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Nursing documentation in long-term care settings: new empirical evidence demands changes be made

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Abstract: In this study on nurse documentation in LTC facilities, a set of 9 delirium symptoms were used to evaluate the congruity between symptoms detected by nurses during monthly interviews and those documented in the in the nursing notes for the same 7-day observation period. Residents aged 65 and over (N = 280) were assessed monthly over a six-month period for the presence of delirium and its symptoms using the Confusion Assessment Method. The proportion of symptoms documented in the nursing notes ranged from 1.9% to 53.5%. A trend toward lower proportion of documented symptoms for higher resident to nurse ratios was observed, although the difference did not reach a statistically significance. Effort should be made to improve the situation by revisiting the content of academic and clinical training given to nurses as well as exploring innovative ways to increase time efficiency of documentation in the actual context of nurses` work overload.
To develop a delirium risk screening tool for use in long-term care (LTC) facilities.

Introduction

Clear, accurate and complete documentation is crucial to the delivery of quality health care as it provides an efficient way to communicate vital patient information to all members of the health care team. Because nurses have frequent and continual contact with patients throughout the day, their role in documenting any changes in health status that may occur, is critical. Residents in long-term care (LTC) settings do not receive the same level of medical service intensity as that provided to acute care patients, so nursing documentation is even more essential to their receiving comprehensive and continuous care. This article focuses mainly on the accuracy of the documentation of delirium symptoms by nurses.

According to the Long-Term Care Health Information Practice and Documentation Guidelines, documentation should provide a clear picture of the resident, including any change in treatment, their response to treatment and changes in their condition (American Health Information Management Association, Sept 2001). Yet the literature reveals major deficiencies in the nursing documentation of several problems commonly found in LTC settings, such as decubitus ulcers (Berglund & Nordstrom, 1995), risk of falls (Uden, Ehnfors, & Sjostrom, 1999), constipation and pain (Ehrenberg & Ehnfors, 1999a). Serious shortcomings in the nurse documentation of assessments, goals, interventions, outcomes and resident's status have been identified (Ehrenberg & Ehnfors, 1999a; Martin, Hinds, & Felix, 1999; Voutilainen, Isola, & Muurinen, 2004). For instance, a retrospective audit of resident records (N = 120) from eight nursing homes (Ehrenberg & Ehnfors, 1999a) found only one record containing a comprehensive description of the resident's problem. However, none of the studies mentioned enables us to reach any conclusion concerning possible causes for the omissions. Was the nurse aware of the resident's problem but omitted documenting it in the medical chart or was the problem not recognized and therefore not recorded? Short-staffing and heavy demands with regard to completing resident care activities have been proposed as a possible cause of poor documentation (Ouslander et al., 2004). Some authors also suggest that because of the relatively longer time residents stay in LTC settings compared to patients in acute care facilities, a nurse's accumulated knowledge about the residents may not necessarily be expressed in writing (Voutilainen et al., 2004), unless the resident's usual functioning has obviously changed. Current knowledge concerning the agreement between the observations made by nurses and the information written in the resident record is limited, as are the possible causes for omissions. The present study aimed to address this knowledge gap by looking at nurse documentation of delirium. Delirium is a serious and prevalent problem in LTC settings with numerous deleterious consequences, including functional decline, morbidity and mortality (D. M. Fick, Agostini, & Inouye, 2002).

Delirium is a disturbance of consciousness and cognition with a fluctuating course (*American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders,* 2000) and is considered one of the most serious forms of sudden change in mental status

(Flaherty et al., 2007). In fact, Flaherty et al. (2007) suggested that mental status should be the sixth vital sign, since a sudden change in mental status such as that seen in delirium, could indicate an underlying problem, such as sepsis or a myocardial infarction. Documentation of delirium symptoms is crucial: the correct recording of signs of delirium is a prerequisite for further assessments, diagnosis and the consequent identification of underlying causes and implantation of strategic interventions.

Studies on nurse documentation of delirium symptoms reveal a documentation rate ranging from 0% to 83% (Gustafson, Brannstrom, Norberg, Bucht, & Winblad, 1991; Laurila, Pitkala, Strandberg, & Tilvis, 2004; Steis & Fick, 2012; Voyer, Cole, McCusker, St-Jacques, & Laplante, 2008). However, since these studies were conducted in acute care settings, their results cannot be generalized to LTC facilities. In addition the methodology used does not enable us to draw any conclusion concerning agreement between the symptoms reported by nurses and what was actually documented in the medical chart. It should be noted that a symptom may be reported but not necessarily documented: the present study aimed to determine the discrepancies between recognition and documentation. More precisely, this study addressed the following questions: 1) What proportion of the delirium symptoms reported by nurses is actually documented in the nursing notes? 2) What association, if any, is there between the resident-nurse ratio, an indicator of nurse work load, and the proportion of documented delirium symptoms in the nursing notes? 3) What is the proportion of documented delirium symptoms in the nursing notes in relation to the resident's delirium status?

Methods

Design, study settings and selection of participants

This study looks at data collected as part of the Delirium Study in Long-term Care Settings, a prospective, observational study conducted at seven LTC facilities, in both Montreal and Quebec City, Canada (McCusker et al., 2011). All residents aged 65 and over, admitted to LTC (not respite care) and able to communicate in English or French were eligible for the study. A research assistant (RA) compiled weekly lists of all eligible residents for each of the study sites. In an effort to recruit residents who were representative of their institution, both newly admitted and longer term residents were recruited consecutively from resident lists. Different recruitment procedures were used, depending on each resident's competence to consent to the study (based on the clinical impression of the primary nurse). The RA invited competent residents to participate in the study after they had accepted to be met according to the nurse. For incompetent residents, a letter describing the study was sent to the legal guardian or, in the absence of one, a family member designated as surrogate. The family member informed the nurse if they were willing to meet the RA who then described the study and requested their signed consent. The study protocol was approved by the research ethics boards of the University and those sites with such a review committee.

Data collection and measures

Residents were followed for up to 6 months or until death, withdrawal or transfer to another facility. In this paper, we limit our presentation to the procedure relevant to the understanding of the present study. Data collection procedure for the original study has been presented before (McCusker et al., 2011). RAs involved in the project received in-class and bedside coaching on how to administer all the materials (tools, chart review). They were trained to recognize the symptoms of delirium by clinical demonstrations, trial rating of cases and discussion of findings until there was satisfactory agreement between the RA and the clinical investigator. The RA and the clinical investigator simultaneously and independently assessed samples of residents, both before data collection commenced and throughout the study.

At baseline, the RA conducted an assessment of the resident that included an evaluation of the severity of cognitive impairment using the Mini-Mental State Exam (MMSE) (Folstein, Folstein, & McHugh, 1975) and the Hierarchic Dementia Scale (HDS) (Cole & Dastoor, 1987), the level of functional autonomy using the Barthel (Mahoney & Barthel, 1965) and the presence of delirium and its symptoms using the Confusion Assessment Method (CAM)(Inouye et al., 1990). The CAM and the MMSE were both repeated monthly. As soon as possible after the RA's monthly assessment of delirium symptoms, the primary nurse (the nurse providing the most direct care to the resident) was interviewed for the presence of delirium symptoms over the past 7 days using the CAM. At the end of the study, a trained clinical researcher using the same time frame abstracted delirium symptoms (or synonyms for these) together with the term "confusion", from the nursing notes. Both the nurse and clinical researcher were blind to the RA's assessment of delirium symptoms.

Instruments

The presence of delirium and its symptoms were measured with the CAM, an established and widely used instrument to help in the detection of delirium (Inouye et al., 1990; Wei, Fearing, Sternberg, & Inouye, 2008). The tool assesses the 9 criteria for delirium specified in the revised third edition of the Diagnostic and Statistical Manual of Mental Disorders (similar to DSM-IV criteria): 1) acute onset and fluctuation; 2) inattention; 3) disorganized thinking; 4) altered level of consciousness; 5) disorientation; 6) memory impairment; 7) perceptual disturbances; 8) psychomotor agitation or retardation; and 9) altered sleep-wake cycle. The presence of criteria 1 and 2 and the presence of either criterion 3 or 4 are indicative of a definite delirium. For a diagnosis of probable delirium (Lemiengre et al., 2006), the first criterion changes to acute onset **or** fluctuation of symptoms over the course of the day and the remainder of the algorithm stays the same. In the present study, residents meeting the criteria for probable delirium were defined as having delirium. The RA completed the CAM based on observations of the resident during a structured interview that included the administration of the Mini-mental State

Examination (MMSE) (Folstein et al., 1975), plus a chart review to identify acute onset and sleep-wake disturbance over the past 7 days (chart review of the previous 4 weeks for assessment of acute onset at baseline assessment). A nurse-administered CAM, validated against a consensus diagnosis, has a sensitivity of 89%, and specificity of 100% (Zou et al., 1998). Similar results are reported between a CAM obtained by a trained non-physician interviewer and that obtained by a geriatrician (Monette et al., 2001). In the present study, Kappa values and sensitivity and specificity were calculated for each CAM-defined core symptom of delirium (fluctuation, inattention, disorganized thinking and altered level of consciousness). Kappa values ranged from 0.41 to 0.74, a result similar to Kappa values reported in previous studies (Cole, McCusker, Dendukuri, & Han, 2002; Levkoff et al., 1992). Sensitivity of the RA's assessments of symptoms ranged from 75% to 100%, compared to the clinical investigator; specificity ranged from 75% to 91%.

The MMSE (Folstein et al., 1975), a widely-used instrument with established reliability (alpha level: 0.96; test-retest correlation of 0.95) and validity (75% sensitivity for dementia and correlation with other tests of 0.80) (Tombaugh & McIntyre, 1992), was rated by the RA. The MMSE score ranges from 0 to 30, with a lower score indicating greater cognitive impairment. It has been validated in LTC facilities (Kafonek et al., 1989). In the present study, we tested inter rater reliability of the MMSE using intra-class correlation coefficient (ICC) and the agreement was excellent 0.92 (95% confidence interval [CI] 0.87, 0.96). The RA assessed the severity of cognitive impairment using the HDS (Cole & Dastoor, 1987), a scale that can be used among individuals with mild or severe cognitive impairment (Boller, Verny, Hugonot-Diener, & Saxton, 2002) and validated in LTC residents (Ronnberg & Ericsson, 1994). The test retest correlation was 0.96. The concurrent validity of the HDS, as measured by the correlation between the HDS and the MMSE, was 0.86. The HDS comprises 20 subscales, each of which is rated from 0 to 10 based on the resident's highest level of performance on the subscale. Total HDS scores ranged from 0 to 200, and were grouped into 4 categories of cognitive impairment severity: severe (< 40), moderate (40-99), mild (100-159), and minimal (160-200). In the present study, inter rater reliability of the HDS using ICC was excellent 0.91 (95% CI 0.83, 0.99).

Barthel Index (BI) measuring activities of daily living (ADL) (Mahoney & Barthel, 1965) was rated by interviews with the bedside nurse. The nurse was asked to rate the resident's current status and whether there had been any time during the past week when the resident had been more or less independent in each ADL. We used the modified scoring suggested by Shah (Shah, Vanclay, & Cooper, 1989); the total weighted score ranges from 0 (complete dependence) to 100 (complete independence). The internal consistency reliability was 0.90 to 0.93 (Shah et al., 1989) and inter-rater reliability (Pearson's *r*) was 0.99. Data extracted from resident charts at the end of the study included: demographic information (e.g. age, gender, and years since admission), diagnosis of dementia, and other medical diagnoses. Information on medical problems was used to compute the Charlson

Comorbidity Index (Charlson, Pompei, Ales, & MacKenzie, 1987), validated as a predictive index for survival in two elderly nursing home cohorts (Bravo, Dubois, Hebert, De Wals, & Messier, 2002; Buntinx et al., 2002). Receiver operating curve (ROC) analysis illustrating the prognostic accuracy of Charlson's comorbidity for functional decline is also highly significant ($z = 2.67$, $P = 0.008$) among long-term care residents.

The characteristics of the primary nurses (age, sex, level of education, years of experience as a nurse and years of experience in geriatrics) plus a measure of their work load (resident to nurse ratio), were also collected.

Statistical Analysis

First, descriptive statistics were calculated to describe the baseline characteristics of both the residents and nurses. Next, a set of 9 delirium symptoms (inattention, altered level of consciousness, disorganized thinking, hyper-activity, hypo-activity, memory impairment, perceptual disturbance, altered sleep-wake cycle and disorientation) were used to measure agreement between the symptoms reported by nurses (nurse interview) and those documented in the nursing notes for the same 7-day observation period. Using resident-month as observational units, agreement was defined as follows: for every symptom mentioned by a nurse in the monthly interview (including baseline), a binary variable was defined indicating the presence of the same symptom (or a synonym of same) in the preceding week in the nursing notes. The proportion of the symptoms documented in the nursing notes was calculated for each individual symptom and a global measure was also computed by pooling all the symptoms.

To study binary outcome variable, univariate logistic regression models (Hosmer & Lemeshow, 1989) were fitted to meet the following three objectives: 1) Estimate the proportions of documented symptoms of delirium and 95% Wald confidence intervals (constant term only, to be corrected eventually to take into account the correlated nature of the data [e.g. Results section]); 2) Study the association between facilities, the resident-nurse ratio (workload computed for each facility) and the proportion of documented symptoms (global measure); and 3) Study the relationship between the presence of delirium and the proportion of documented symptoms for every symptom and globally. The presence of delirium was defined each month (time dependant variable) based on the RA and nurse interviews using the CAM algorithm for probable delirium. Finally, additional analysis were performed to refine and account for the correlated nature of the data, using Generalized Estimating Equation (GEE) methodology (Johnston & Strokes, 1997) for binary outcome variables. All analyses were carried out using SAS for Windows, version 9.2.

Results

A total of 168 nurses took part in the study. Ninety-two percent were female and approximately two-thirds were aged 45 and over. The majority of the nurses had a college-degree educational level (70%) and more than 14 years experience in nursing (65%) and in geriatrics (53%).

Of the 1,484 residents considered for inclusion in the study, 928 (62.6%) were eligible for enrollment (figure 1). Consent was obtained for 283 residents: 108 (49%) of the 221 competent residents and 175 (25%) of the 707 incompetent residents. Of those who consented, 3 did not complete the baseline assessment, leaving a total of 280 residents. Twenty-eight residents (10%) died during follow-up and 15 (5%) withdrew from the study before the 24 weeks elapsed. In the present study, a total of 214 residents had at least one symptom of delirium identified by the primary nurse during the monthly interviews. Of these, 106 (50%) were identified as delirious at least once during the course of the study (based on RA or nurse monthly assessment/interview). Eighty percent of the residents were 80 years old and over, 57% were women and 42% demonstrated severe functional limitations (score < 20 on the Barthel). The majority (72%) had a diagnosis of dementia in their medical chart and 20% had severe cognitive deficit, according to the HDS scale.

Our first research question was: What proportion of the delirium symptoms reported by nurses is actually documented in the nursing notes?" Table 1 shows that the proportion of the symptoms in the nursing notes ranged from 1.9% to 53.5%. The lowest proportion was for inattention, a core feature of delirium and the highest was for hyper-activity. Overall, of the 2,536 resident-monthly time points where, according to the nurse interview, a symptom was present, the proportion documented in the nursing note was 7.6%. The proportion of the term "confusion" in conjunction with at least one symptom of delirium recorded in the nursing note was 2.5%. "Confusion" was also recorded in the nursing note with no other documented symptoms of delirium (8%) [P (confusion or symptom) = P (confusion) + P (symptom) – P (confusion and symptom)].

Our second research question was: What association, if any, is there between the resident-nurse ratio, an indicator of nurse work load, and the proportion of documented delirium symptoms in the nursing notes? Table 2 shows the proportion of symptoms of delirium documented in the nursing notes (global measure) by the resident-nurse ratio and as can be seen, the association is not statistically significant.

Our third research question was: What is the proportion of documented delirium symptoms in the nursing notes in relation to the resident's delirium status? Table 3 shows that only two (2) of the nine symptoms of delirium considered in this study, were found to be documented more frequently for delirious residents: altered level of consciousness ($p = 0.042$) and disorientation ($p = 0.018$).

We did additional analysis to refine and account for the correlated nature of the data, using GEE methodology for binary outcome and it gave very similar results for Table 1 and 2 (data not shown). In Table 3, only one result appeared different: the proportion of documented symptoms (global measure) in the delirium group was 9.5 [7.8; 11.6] and 6.6 [5.1; 8.5] in the non-delirium group (p-value for comparison = 0.134).

Discussion

We undertook this study to increase our knowledge base for nurse documentation in LTC facilities. More precisely, we wished to investigate the question: When a symptom is recognized by a nurse, is it documented in the nursing notes? and also to examine possible causes for omission. As far as the authors are aware, the present study is the first to address this issue among LTC residents. Our paper on nursing documentation focuses specifically on delirium, a serious and prevalent problem among this population.

Studies on delirium have shown that symptoms of delirium are poorly recognized by nurses (Inouye, Foreman, Mion, Katz, & Cooney, 2001; Voyer, Richard, Doucet, Danjou, & Carmichael, 2008). Our study strengthens this concern by demonstrating that even when nurses do recognize the symptoms of delirium, they often fail to document it in the nursing notes. Only a small percentage of the delirium symptoms reported by nurses during the monthly interviews were actually documented in nursing notes. The nurses in the study were in fact, able to recognize the presence of symptoms of delirium when asked specifically during an interview; however, these same symptoms were rarely documented in the nursing notes. Moreover, even when the term “confusion” was substituted for delirium symptoms, documentation of it in the nursing notes was poor as well. One possible explanation for the discrepancies we observed between documented symptoms and those reported by nurses, is an inclination on the part of nurses to communicate information about residents orally rather than in writing. This predelection for oral communication is highlighted in the literature. For instance, in the Jefferies et al. study comparing written and oral approaches to clinical reporting in nursing (Jefferies, Johnson, & Nicholls, 2012), the authors found that clinical handover contained much greater detail about the patient’s condition, care and response to care, than the information found in the official nursing documentation.

An alternative explanation for the poor documentation of delirium symptoms observed in this study may have to do with the degree of importance given to mental status evaluation in LTC settings. In this respect, an audit conducted by Voutilainen et al. (2004) revealed that every fourth nursing document (N = 332) lacked a written assessment of the resident’s cognitive ability. It should also be noted that there is a high rate of dementia among older residents in LTC facilities and the literature reveals that in a context of dementia, nurses seldom view change in cognition and behaviors as important (Inouye, 1994; Inouye, Schlesinger, & Lydon, 1999). Indeed, nurses generally tended to attribute a

change in cognition to the underlying dementia instead of an emerging delirium, and therefore, they would not document the mental health change. This tendency can be detrimental to the residents given that a change in the mental health status can be a delirium caused by an infectious disease, a pulmonary embolism, a myocardial infarction or many other predisposing and precipitating factors, all of which require nursing and medical care (Fick & Foreman, 2000; Fick, Agostini, & Inouye, 2002). It also lends credence to the suggestion that mental status be considered the sixth vital sign, along with blood pressure, pulse rate, respiratory rate, pain, and temperature (Ely, Siegel, & Inouye, 2001; Flaherty et al., 2007).

Time constraints as a potential barrier is often advanced as an explanation for poor documentation (Howse & Bailey, 1992; Ouslander et al., 2004). In the present study, we did not observe any association between the proportions of documented symptoms and resident-nurse ratios. It is important to realize that resident-nurse ratios are particularly high in LTC facilities compared to acute care settings. In the present study, all three resident-nurse ratio categories were high which may explain the absence of a statistically significant association. For example, 57% of the nurses in the study had 10 or more residents in their care. Resident-nurse ratios also rise for evening and night shifts. Given such high ratios, nursing staff often find themselves confronted with a choice between delivering care or documenting it (Morin & Leblanc, 2005). Moreover, overwhelmed nursing staff may also decide to postpone their documentation of important observations to later on in their shift. Such a delay in recording suggests that nursing staff rely on memory, which increases the risk of their omitting something or overlooking it. To counteract this possibility, the Long-Term Care Health Information Practice and Documentation Guidelines recommend that clinical staff information be documented during or immediately after care, or following occurrence of an event, instead of recalling and recording it at a later time (American Health Information Management Association, Sept 2001). Of course, this is easier said than done. The question of the quality of nursing documentation dates back many decades (Wang, Hailey, & Yu, 2011). Accumulated evidence of failure to provide accurate nursing documentation (Wang et al., 2011) raises the following points for discussion: should we look for new solutions or rather acknowledge that accurate documentation is simply not possible, or is it that nurses are carrying out too many tasks to document all of them? Moreover, could it be that the level of actual documentation is adequate for providing quality nursing care? As mentioned in their review (Wang et al., 2011), the causes of flaws in documentation and the effects of such flaws on patient outcomes need investigation. We invite our fellow colleagues to ponder whether the time has come to revise our expectations about documentation.

The last question addressed by this study sought to discover whether nurses are more inclined to document symptoms when the resident's baseline functioning is disturbed by the presence of a delirium. According to our study only two of the nine symptoms of delirium,

level of consciousness and disorientation, were documented more frequently among delirious residents than among those who were not delirious. Although this result may appear encouraging initially, one should remain aware that the proportion of documented symptoms among delirious residents was very low. What we found indicates that, contrary to what had generally been stated on many occasions by the nurses in our continuing education sessions, deterioration in a resident's status does not necessarily translate to accurate nursing documentation.

Clinical implications

The low proportion of documented symptoms of delirium observed in this study implies that important information is not available to all members of the health care team. This is a serious concern considering that, compared to acute care settings, physician visits are less frequent and the physicians must often rely on nursing notes to get a clear picture of the resident's functioning and changes in cognitive status. In our study, the lowest proportion of documented symptoms of delirium was for inattention, a core feature of delirium. Omission of this symptom in the medical chart decreases the probability of detecting the development of a delirium and thus increases the probability of deleterious consequences. Moreover, for delirium to be detected, fluctuation of symptoms too must also be recognised. To enable this, accurate chart notes are essential.

Results from this study reinforce the need to improve nursing documentation in LTC settings. Some studies have shown improvements in documentation practice after the introduction of educational sessions (Ehrenberg & Ehnfors, 1999b) and supervised intervention (Hansebo, Kihlgren, & Ljunggren, 1999). Although there are ways to improve the situation, the nursing profession is still waiting for a broad solution. There has been some encouraging results obtained using voice-assisted-care technology. Voice-assisted documentation (Wolf, Kapadia, Kintzel, & Anton, 2009) was first introduced to LTC settings in 2003 and consists of a lightweight headset and small fist sized wireless computer. It allows nurses to document in real time without having to log into a computer or search for the medical chart. Although this technology opens an interesting avenue to improving nursing documentation, it needs further testing in LTC settings.

Study strengths and limitations

The study has several strengths. First, delirium and its symptoms were measured prospectively on a monthly basis using a well-known delirium instrument. Second, the RAs involved in this study received extensive training in the use of the instruments. Third, the analyses are based on a sample of residents from seven LTC facilities which increases the possibility of generalizing the results to other LTC settings. On the other hand, findings of this study should be interpreted in light of certain limitations. The first limitation relates to the methodology used to measure agreement between the symptoms reported by nurses and those documented in the in the nursing notes for the same 7-day observation period. While

the monthly interview was conducted with the primary nurse only, the symptoms abstracted from the nursing notes, although indeed documented by the primary nurse, were documented by other nurses as well, such as nurses from the evening and night shifts. It is important to note however, that the objective of the study was to compare the actual recognition of delirium symptoms to their documentation, rather than the performance of individual nurses. Another limitation of this study relates to the number of accurately documented symptoms. There may not have been sufficient power to detect a statistically significant association between resident-nurse ratio and level of documentation. The proportion of accurately documented symptoms per resident-nurse ratio category is low. As a result, there might be a lack of power and this potential association should not be discarded. Lastly, it is important to mention that nurses were relying on their memory to report all delirium symptoms observed over the past 7 days, which increased the risk of omission and may have affected our results.

In conclusion, nursing documentation in LTC settings is far from optimal. Efforts should be made to improve the situation by revisiting the content of academic and clinical training given to nurses on documentation, an essential task for the delivery of quality care. Exploring innovative ways to increase time efficiency of documentation is also imperative in the current context of nurses` work overload.

Declaration of Conflicting Interests

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

TABLE 1 Agreement between symptoms reported by the primary nurses during the monthly interviews and those documented in the nursing notes for the same 7-day period.

Symptoms	Reported Symptoms (interview)	Documented [a] Symptoms (nursing notes)		Documented [b] "Confusion" (nursing notes)		Documented symptoms or "confusion" (nursing notes)	
	n(N)*	%(n)	[95% CI]	%(n)	[95% CI]	%(n)	[95% CI]
Inattention	415 (120)	1.9(8)	[1.0; 3.8]	8.4(35)	[6.1; 11.5]	9.6(40)	[7.1; 12.9]
Level of consciousness	324 (124)	13.0(42)	[9.7; 17.1]	9.3(30)	[6.5; 12.9]	18.8(61)	[14.9; 23.5]
Disorganized thinking	357 (113)	8.7(31)	[6.2; 12.1]	11.2(40)	[8.3; 14.9]	16.8(60)	[13.3; 21.0]
Hyper-activity	71 (34)	53.5(38)	[41.9; 64.7]	19.7(14)	[12.0; 30.6]	53.5(38)	[41.9; 64.7]
Hypo-activity	176 (76)	2.8(5)	[1.2; 6.6]	9.7(17)	[6.1; 15.0]	12.5(22)	[8.3; 18.3]
Memory impairment	562 (155)	2.0(11)	[1.1; 3.5]	8.4(47)	[6.3; 11.0]	9.8(55)	[7.6; 12.5]
Perceptual disturbance	171 (59)	6.4(11)	[3.6; 11.2]	14.0(24)	[9.6; 20.1]	18.1(31)	[13.0; 24.6]
Sleep-wake cycle	117 (61)	26.5(31)	[19.3; 35.2]	19.7(23)	[13.4; 27.9]	38.5(45)	[30.1; 47.6]
Disorientation	343 (110)	5.0(17)	[3.1; 7.8]	11.1(38)	[8.2; 14.9]	13.4(46)	[10.2; 17.4]
Global measure	2,536 (214)	7.6(194)	[6.7; 8.8]	10.6(268)	[9.4; 11.8]	15.7(398)	[14.3; 17.2]

* n = number of resident-monthly time points having the symptom present; N = number of residents having at least one time point with the symptom (from nurse interview).

[a] Symptom or its synonym documented in the nursing notes.

[b] The term "confusion" documented in the nursing notes.

Global measure is all the symptoms combined

TABLE 2 Proportion of symptoms of delirium (global measure) documented in the nursing notes by the resident-nurse ratio

		Reported Symptoms (interview)	Documented [a] Symptoms (nursing notes)		Wald chi-square test
		n(N)*	%(n)	[95% CI]	p-value
Global measure		2,536(214)	7.6(194)	[6.7; 8.8]	
Resident-nurse ratio					0.157
	<10	683(68)	9.4(64)	[7.4; 11.8]	
	10-14	1,159(112)	7.1(82)	[5.7; 8.7]	
	15+	694(34)	6.9(48)	[5.3; 9.1]	
LTC facilities					0.064
	#1	97(35)	13.4(13)	[7.9; 21.7]	
	#2	585(60)	7.5(44)	[5.6; 10.0]	
	#3	586(33)	8.7(51)	[6.7; 11.3]	
	#4	337(31)	8.6(29)	[6.0; 12.1]	
	#5	237(21)	3.8(9)	[2.0; 7.1]	
	#6	342(21)	6.4(22)	[4.3; 9.6]	
	#7	352(13)	7.4(26)	[5.1; 10.6]	

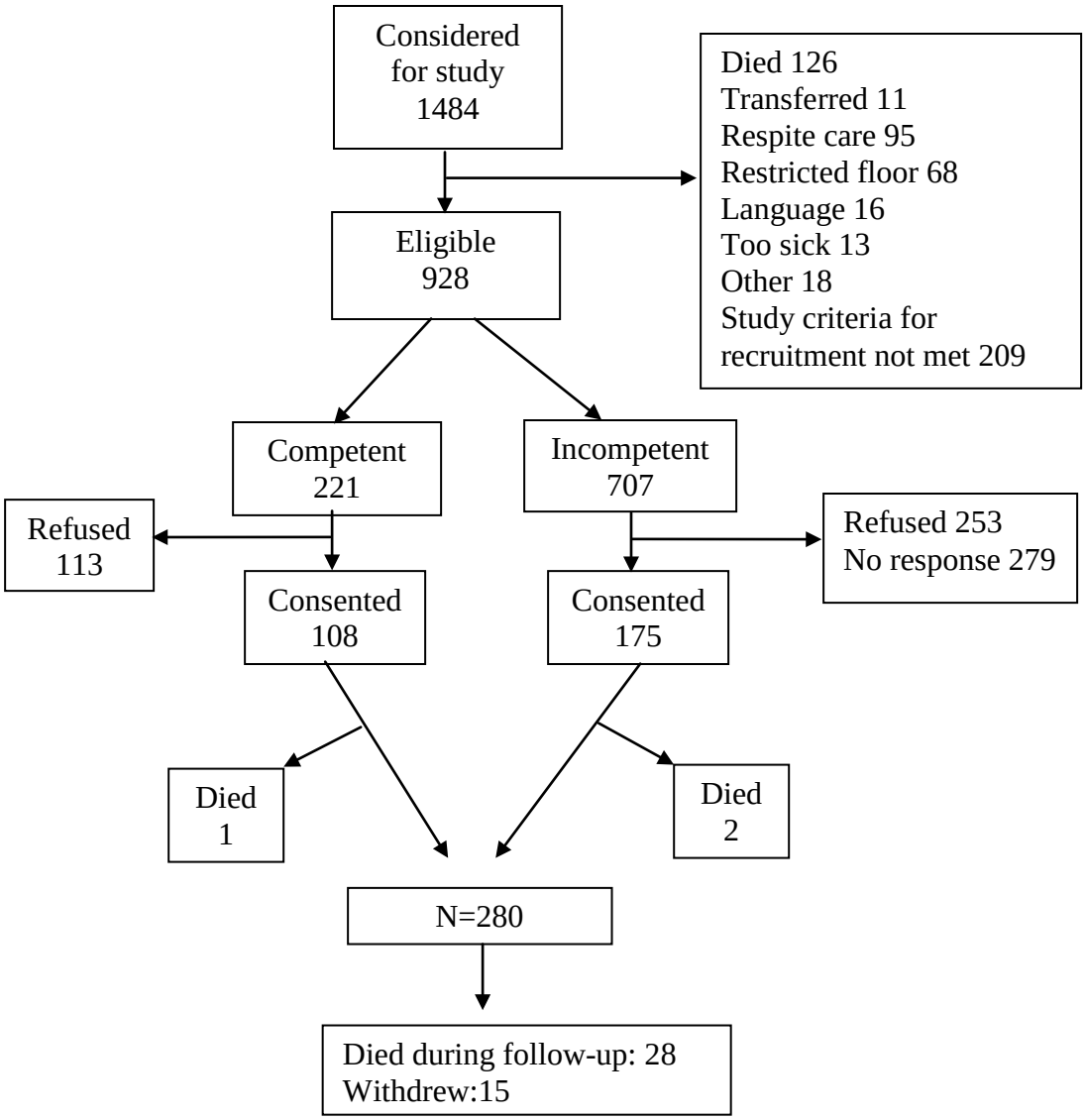
* n = number of resident-monthly time points having a symptom present; N = number of residents having at least one time point with a symptom (from nurse interview).
[a] Symptom or its synonym documented in the nursing notes.
Global measure is all the symptoms combined

TABLE 3 Proportion of documented delirium symptoms from the nursing notes by the presence of delirium

	Delirium**			No Delirium			
	Reported Symptoms (interview)	Documented [a] Symptoms (nursing notes)		Reported Symptoms (interview)	Documented [a] Symptoms (nursing notes)		Wald chi-square test
Symptoms	n(N)*	%(n)	[95% CI]	n(N)*	%(n)	[95% CI]	p-value***
Inattention	240(89)	2.5(6)	[1.0; 5.5]	175(75)	1.1(2)	[0.3; 4.5]	0.333
Level of consciousness	168(72)	16.7(28)	[11.8; 23.1]	156(82)	9.0(14)	[5.4; 14.6]	0.042
Disorganized thinking	233(83)	10.3(24)	[7.0; 14.9]	124(69)	5.7(7)	[2.6; 11.4]	0.143
Hyper-activity	46(26)	58.7(27)	[44.1; 71.9]	25(17)	44(11)	[26.3; 63.4]	0.238
Hypo-activity	104(51)	2.9(3)	[0.9; 8.6]	72(45)	2.8(2)	[0.2; 10.2]	0.967
Memory	244(88)	2.1(5)	[0.9; 4.8]	318(117)	1.9(6)	[0.9; 4.1]	0.891
Perceptual disturbance	113(42)	4.4(5)	[1.9; 10.2]	58(34)	10.3(6)	[4.7; 21.2]	0.146
Sleep-wake cycle	63(29)	20.6(13)	[12.4; 32.4]	54(39)	33.3(18)	[22.1; 46.8]	0.124
Disorientation	195(73)	7.7(15)	[4.7; 12.4]	148(73)	1.4(2)	[0.2; 5.1]	0.018
Global measure	1406(106)	9.0(126)	[7.6; 10.6]	1130(188)	6.0(68)	[4.8; 7.6]	0.006

* n = number of resident-monthly time points having the symptom present; N = number of residents having at least one time point with the symptom (from nurse interview max: 7 monthly ass.).
[a] Symptom or its synonym documented in the nursing notes.
** Delirium is reported/detected during the same weekly period by the nurse or research assistant based on CAM criteria for probable delirium.
*** Comparing Delirium and no delirium.
Global measure is all the symptoms combined.

FIGURE 1 Flow chart



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