

Healthcare workers' judgments about pain in older palliative care patients with and without delirium

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Abstract

Delirium can interfere with the assessment and management of pain in older advanced cancer patients. This retrospective cohort study investigated whether healthcare workers' (HCWs) pain judgments differ between older patients with advanced cancer who have been diagnosed with delirium and those who have not. We reviewed HCWs' daily chart notations about pain in patients with advanced cancer, ≥ 65 years of age, who were admitted to a palliative care inpatient unit within a one-year period ($N = 149$). Proportions of days during hospitalization that HCWs judged patients to have pain and good pain control were calculated. Patients with and without a delirium diagnosis and across different delirium subtypes and trajectories were compared on both pain outcomes. The moderating effect of highest analgesic class administered was examined. Although most patients received opioid analgesics, mean proportions of days with judged pain were high (39%–60%), and mean proportions of days with judged good pain control were low ($< 25\%$) across groups. HCWs judged that patients with delirium had significantly fewer days of good pain control than patients without delirium. The group difference in judged pain control was evident in patients who received either opioid or non-opioid medication. Cancer pain management is a mandate of palliative care, and our findings highlight the urgent need for better pain assessment in older patients with advanced cancer who have delirium, including a psychometrically sound protocol to assess pain accurately in this clinical group.

Keywords: cancer pain, older people, delirium, chart audit, pain management

During palliative care hospitalization, about 26% to 62% of older people with advanced cancer experience delirium,¹ with prevalence rates rising to almost 90% in the last days of life.^{2,1} In addition, pain is common in advanced cancer^{3,4} but is frequently undertreated especially in older people.^{3,5} Despite the growing numbers of older patients with advanced cancer who develop both cancer pain and delirium,^{6,2,3,7} there has been little new research within the last decade on healthcare workers' (HCWs') pain assessments with this subpopulation. The present study, a follow-up of an investigation of the pain cues HCWs use in judging pain presence in older cancer patients with delirium,⁸ addresses this critical issue by comparing pain judgments about patients with and without delirium.

Delirium is an acute organic brain disorder marked by disturbances in attention, cognition, and perception.⁹ There are three subtypes of delirium: *hyperactive*, characterized by restlessness, hallucinations, delusions, and agitation; *hypoactive*, characterized by decreased alertness and activity, confusion, and apathy; and *mixed*, characterized by alternating hyperactive and hypoactive features.^{10,11} Hypoactive delirium is the most common subtype within palliative care settings.^{1,12} Rather than resolving (*reversed delirium*),^{10,13} delirium in older patients will more likely persist even after discharge and may continue until death (*terminal delirium*).^{13,2,14}

Delirium not only is distressing to patients and caregivers^{15,16,17} but can interfere with effective pain assessment and management, which are core goals of palliative care.¹⁸ Cancer pain is one of the most common and most feared symptoms of advanced cancer.^{19,4} If not effectively treated, it disrupts physical and cognitive functioning and quality of life at the end of life.^{3,4} However, pain management in older patients is frequently inadequate,^{3,5} with older cancer patients less likely than younger patients to receive adequate analgesic medication.^{3,20,21} Inadequately treated pain can precipitate or exacerbate delirium in older patients and worsen prognosis.^{3,22} Hence, pain management plays an important role in the relationship between delirium and pain in older patients.

Effective pain management relies on pain assessment. The cognitive and behavioral disturbances associated with delirium, however, can hinder patients' ability to report reliably on their pain experience or HCWs' ability to interpret behavioral cues accurately as indicative of pain.^{23,24} To date, existing self-report and observational pain measures have not been validated for older advanced cancer patients with delirium. Pain measures validated for cancer patients with or without cognitive impairments like dementia are not appropriate for those with delirium: item-content overlap with behavioral manifestations of delirium results in inflated pain judgments on these measures.^{25,23,26,24} HCWs in one small study misinterpreted delirium-related agitation as expressions of pain in patients with terminal cancer, even when their pain was well-controlled before and after delirium episodes.²⁷ Recently in a retrospective cohort study, we showed that HCWs in palliative care settings routinely decide whether patients are in pain by using patient self-report and observation of behaviors.⁸ Judgments based on behavioral observation were more likely than those based on self-report to indicate pain presence.⁸ This initial study focused only on patients with delirium, so we do not know the comparative extent of documented pain in older patients with delirium and without delirium.

The purpose of the present study, which is part of the same retrospective cohort study,⁸ is to investigate whether HCWs' judgments about pain presence and good pain control differ between older advanced cancer patients diagnosed with delirium and those without a diagnosis. We hypothesize that HCWs (palliative care physicians and nurses) will judge patients with delirium to be in greater pain and to have poorer pain control than those without delirium. In addition, we explore the moderating impact of highest class of analgesic medication administered on the relationship between delirium presence and judged pain and pain control.

Method

Participants

As previously described,⁸ we reviewed the medical records of consecutive patients, 65 years of age and older, who were admitted during a one-year period to the Harold and Shirley Lederman Palliative Care Centre of the Princess Margaret Cancer Centre in Toronto, Ontario, Canada. The Lederman Centre is an acute palliative care inpatient unit for patients with cancer.

Data Collection

Data were collected from physicians' and nurses' clinical notations in medical records using a uniform electronic data extraction template. Two abstractors, a registered nurse and a clinical research associate who were trained in data-extraction procedures, collected the data. Unanticipated issues in data extraction that were not addressed during training were discussed with the research team until consensus about coding was reached. Abstractors were blind to the study's specific objectives but were aware that it was about pain and delirium. Each chart was reviewed by one abstractor, and thus inter-rater reliability could not be calculated. All categorizations were reviewed by L.G. All notes from admission to either discharge or death were reviewed. The study was approved by the University Health Network's Research Ethics Board.

Demographic and medical data. Demographic and medical data abstracted included age, sex, marital status, education, ethnicity, time since cancer diagnosis, cognitive status, length of the admission in days, and medications administered. Cognitive impairment on admission, based on clinical interview conducted prior to admission by the palliative care physician or psychiatrist, was also abstracted. Types of comorbidities and total number of comorbidities were recorded. Comorbidities were classified into conditions usually associated with pain (e.g., osteoarthritis)²⁸ and those not usually associated with pain (e.g., hypertension). Strongest analgesic class administered during admission was categorized according to the World Health Organization (WHO) analgesic ladder: opioid $\pm$ non-opioid (e.g., non-steroidal anti-inflammatory drugs, adjuvants) analgesics; non-opioid analgesics only; and no analgesics.²⁹

Delirium characteristics. Patients were classified as having delirium if a diagnosis of delirium based on clinical interview by a palliative care physician or psychiatrist was recorded in the chart notations. All specific notations about delirium subtype (hyperactive, hypoactive, or mixed) were recorded. Delirium was also categorized by trajectory as reversed (resolved prior to discharge or death) or terminal (continued until death during the admission). Delirium status was evaluated daily. To control for variable lengths of hospital stay, the proportion of days with delirium was calculated as the number of days the patient was noted to have delirium divided by length of the admission.

Proportions of days with judged pain presence and good pain control. HCWs' notations that described pain assessment, pain characteristics, and behavioural expressions, as well as why assessment was not possible, were extracted. Notations primarily documented only pain presence, with little detail about pain intensity or pain qualities. Patients were classified as having pain on any day that notes indicated they were in pain. Multiple notations of pain on the same day were scored as one day in pain. Similar rubrics were used to code "no pain" and "unable to judge pain." The proportion of days in pain was calculated as the number of days judged in pain divided by length of the admission. Similarly, notations describing HCWs' judgments of good pain control were extracted, and proportion of days with judged good pain control was calculated.

Statistical Analyses

Prior to the main analyses, comparisons between the two abstractors on all variables were conducted using independent-samples t-tests for continuous variables and χ^2 tests for categorical variables, to assess consistency of extraction and identify biases due to abstractor. There were no significant differences between abstractors on any variable, so data were pooled across abstractor for all analyses.

Demographic and medical data. Descriptive statistics were calculated for the demographic and

medical variables.

Delirium characteristics. The prevalence of delirium, its subtypes, and trajectories was calculated. Patients who experienced delirium and those who did not were compared on demographic and medical characteristics, using independent-sample t-tests for continuous variables and χ^2 tests for categorical variables.

Proportions of days with judged pain and good pain control across delirium characteristics. Delirium groups were compared on proportion of days with judged pain and good pain control using independent-sample t-tests or one-way ANOVAs with post hoc Tukey tests. With patients with delirium, a paired-sample t-test was conducted to compare the proportion of days judged in pain during periods of delirium versus periods without delirium.

Highest analgesic class administered during admission. Analgesic groups (opioid $\pm$ non-opioid, non-opioid only, none) were compared across sociodemographic and medical characteristics using χ^2 tests or one-way ANOVAS with post-hoc Tukey tests. We explored patient distributions of analgesic groups across delirium characteristics using χ^2 tests.

We then initially compared analgesic groups on proportions of days with judged pain and good pain control using one-way ANOVAS with post-hoc Tukey tests. We subsequently investigated two-way delirium characteristic x analgesic class interaction effects on proportions of days with judged pain and good pain control using two-way univariate ANOVAs. Significant interaction effects were plotted, and simple main effects tests were conducted to identify significant pairwise differences. Although the interaction analyses involved some cells with small n 's, we nevertheless conducted the analysis on an exploratory basis because of its clinical relevance.

Results

Participants

During the one-year review period, 169 eligible patients were admitted to the palliative care unit. Twenty (11.8%) were excluded due to missing information on cognitive status at admission. This paper reports on data from 149 patients (88.2%). Table 1a summarizes sociodemographic and medical characteristics of the 149 patients and for those with and without a delirium diagnosis. Overall, patients were about 75 years of age on average (range = 65–94 years). There were approximately equal numbers of men and women. Patients had received their cancer diagnosis about four years prior to admission, but lengths of time between diagnosis and admission varied widely (range = 1–324 months). Most patients had no cognitive impairment on admission. Average length of hospitalization was about 10 days (range = 1–29 days).

Clinical notes from 1,126 assessment days were abstracted: 798 days for patients who experienced delirium and 328 days for those who did not. Analyses excluded days in which either there were no chart notations about pain or HCWs were unable to judge pain. Therefore, the present study reports on 1,021 assessment days: 708 days for patients who experienced delirium and 313 days for those who did not.

Prevalence of Delirium Characteristics

As previously reported,⁸ 113 of the 149 patients (75.8%) received a delirium diagnosis during their hospitalization, and the remaining 36 (24.2%) had no delirium diagnosis. Patients with delirium were comparable to those without delirium on almost all characteristics. As also reported previously,⁸ the 113 patients with delirium presented with the following subtypes: 70 (61.9%) with hypoactive delirium, 25 (22.1%) with hyperactive delirium, and 18 (15.9%) with mixed presentation. The 113 patients with delirium exhibited the following trajectories: 22 patients (19.5%) with reversed delirium, and 91 (80.5%) with terminal delirium.

Proportions of Days with Judged Pain and Good Pain Control across Delirium Characteristics

Table 2 summarizes the proportions of days in which HCWs judged patients to have pain and good pain control, across delirium characteristics. Average proportions of days in which HCWs judged that patients were in pain were fairly high, from 39% to 60%. Proportions of days with judged pain did not differ significantly between those with and without delirium, among delirium subtypes, or between delirium trajectories. Moreover, within patients with delirium, there was no significant difference in proportions of days judged in pain between the periods when they had delirium, $M (SD) = 55.26\%$ (36.70), and when they did not have delirium, $M (SD) = 56.21\%$ (36.61), $p = .81$.

Table 2 indicates that the mean proportions of days in which HCWs judged patients to have good pain control were $< 25\%$ across delirium characteristics. Although patients with and without delirium did not differ in proportion of days with judged pain presence, a significant group difference was evident in proportion of days with judged good pain control. Patients with delirium were judged to have significantly fewer days with good pain control than those without delirium, $p < .001$ (Table 2). No other group differences were observed among delirium subtypes or between delirium trajectories.

Highest Class of Analgesic Administered

Most patients were administered opioid analgesics $\pm$ non-opioid analgesics during their hospital stay (Tables 1a and 1b). No significant differences in distribution of patients across analgesic groups were apparent between delirium/no-delirium groups, among delirium subtypes, or between delirium trajectories. Analgesic groups differed significantly on proportion of days with judged pain, $p = .005$, with patients receiving opioids judged to be in pain on a greater proportion of days than those receiving no analgesics, $p = .007$ (Table 2). Analgesic groups did not differ on proportion of days with judged good pain control, $< 15\%$ across groups.

Delirium characteristics x highest analgesic class on proportions of days with judged pain and good pain control. We observed a delirium presence x analgesic class interaction effect on

proportion of days with judged good pain control, $p = .03$. The significant interaction is plotted in Figure 1a. The delirium and no-delirium groups significantly differed within the non-opioid and the opioid $\pm$ non-opioid analgesic groups: within both analgesic groups, patients with delirium were judged to have good pain control on a significantly lower proportion of days than patients with no delirium, p 's $\leq .001$. This difference was evident even though the delirium and no-delirium patients did not differ in proportions of days with noted pain, $p = .62$ (Figure 1b).

Discussion

The current findings extend those published on HCWs' use of patient self-report and behavioral observations in assessing pain in older patients with advanced cancer and delirium.⁸ Overall, although most patients received opioid analgesics, HCWs judged that pain control was inadequate. Most critically, while HCWs judged that patients with delirium were in pain as frequently as patients without delirium and administered opioid analgesics to them as frequently, they documented good pain control on substantially fewer days in patients with delirium. The group difference in judged pain control was evident whether patients received non-opioid or opioid analgesics. Thus, HCWs perceived pain as more intractable or more poorly controlled in patients with delirium than in patients without delirium.

These findings are consistent with the earlier study that reported overestimation by HCWs of pain levels in patients with terminal cancer and delirium-related agitation.²⁷ That patients with delirium were particularly vulnerable to perceived inadequate pain control elaborates upon the high judged pain prevalence in the delirium sample first reported in our previous paper.⁸ HCWs' judgments of inadequate pain control are also consistent with reports of inadequate cancer pain assessment and pain relief in older patients in palliative care,^{3,30,31,5} but they further highlight delirium as a notable risk factor. There is a dearth of recent work investigating whether older patients with advanced cancer and delirium experience

more persistent or severe pain; our findings offer important evidence from the HCWs' clinical perspective.

Furthermore, patients who received opioids were judged to have pain on a greater proportion of days than those who received no analgesics. Causal statements are beyond this study, and thus the factors underlying this finding remain unclear. The finding could suggest that those patients with the worst pain subsequently received opioids, whereas those with little or no pain did not require analgesics. Alternatively, opioids may not have relieved patients' pain completely, or patients with pain received insufficient doses of opioid analgesics. A recent study of advanced cancer patients in the last week of life similarly indicated that most patients still experienced pain despite opioid administration.²¹ The efficacy of opioid analgesics in managing cancer pain in older advanced cancer patients has not been well examined,³² but some aspects of cancer pain may not respond well to opioid analgesics.^{33,32} Prospective studies correlating serum concentrations of opioid metabolites with scores on a validated pain assessment tool would be informative.

Our main findings suggest that cancer pain relief may be problematic especially in advanced cancer patients with delirium. As far as we are aware, no studies have investigated whether the neuromechanisms underlying delirium interfere with analgesic efficacy in older advanced cancer patients. At the same time, misinterpretation of delirium symptoms as pain cues is a potential complication.^{27,12,34} Because there is currently no standardized pain assessment tool validated for use with cancer patients with delirium, HCWs conducting observation-based assessments must rely on professional judgment. Our previous work indicated that observation-based assessments more frequently resulted in documented pain presence than assessments based on patient self-report.⁸ While patient self-report is generally considered the most reliable method of pain assessment,³⁵ the reliability of these self-reports within the context of delirium is uncertain.^{25,8} These issues may confound the poorer pain control

documented in patients with delirium. The behavioral overlap between delirium symptoms and pain cues is of concern considering the clinical risk that overestimation of pain poses: confusing delirium and pain symptoms can lead HCWs to increase opioid dosages, which, in turn, can cause opioid neurotoxicity, exacerbate delirium, and worsen prognosis.^{19,34,36,5}

Our chart-review study has some limitations. The retrospective study adopted a naturalistic approach, but HCWs' chart notations are often unsystematic and lack detail.³⁷ How HCWs weighted patient self-reports and observations in their pain assessments and whether they did so in a standardized fashion were not indicated in chart notations. At the same time, chart notations reflect HCWs' naturalistic treatment procedures with a non-selected patient cohort and thus provide information on treatment outcomes in the course of routine clinical practice. HCWs documented presence or absence of pain only, and so we did not have data on pain intensity or qualities, evolution over time, or underlying mechanism (e.g., nociceptive versus neuropathic pain). HCWs' chart notations did not specify sources of pain, so it remains unclear whether HCWs distinguished between cancer and non-cancer pain. We do not know the cause(s) of delirium in this sample and whether analgesic medication contributed to delirium in some cases. The sample was small and was recruited from a single palliative care unit in an urban cancer centre, so replication is important.

At the same time, the study has several strengths. HCWs' chart notations may be relatively free of response biases, since HCWs composed them without knowledge of research observation or audit. Abstraction methods maximized rigor, such as training abstractors, employing a standardized abstraction protocol, and reviewing disagreements to achieve consensus.³⁷ The study is innovative in that, to our knowledge, it is the first to evaluate HCWs' daily pain assessments throughout older cancer patients' hospitalizations, rather than to rely on cross-sectional evaluation. The high prevalence especially of

hypoactive delirium with terminal trajectory corresponds to reported prevalence rates in other studies of older advanced cancer patients,^{2,1,12} supporting the representativeness of our sample.

The current findings are preliminary and should be cautiously interpreted, but they are intriguing and offer hypotheses for future prospective studies. One of the most urgent next steps is to investigate whether and how HCWs discriminate between pain and delirium symptoms in this palliative care subgroup.²⁷ Examining this issue would inform the development and psychometric evaluation of a much-needed standardized pain assessment protocol for use with older advanced cancer patients with delirium. The protocol would help to identify cancer pain symptoms and differentiate them from overlapping delirium symptoms. Such a tool would stimulate further vital work on cancer pain assessment and management with the growing population of older advanced cancer patients, who have received too little attention considering their complex needs.

An important goal of palliative care is to achieve effective pain management to lessen suffering and sustain quality of life near end of life.^{27,18} The present findings suggest that this clinical goal has yet to be met with older advanced cancer patients with delirium. Patients were judged to experience persistent pain, and those with delirium, more importantly, were judged to have markedly fewer days of good pain control. Uncovering the factors contributing to judgments of inadequate pain relief and developing tools to optimize pain management in this highly vulnerable population should become research and clinical priorities.

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References

1. Hosie A, Davidson PM, Agar M, Sanderson CR, Phillips J. Delirium prevalence, incidence, and implications for screening in specialist palliative care inpatient settings: A systematic review. *Palliat Med* 2012;27:486-498.
2. Breitbart W, Strout D. Delirium in the terminally ill. *Clin Geriatr Med* 2000;16:357-372.
3. Caltagirone C, Spoletini I, Gianni W, Spalletta G. Inadequate pain relief and consequences in oncological elderly patients. *Surg Oncol* 2010;19:178-183.
4. van den Beuken-van Everdingen M, Hochstenbach LMJ, Joosten BEAJ, Tjan-Heijnen VCG, Janssen DJA. Update on prevalence of pain in patients with cancer: Systematic review and meta-analysis. *J Pain Symptom Manage* 2016. <http://dx.doi.org/10.1016/j.jpainsymman.2015.12.340> Accessed May 18, 2015.
5. Yennurajalingam S, Braith F, Bruera E. Pain and terminal delirium research in the elderly. *Clin Geriatr Med* 2005;21:93-119.
6. Boettger S, Jenewein J, Breitbart W. Delirium in advanced age and dementia: A prolonged refractory course of delirium and lower functional status. *Palliat Support Care* 2015;13:1113-1121.
7. 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.
8. Gagliese L, Rodin R, Chan V, Stevens B, Zimmerman C. How do healthcare workers judge pain in older palliative care patients with delirium near the end of life? *Palliat Support Care* 2015;14:151-158.
9. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. Washington, DC: American Psychiatric Association; 2013.
10. Boettger S, Breitbart W. Phenomenology of the subtypes of delirium: Phenomenological differences between hyperactive and hypoactive delirium. *Palliat Support Care* 2011;9:129-135.
11. Meagher D. Motor subtypes of delirium: Past, present and future. *Int Rev Psychiatry* 2009;21:59-73.
12. Moyer DD. Terminal delirium in geriatric patients with cancer at end of life. *Am J Hospice Palliat Med* 2011;28:44-51.
13. Bond SM, Neelon VJ. Delirium resolution in hospitalized older patients with cancer. *Cancer Nurs* 2008;31:444-451.
14. Centeno C, Sanz A, Bruera E. Delirium in advanced cancer patients. *Palliat Med* 2004;18:184-194.

15. Breitbart W, Gibson C, Tremblay A. The delirium experience: Delirium recall and delirium-related distress in hospitalized patients with cancer, their spouses/caregivers, and their nurses. *Psychosomatics* 2002;43:183-194.
16. Bruera E, Bush SH, Willey J, et al. Impact of delirium and recall on the level of distress in patients with advanced cancer and their family caregivers. *Cancer* 2009;115:2004-2012.
17. Morita T, Hirai K, Sakaguchi Y, Tsuneto S, Shima Y. Family-perceived distress from delirium-related symptoms of terminally ill cancer patients. *Psychosomatics* 2004;45:107-113.
18. World Health Organization. *WHO Definition of Palliative Care*. <http://www.who.int/cancer/palliative/definition/en/> Accessed December 7, 2015.
19. Bruera E, Kim HN. Cancer pain. *JAMA* 2003;290:2476-2479.
20. Gauthier LR, Young A, Dworkin RH, et al. Validation of the Short-Form McGill Pain Questionnaire-2 in younger and older people with cancer pain. *J Pain* 2014;15:756-770.
21. Mercadante S, Aielli F, Masedu F, Valenti M, Verna L, Porzio G. Age differences in the last week of life in advanced cancer patients followed at home. *Support Care Cancer* 2016;24:1889-1895.
22. Robinson S, Vollmer C, Jirka H, Rich C, Midiri C, Bisby D. Aging and delirium: Too much or too little pain medication? *Pain Manage Nurs* 2008;9:66-72.
23. Kang JH, Shin SH, Bruera E. Comprehensive approaches to managing delirium in patients with advanced cancer. *Cancer Treat Rev* 2013;39:105-112.
24. Tate JA, Sereika S, Divirgilio D, et al. Symptom communication during critical illness: The impact of age, delirium, and delirium presentation. *J Gerontol Nurs* 2013;39:28-38.
25. Bjoro K, Herr K. Assessment of pain in the nonverbal or cognitively impaired older adult. *Clin Geriatr Med* 2008;24:237-262.
26. Lints-Martindale AC, Hadjistavropoulos T, Lix LM, Thorpe L. A comparative investigation of observational pain assessment tools for older adults with dementia. *Clin J Pain* 2012;28:226-237.
27. 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.
28. IASP Task Force on Taxonomy. *Classification of Chronic pain: Descriptions of Chronic Pain Syndromes and Definitions of Pain Terms*, 2nd ed. H Merskey, N Bogduk (eds.). Seattle: IASP Press; 1994.
29. World Health Organization. *WHO's Cancer Pain Ladder for Adults*. <http://www.who.int/cancer/palliative/painladder/en/> Accessed October 23, 2015.
30. Cleeland CS. Undertreatment of cancer pain in elderly patients. *JAMA* 1998;279:1914-1915.

31. Wilkie DJ, Ezenwa MO. Pain and symptom management in palliative care and at end of life. *Nurs Outlook* 2012;60:357-364.
32. Pergolizzi J, Boger RH, Budd K, et al. Opioids and the management of chronic severe pain in the elderly: Consensus statement of an international expert panel with focus on the six clinically most often used World Health Organization step III opioids (buprenorphine, fentanyl, hydromorphone, methadone, morphine, oxycodone). *Pain Pract* 2008;8:287-313.
33. Cohen SP, Mao J. Neuropathic pain: Mechanisms and their clinical implications. *BMJ* 2014;348:f7656. <http://dx.doi.org/10.1136/bmj.f7656> Accessed October 8, 2015.
34. Senel G, Uysal N, Oguz G, et al. Delirium frequency and risk factors among patients with cancer in palliative care unit. *Am J Hospice Palliat Med* 2015. <http://ajh.sagepub.com/content/early/2015/12/30/1049909115624703.full.pdf+html> Accessed May 18, 2016.
35. AGS Panel on Persistent Pain in Older Persons. The management of persistent pain in older persons. *J Am Geriatr Soc* 2002;50:S205-S224.
36. Vella-Brincat J, Macleod AD. Adverse effects of opioids on the central nervous system of palliative care patients. *J Pain Palliat Care Pharmacotherapy* 2007;21:15-25.
37. Zozus MN, Pieper C, Johnson CM, et al. Factors affecting accuracy of data abstracted from medical records. *PLoS ONE* 2015;10:e0138649. <http://dx.doi.org/10.1371/journal.pone.0138649> Accessed October 30, 2015.

Figure Captions

Figure 1a. Delirium presence x highest analgesic class interaction effect on proportion of days with judged good pain control. **Figure 1b.** Delirium presence x highest analgesic class interaction effect on proportion of days with judged pain.