium requires further research. Gagliese et al. (7) also described HCP s judging pain in patients with delirium based on the presence of vocalizations (moans/groans, cries out), facial expressions (grimaces, winces) and actions (holding a body part, clenching fists), all of which were cues identified in the present study. Furthermore, the current study extended these findings by investigating differences in pain behaviours between delirium subtypes. It is evident, taking both studies together, that HCP s judge whether these patients are in pain based mainly on behavioural indicators.

Pain cues identified for the different subtypes of delirium overlapped with symptoms of that specific subtype of delirium, such as *aggression* for patients with hyperactive delirium and *withdrawn* for patients with hypoactive delirium. For patients with mixed delirium, pain cues were a combination of the cues described for both hyperactive and hypoactive subtypes of delirium. Based on these patterns, it appears that delirium, whichever subtype, looks "painful" to HCP s.

The lack of uniformity when describing pain indicators for patients with delirium may reflect HCP s' uncertainty in diagnosing pain in these patients (25). With the heterogeneity of symptoms in patients with the different subtypes of delirium, the overlap between symptoms of delirium and behaviours which may indicate pain, and the lack of a standardized tool for pain assessment, it is not surprising to find idiosyncratic pain behaviours reported by HCP s. In addition, if a patient is unable to verbally report symptoms, it may not be possible to differentiate between patient pain and patient discomfort (8). Both pain under- and over-estimation by HCP and the subsequent treatment can have serious consequences for this vulnerable group of patients, highlighting the importance of this neglected area of research. There is an urgent need for a standardized, validated pain identification tool developed specifically for older people with delirium at the end of life.

Several limitations of this study must be considered in interpreting the results. One limitation is the lack of feedback from participants on transcript content to verify accuracy. However, because our approach involved content analysis, rather than thematic analysis, there is arguably less interpretation involved when assessing pain cues (26). Another limitation of this study includes the reliance on HCP reports. We were unable to verify whether these reports accurately reflect pain assessment during clinical practice. While there might be a difference in what HCP report doing and what they chart having done, the previous chart audit study by Gagliese et al. (7) allows us to begin to address any potential inconsistencies. Future prospective studies should document what HCP actually do in situ when assessing older patients with and without delirium at the end of life. Another potential limitation is that participants were aware that this study aimed to clarify pain assessment in patients with delirium. This may have led to participants focusing on pain behaviours for patients with delirium as compared to patients who are cognitively intact. The lack of consistency between HCP s in reporting pain behaviours for the different subtypes of delirium and the use of hypothesis testing for assessment reflects the difficulty of this task and the potential uncertainty HCP s have in their own pain judgements in these patients. Nevertheless, this method of identifying pain behaviours has been used successfully in multiple other non-verbal patient populations (9, 11). Despite these limitations, the convergence of evidence regarding pain assessment across different research methodologies and sources of data is an essential first step in clarifying pain assessment in this population.

Conclusion

This study outlines how HCP conduct pain assessment in patients with delirium and provides preliminary information required to develop a pain assessment method for this patient population. In addition, this study outlines specific pain behaviour profiles for the subtypes of delirium and identifies potential problems with those behaviours, such as overlap of pain cues with behavioural characteristics of delirium. Further research is required to guide the development and validation of a standard method of pain assessment for patients with delirium.

Disclosures and Acknowledgments

This research was funded by grant **MOP – 111090** from the Canadian Institutes of Health Research to Lucia Gagliese.

We wish to thank the members of the Cancer Pain Research Unit for their contributions to the analyses and for their valuable feedback on earlier drafts of this manuscript.

References

1. Merskey H, Bogduk N, eds.: Classification of Chronic Pain: Descriptions of Chronic Pain Syndromes and Definitions of Pain Terms. 2nd ed. Seattle, Wash: IASP Press, 1994
2. Coyle N, Adelhardt J, Foley KM, Portenoy RK. Character of terminal illness in the advanced cancer patient: pain and other symptoms during the last four weeks of life. *J Pain Symptom Manage.* 1990;5:83-93.
3. Romem A, Tom SE, Beauchene M, et al. Pain management at the end of life: A comparative study of cancer, dementia, and chronic obstructive pulmonary disease patients. *Palliat Med.* 2015;29:464-469.

4. American-Psychiatric-Association. Diagnostic and Statistical Manual of Mental Disorders, 4th Edition. Washington, DC: American Psychiatric Association; 1994.
5. Hosie AM, Agar M, Davidson PM, Sanderson C, Phillips JL. Delirium prevalence, incidence and implications for screening in specialist palliative care inpatient settings: a systematic review. *Palliat Med*. 2013;27:486-498.
6. O'Keeffe ST, Lavan JN. Clinical significance of delirium subtypes in older people. *Age and Ageing.* 1999;28:115-119
7. Gagliese L, Rodin R, Chan V, Stevens B, Zimmermann C. How do healthcare workers judge pain in older palliative care patients with delirium near the end of life? *Palliat Support Care.* 2016;14:151-158.
8. Bruera E, Fainsinger RL, Miller MJ, Kuehn N. The assessment of pain intensity in patients with cognitive failure: a preliminary report. *J Pain Symptom Manage.* 1992;7:267-270.
9. 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.* 2004;5:37-49.
10. Breau LM, McGrath PJ, Camfield C, Rosmus C, Finley GA. Preliminary validation of an observational checklist for persons with cognitive impairments and inability to communicate verbally. *Dev Med Child Neurol*. 2000;42:609-616.
11. McGrath PJ, Rosmus C, Canfield C, Campbell MA, Hennigar A. Behaviours caregivers use to determine pain in non-verbal, cognitively impaired individuals. *Dev Med Child Neurol.* 1998;40:340-343.

12. Hurley AC, Volicer BJ, Hanrahan PA, Houde S, Volicer L. Assessment of discomfort in advanced Alzheimer patients. *Res Nurs Health.* 1992;15:369-377.
13. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care.* 2007;19:349-357.
14. Davis MH. Measuring individual differences in empathy: Evidence for a multidimensional approach. *J Pers Soc Psychol*. 1983;44:113-126.
15. Sullivan MJ, Bishop SR, Pivik J. The pain catastrophizing scale: development and validation. *Psychol Assess.* 1995;7:524.
16. NVivo qualitative data analysis software; QSR International Pty Ltd. Version 10, 2018.
17. Herr K, Coyne PJ, Key T, et al. Pain assessment in the nonverbal patient: position statement with clinical practice recommendations. *Pain Manag Nurs.* 2006;7:44-52.
18. Bjoro K, Herr K. Assessment of pain in the nonverbal or cognitively impaired older adult. *Clin Geriatr Med.* 2008;24:237-262.
19. Herr K, Bjoro K, Decker S. Tools for assessment of pain in nonverbal older adults with dementia: a state-of-the-science review. *J Pain Symptom Manage.* 2006;31:170-192.
20. Hadjistavropoulos T, Herr K, Turk DC, et al. An interdisciplinary expert consensus statement on assessment of pain in older persons. *Clin J Pain.* 2007;23:S1-S43.
21. Lawlor PG, Gagnon B, Mancini IL, et al. Occurrence, causes, and outcome of delirium in patients with advanced cancer: a prospective study. *Arch Intern Med.* 2000;160:786-794.
22. Robinson S, Vollmer C. Undermedication for pain and precipitation of delirium. *Medsurg Nurs*. 2010;19:79.

23. Voyer P, Richard S, Doucet L, Carmichael P-H. Predisposing factors associated with delirium among demented long-term care residents. *Clin Nurs Res.* 2009;18:153-171.
24. Strang P. Existential consequences of unrelieved cancer pain. *Palliat Med*. 1997;11:299-305.
25. Tait RC, Chibnall JT, Kalauokalani D. Provider judgments of patients in pain: seeking symptom certainty. *Pain Med*. 2009;10:11-34.
26. Joffe H, Yardley L. 4. Content and Thematic. Research methods for clinical and health psychology. 2004:56-58.

Figure 1. Visual representation of the overlap between pain cues retained for Hyperactive, Hypoactive and Mixed delirium subtypes

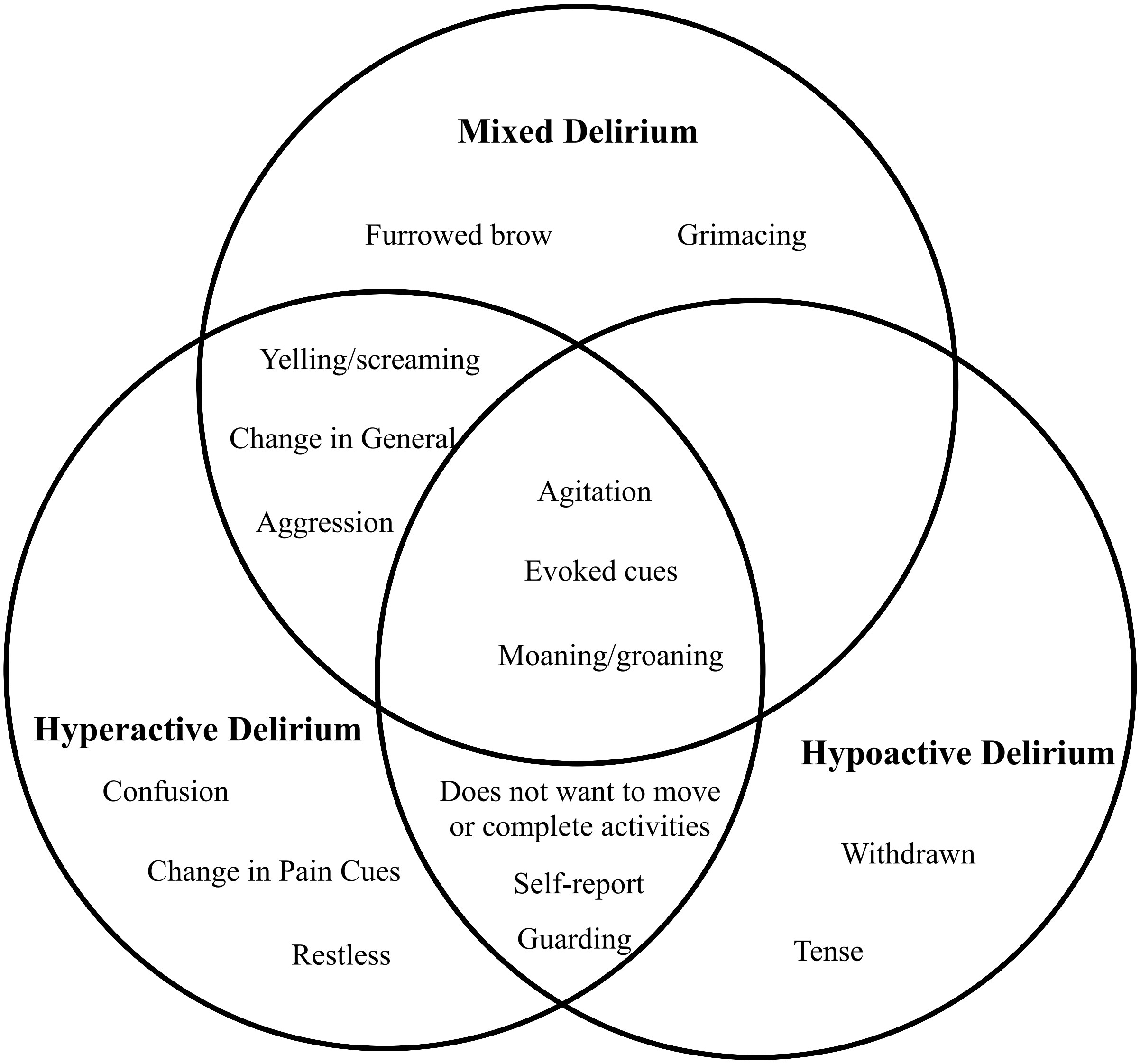
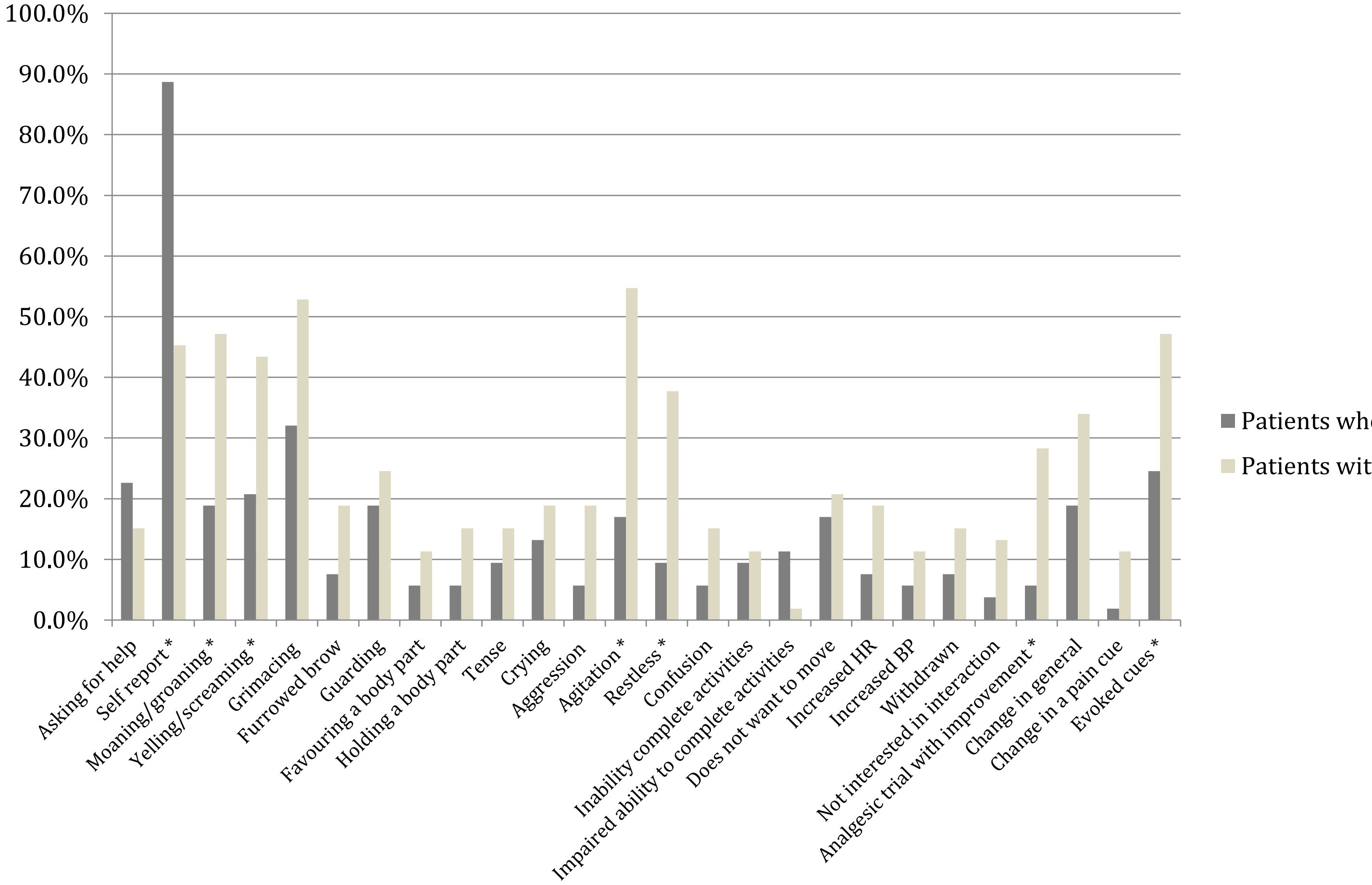
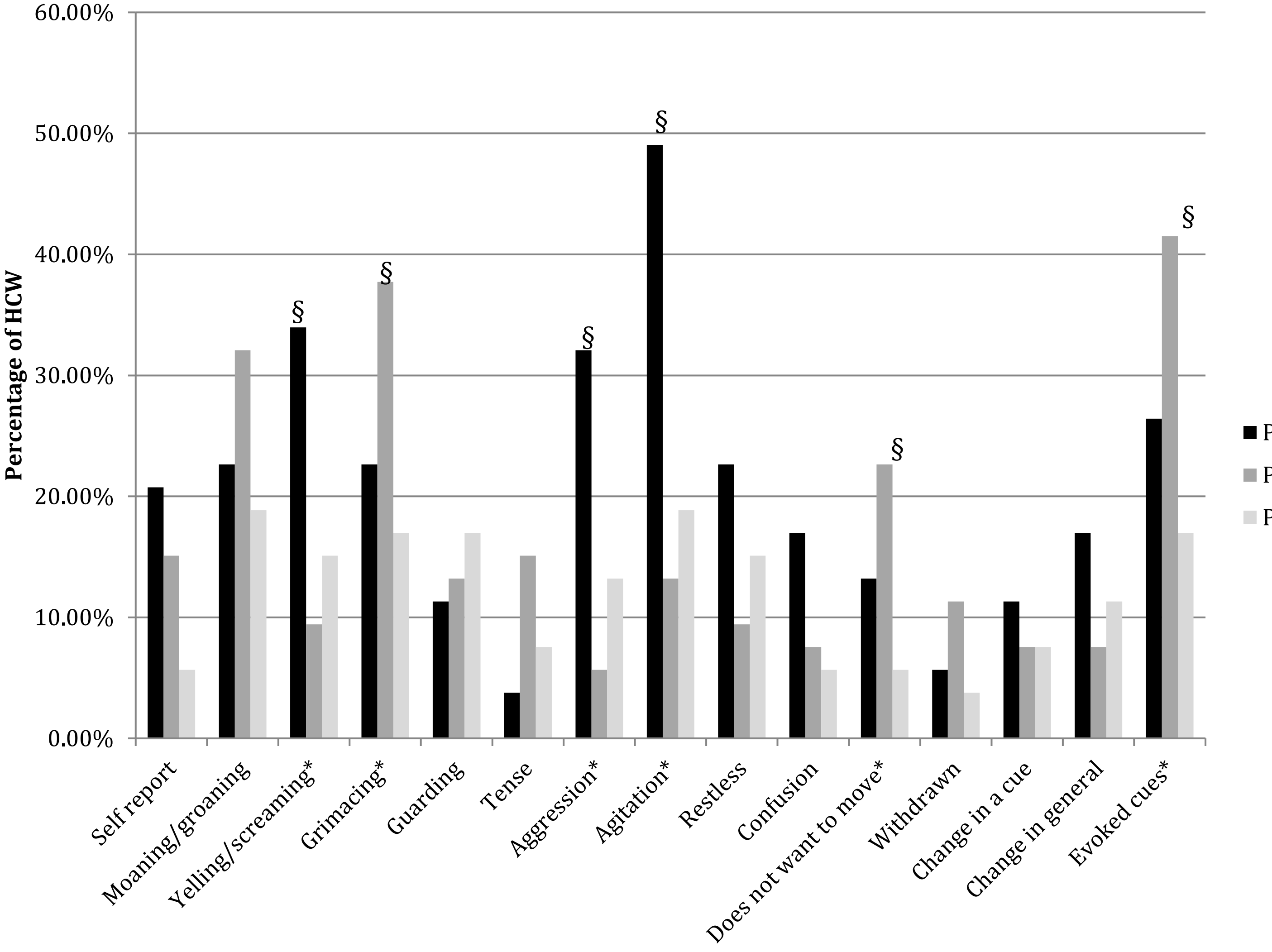

Mixed Delirium
Furrowed brow
Grimacing
Yelling/screaming
Change in General
Aggression
Agitation
Evoked cues
Moaning/groaning
Hyperactive Delirium
Confusion
Change in Pain Cues
Restless
Does not want to move or complete activities
Self-report
Guarding
Hypoactive Delirium
Withdrawn
Tense

Figure 2 Frequencies of HCW stating cues for "Patients who are Cognitively Intact" and "Patients with Delirium"



*p<0.05;

Figure 3 Frequencies of HCW stating pain cues for "Patients with Hyperactive Delirium", "Patients with Hypoactive Delirium", and "Patients with Mixed Delirium"



*p<0.05; §p<0.001

Table 1 Healthcare workers characteristics

Characteristic	**N=53**
Age, *(mean ± SD)*	38.58±11.92
Gender, *n (%)*	
Male	7 (13.2)
Female	46 (86.8)
Discipline, *n (%)*	
Physician	8 (15.1)
Registered Nurse	44 (83.0)
Specialization, *n (%)*	
Oncology	16 (30.2)
Palliative Care	9 (17.0)
Cardiology	8 (15.1)
Pain and Anesthesia	6 (11.3)
Family Medicine	1 (1.9)
Other	8 (15.1)
Specialized training in Pain Management, *n (%)*	
Yes	30 (56.6)
No	11 (20.8)
Years practicing, *Median (Q1-Q3)*	8.0 (3.2-18.7)
Years of experience in Pain Assessment, *Median (Q1-Q3)**	8.0 (4.0-14.0)
Years of experience in Palliative Care/ Oncology, *Median (Q1-Q3)**	4.5 (2.0-10.7)
Years of Experience with Geriatrics, *Median (Q1-Q3)**	6.0 (3.0-11.2)

Years of Experience with Patients who are Cognitively Impaired, *Median (Q1-Q3)**	6.0 (2.7-12.0)

*Median of those with experience n=47

Table 2 Cues stated by ≥10% of HCW for each patient group

		Patients who are Cognitively Intact	**Patients with Delirium**	**Patients with Hyperactive Delirium**	**Patients with Hypoactive Delirium**	**Patients with Mixed Delirium**
Verbal communication	Asking for help	*	*			
	Self report	*	*	*	*	
	Moaning/groaning	*	*	*	*	*
	Yelling/screaming	*	*	*		*
	Crying	*	*			
Appearance	Grimacing	*	*	*	*	*
	Furrowed brow		*			*
	Guarding	*	*	*	*	
	Favoring a body part		*			
	Holding a body part		*			
	Tense		*		*	
Aggression	Aggression		*	*		*
Agitation	Agitation	*	*	*	*	*
Restlessness	Restless		*	*		*
Mental status	Confusion		*	*		
Activity level/loss of function	Inability to move or complete an activity		*			
	Impaired ability to move or complete an activity	*	*			
	Does not want to move or complete activities	*	*	*	*	
Medical	Increased HR		*			
	Increased BP		*			
Social Interactions	Withdrawn		*		*	
	Not interested in interaction		*			
Analgesic Trial	Improvement with analgesic trial		*			

Change	Change in general	*	*	*		*
	Change in pain cues		*	*		
Evoked cues	Evoked cues	*	*	*	*	*

Notes: * indicates pain cue was stated by ≥10% of HCWs

Appendix 1

Table 3. HCW Interview Semi Structured interview

Knowledge/Attitudes

1. Tell me about your experiences working with older cancer patients.

2. What is your impression of the pain experienced by older cancer patients?

3. Describe your usual approach to pain assessment for older people.

a. How does this differ from your approach with younger people?

4. How does the experience of cancer pain change with age?

5. How should pain management protocols be tailored to patients of different ages?

6. Tell me about your experiences working with older cancer patients who are cognitively impaired?

7. What is your impression of the pain experienced by older cancer patients during delirium?

8. How does pain differ in older cancer patients with hyperactive, hypoactive or mixed delirium?

9. What is your impression of the relationship between opioids, pain and delirium in older cancer patients? (Probe any concerns expressed about opioid use)

10. How should cancer pain be managed in older patients with delirium?

11. What barriers/obstacles/challenges have you encountered when assessing or managing pain in older cancer patients with delirium? (Probe for patient, family, HCW and system based barriers)

Generation of Pain Cues,

1. How do you recognize pain (behavioral and clinical cues) in patients with each subtype of delirium?

a. which of these cues are the most important?

b. which of these cues are the most common?

2. Are there different cues for mild, moderate and severe pain?

a. How can you tell them apart?

3. How do you differentiate pain from other symptoms or sources of discomfort such as agitation? (probe any symptoms or sources of discomfort mentioned)

4. How confident do you feel about your ability to detect pain in older people with hyperactive/hypoactive/mixed delirium (0-10 NRS)

5. How can you tell if older patients with delirium (hyperactive/hypoactive/mixed) have adequate pain control?