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Psychometric Properties of the Family Caregiver Delirium Knowledge Questionnaire

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Abstract

A valid, reliable measure of family caregivers' knowledge about delirium was not located in the literature; such an instrument is essential to assess learning needs and outcomes of education provided. The purpose of the current study was to (a) develop a family Caregiver Delirium Knowledge Questionnaire (CDKQ) based on the Symptom Interpretation Model; and (b) establish validity and reliability of the measure. The 19-item CDKQ was developed and administered to 164 family caregivers for community-dwelling older adults. Descriptive statistics were examined for all variables. Psychometric testing included confirmatory factor analysis, item-to-total correlations, and internal consistency reliability. A three-factor model provided the best fit for the data. The

findings support initial validity and reliability of the CDKQ with family caregivers. Although the CDKQ was developed for use with family caregivers, it has potential for use with other caregivers, such as home health aides.

Conflicts of Interest and Funding

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Introduction

Delirium, also known as acute confusion, is a serious, common problem in hospitalized older adults, with an associated in-hospital mortality rate as high as 33% (Leslie & Inouye, 2011). Delirium also affects up to 85% of palliative care patients and even some community-dwelling older adults (Bull, 2011; Fick, Kolanowski, Waller, & Inouye, 2005; Greaves, Vojkovic, Nikoletti, White, & Yuen, 2008; Mathillas, Olofsson, Lovheim, & Gustafson, 2013). One population-based study of community-dwelling older adults found delirium prevalence ranged from 17% to 39%, with higher prevalence in individuals older than 90 (Mathillas et al., 2013). Delirium is characterized by sudden onset and fluctuations in orientation, inattention, disorganized or illogical thinking, and incoherent speech (Inouye, 2006; Sykes, 2012). Delirium is often reversible when recognized early and the underlying cause is treated (DeCrane et al., 2011; Inouye, 2006; Sykes, 2012). Duration of delirium in older adults is a critical factor associated with poor health outcomes, including functional decline, institutionalization, increased length of hospital stay, and death (Balas et al., 2007; Bond, 2009; Dasgupta & Brymer, 2014; Gonzalez et al., 2009; Keily et al., 2003; Rudolph & Marcantonio, 2011; Saczynski et al., 2012).

Despite efforts to educate nurses about delirium, it is often not recognized, thereby contributing to delirium duration (Greer et al., 2011; Sykes, 2012). Nurses lack of familiarity with an older adult's usual behaviors (i.e., cognitive baseline) might contribute to the difficulty in recognizing delirium. Family members who are familiar with an older adult's usual behaviors are more likely to recognize delirium symptoms and could be vital partners in early recognition of symptoms but often lack knowledge of delirium, its symptoms, and the importance of contacting the older adult's health care provider when symptoms occur (Bull, 2011; Bull, Boaz, & Sjostedt, 2014; Otani et al., 2013).

Identifying what family caregivers know about delirium is an essential step in preparing them to partner effectively with nurses and other health care professionals in early identification of delirium in older adults. However, a valid, reliable measure to help nurses evaluate family caregivers' knowledge does not exist. Previous efforts to measure delirium knowledge focus primarily on health care professionals' knowledge of risk factors and symptoms (Greer et al., 2011). Limited attention has been given to family members' knowledge of delirium; the few studies that describe family members' knowledge focus on risk factors for delirium and possible causes, specifically in relation to end-of-life delirium (Keyser, Buchanan, & Edge, 2012; Otani et al., 2013). Validity and reliability of these measures often are not reported, and measurement of family members' ability to recognize symptoms and take appropriate action has been neglected. It is critical to address symptom recognition and appropriate action to enable family caregivers to communicate with health care providers. A valid, reliable measure of family caregiver delirium knowledge would help nurses target education efforts to areas of knowledge deficit, and this education would prepare family members to recognize delirium in older adults. Irrespective of setting, family members can play a key role in early recognition of delirium symptoms. The purpose of the current study was to (a) develop a family Caregiver Delirium Knowledge Questionnaire (CDKQ) based on the Symptom Interpretation Model; and (b) establish validity and reliability of the measure. A valid, reliable instrument is essential to identify family caregivers' need for education about delirium and examine outcomes of education that is provided.

Literature Review

Previous studies noted the need for family caregiver education about delirium (Bruera et al., 2009; Cohen, Pace, Kauer, & Bruera, 2009). These qualitative studies found family caregivers were distressed by delirium symptoms and unprepared for the behaviors that accompanied delirium. However, few studies examined or measured family caregivers' knowledge of delirium quantitatively. Only three studies were located that focused specifically on family caregiver delirium knowledge. Gagnon et al. (2002) provided education on delirium to family caregivers of terminal patients hospitalized with cancer. A brochure provided a basis for the staff nurse to discuss delirium and the multiple causes of delirium at the end of life. The investigators developed their own questionnaire to evaluate family caregiver knowledge about the multiple causes of delirium at the end of life. Family caregivers who received the brochure scored higher than those in the sequential control group on delirium knowledge. Otani et al. (2013) provided an education leaflet on delirium to 113 family caregivers for patients with cancer who were living in Japan. The leaflet focused on causes of delirium. Six months after the patient's death, family caregivers were mailed a questionnaire to evaluate their knowledge of five causes of delirium and obtain their opinions about the extent to which health professionals' care of patients with delirium needed improvement. Compared to a historical control group, family caregivers who received the leaflet reported better understanding of the causes of delirium at the end of life. These family caregivers also indicated that the leaflet was helpful. Keyser et al. (2012) provided seven in-person education sessions on delirium to 16 family caregivers for community-dwelling older adults residing in Canada. Only 11 family caregivers completed both the pre- and posttest on delirium knowledge. However, the authors noted that family caregivers scored higher on knowledge immediately after the education session. Validity and reliability of the delirium knowledge questionnaires and theoretical frameworks for the instruments in these studies were not addressed.

Method

Theoretical Model

Potential items for the CDKQ were developed from a review of the relevant literature on delirium and the Symptom Interpretation Model (SIM). The three dimensions of delirium knowledge (i.e., *risk*, *actions*, and *symptoms*) were based on the SIM (Teel, Meek, McNamara, & Watson, 1997). According to the SIM, recognition of symptoms begins with awareness that a behavior is different from the older adult's normal or usual behavior. Next, the symptom is named, or labeled, and assigned meaning. The process of assigning meaning incorporates the family caregiver's knowledge, beliefs, and experience. In applying this framework to delirium, the entire process includes knowledge of risk factors for delirium as well as previous experience with illness symptoms in the older adult. After the symptom is interpreted, a decision is made about taking action or doing nothing (Teel et al., 1997).

Instrument Development

Items were initially assigned to one of the three SIM dimensions (i.e., risks, actions, and symptoms) based on the authors' review and agreement. A total of 19 items were included in the CDKQ: 10 addressing risks factors, 4 addressing actions, and 5 addressing symptoms. Both *correct* and *incorrect* items were included for each dimension. The ratio of correct items was 7:10 for the risks subscale, 1:4 for the actions subscale, and 3:5 for the symptoms subscale. Response options were *yes*, *no*, or *don't know*; however, the coding of the responses resulted in dichotomous items. Correct responses received a score of 1 and incorrect responses a score of 0. Responses of *don't know* also received a score of 0. The total score range is 0 to 19; subscale score for risks ranges from 0 to 10, actions 0 to 4, and symptoms 0 to 5.

The items were reviewed for clarity, content, and placement in risks, actions, and symptoms categories by two gerontological nurse practitioners with clinical expertise in delirium and a nationally recognized nurse expert on delirium. There was 100% agreement from the experts on the content and placement of the content in the categories. Based on feedback from the professional experts, all items were retained in the respective subscales

of risks, actions, and symptoms. The experts did not recommend adding any new items or deleting any items. The national expert suggested the subscales be sequenced as risks, actions, and symptoms. Two family members who had experience caring for older adults also reviewed the CDKQ for item clarity. Modifications were made to improve item clarity based on feedback from the two family caregivers. Because a valid, reliable tool to measure family caregivers' knowledge of delirium was not available, it was not possible to evaluate concurrent validity.

Design and Sample

The study was approved by the University's Institutional Review Board for the Protection of Human Subjects in Research prior to initiating data collection. A cross-sectional design was used, and responses to the CDKQ were obtained from a convenience sample of 164 family caregivers from three sequential, separate samples of family caregivers for community-dwelling older adults. Sample 1 received the CDKQ via U.S. postal service (i.e., mail) ($n = 76$); Sample 2 accessed the CDKQ via Internet ($n = 58$); and Sample 3 completed the CDKQ at a regional family caregiver conference ($n = 30$). Two of the three samples (i.e., Internet and mail survey samples) were family members caring for older adults with dementia.

Family caregivers who received the CDKQ via mail were identified through the local chapter of the Alzheimer's Association; those accessing the CDKQ via Internet were identified through a Family Caregiver Registry maintained by a researcher at a Midwest university; and the third sample of family caregivers was obtained from a regional conference held for family and professional caregivers. At the beginning of the conference, attendees who self-identified as family caregivers were invited to complete the CDKQ.

Data Analysis

Descriptive statistics, including frequency distributions for all variables, were examined. Construct validity was examined using confirmatory factor analysis. LISREL 9.10 was used to perform confirmatory factor analysis and compare three possible models for the scale because it is designed for testing how well theoretical models fit the data and can be used with dichotomous data (Mindrila, 2010; Thompson, 2004). Other programs, such as SPSS, assume continuous measurement on the data (Thompson, 2004). Three different models, determined prior to the final analysis, were compared to determine scale validity because the testing of rival models is recommended to more fully evaluate how well the data fit the hypothesized model (Thompson, 2004). Model 1 tested the hypothesis that the data fit the SIM that guided item development; this model included the three subscales (i.e., risk, action, and symptoms). Model 2 tested a one-factor model; a single-factor model is recommended as one of the rival models (Thompson, 2004). Model 3 tested a model hypothesizing two factors, delirium versus not delirium. Model 3 was consistent with the goal of developing an instrument to measure family caregivers' recognition of the presence or absence of delirium symptoms.

Each of the models tested allowed for correlation between subscales (latent variables in the models). In addition, the items deemed to be the most representative of each subscale were given a value of 1 in accordance with accepted practice in scale identification using LISREL (Kline, 2011). The item *age over 70 years* from the risk subscale was deemed as the most representative for scaling the risk subscale in Model 1, the single-factor scale in Model 2, and the delirium subscale in Model 3, as it represents an important clinical criterion for delirium risk (Inouye, 2006). The item *call the doctor* from the action subscale was selected for scaling the action subscale in Model 1, as it was the only correct response option. The symptom item (number 3) describing sudden onset, inattention, and illogical thinking was selected for scaling the symptoms subscale in Model 1, as it inclusively described a positive screening for delirium (Inouye, 2006; Inouye et al., 1990). Finally, the item *older adults who are married* was selected for scaling the not delirium subscale in Model 3, as it assumes individuals who are married live with someone, have interaction and support, and are therefore at reduced risk for delirium (Inouye, 2006).

Psychometric testing also included internal consistency reliability and item-to-total correlations. Cronbach's alpha was used to examine internal consistency of the total scale and subscales.

TABLE 1. Demographics of the Study Sample

<i>n</i> (%)				
Characteristic	Total Sample (<i>N</i> = 164)	U.S. Postal Mail Sample (<i>n</i> = 76)	Internet Sample (<i>n</i> = 58)	Conference Sample (<i>n</i> = 30)
Gender (female)	135 (82.3)	60 (78.9)	49 (84.5)	26 (86.7)
Partner/marital status				
Married	107 (65.2)	51 (67.1)	40 (69)	16 (53.3)
Single	30 (18.3)	15 (19.7)	9 (15.5)	6 (20)
Widowed	14 (8.5)	7 (9.2)	3 (5.2)	4 (13.3)
Divorced	12 (7.3)	3 (3.9)	5 (8.6)	4 (13.3)
Domestic partner	1 (0.6)	0	1 (1.7)	0
Race/ethnicity				
White	133 (81.6)	58 (76.3)	56 (96.6)	19 (65.6)
Black	15 (9.2)	11 (14.5)	0	4 (13.8)
Hispanic	11 (6.8)	7 (9.2)	0	4 (13.8)
Asian	2 (1.2)	0	1 (1.7)	1 (3.4)
Other	1 (0.6)	0	0	1 (3.4)
Prefer not to say	1 (0.6)	0	1 (1.7)	0
Annual income (median)	\$50,000	\$40,000	\$60,000	\$49,500
Mean (<i>SD</i>), Range				
Age (years)	60.5 (13) (21 to 94)	62 (15.5) (23 to 94)	59.4 (10.2) (21 to 80)	59 (10.4) (34 to 78)
Years of caregiving	5.9 (6.6) (0 to 46)	6 (7.3) (0 to 40)	6.1 (6.8) (1 to 46)	5.9 (4.4) (1 to 20)
Education (years)	15.4 (2.8) (5 to 24)	14.5 (2.8) (5 to 18)	16.7 (2.3) (12 to 24)	14.8 (2.8) (11 to 22)

Note. One individual from the Conference Sample did not complete the race question.

Results

Description of the Sample

A total of 164 participants from three separate samples completed the CDKQ. Mean participant age was 60.5 (*SD* = 13 years); education ranged from fifth grade to completion of graduate study (mean = 15.4 years, *SD* = 2.8 years). As noted in **Table 1**, the mean education level of family caregivers in the Internet sample was significantly higher than those in the mail or conference sample ($F = 1.84, p = 0.03$). The majority (81.8%) of the sample was female, White (81.6%), and had been providing care for an older adult for an average of 5.9 years (*SD* = 6.6 years). The demographic characteristics for the total sample and the three separate samples are shown in **Table 1**. The samples of family caregivers who received the questionnaire via mail and those who received it at the caregiver conference were more ethnically diverse than those who completed the questionnaire via Internet.

The mean score on the CDKQ was 11.5 (range = 0 to 19, *SD* = 3.55). The subscale means were 6.36 (*SD* = 1.99) for delirium risks, 2.43 (*SD* = 1.41) for actions, and 2.70 (*SD* = 1.36) for symptom recognition. No statistically significant difference was noted in the total score ($F = 0.88, p = 0.59$) or subscale scores (risks: $F = 0.76, p = 0.64$;

action: $F = 1.47, p = 0.21$; symptoms: $F = 1.47, p = 0.26$) by sample group (i.e., mail, Internet, or conference group). Approximately 57% of family caregivers indicated that they knew what delirium was, and 43.8% stated that they had experience caring for an individual with delirium.

Validity

The robust, diagonally weighted least squares estimation (DWLS) was used rather than maximum likelihood because the DWLS method provides more accurate parameter estimates with dichotomous data, such as those items in the CDKQ (Mindrila, 2010). The Satorra-Bentler chi-square was then used to compare fit between models, as it was deemed most appropriate given the dichotomous data (Bryant & Satorra, 2012). Fit statistics for each model by order of testing and factor loadings for each item within the hypothesized and two-factor models appear in **Table 2** and **Table 3**. The hypothesized model based on the SIM provided the best fit with the data. Although the root-mean-square error of approximation (RMSEA), which detects model misspecification, indicated an acceptable fit for each model (RMSEA 0.90). Because the chi-square statistic is influenced by the sample size, the chi-square to degrees of freedom ratio was also examined. This ratio was acceptable for both the hypothesized and two-factor models with a ratio of 3.3:1 for the hypothesized model and 3.8:1 for the two-factor model (Arbuckle & Wothke, 1999; Ullman, 1996). Other model fit statistics indicated the need for further refinement of the CDKQ scale (McDonald & Ho, 2002). The comparative fit index (CFI), which assesses the model fit in relation to the null model, the normed fit index, and non-normed fit index were all below the recommended cut off of 0.90 for each model. The standardized root-mean-square residual was >0.08 for all three models. The GFI (0.895) for Model 3 (i.e., delirium versus not delirium) approximated an acceptable level and thereby suggests potential for future development.

All factor loadings were significant within each of the tested models. Only the hypothesized and two-factor models are reported in **Table 3**, as they appeared to provide an acceptable fit for the data. As noted in **Table 3**, item loadings were similar between the hypothesized and two-factor models. However, the squared multiple correlations indicate that more of the variance in the actions and symptoms items was explained by the hypothesized model than the two-factor model. The risk subscale was significantly (p

Reliability

Cronbach's alpha for internal consistency reliability of the CDKQ was 0.76 for the total scale. This estimate is acceptable for a new instrument and meets and exceeds the minimum criterion of 0.70 (Nunnally & Bernstein, 1994; Polit & Beck, 2012). Examination of the item analysis indicated that Cronbach's alpha for the total CDKQ did not improve if any items were deleted (**Table 4**). However, further examination of the internal consistency reliability for three subscales in the hypothesized model indicated that Cronbach's alphas were 0.66 for the risk subscale, 0.72 for the actions subscale, and 0.49 for the symptoms subscale. The item analysis for each subscale indicated that Cronbach's alpha for the risk subscale would improve to 0.70 if any of the incorrect items (i.e., being married, being a member of a minority group, or having more than a high school education) were deleted. Deleting items in the actions and symptoms subscales did not significantly improve Cronbach's alpha.

Examination of the internal consistency reliability for each of the three samples (i.e., mail, Internet, and caregiver conference) revealed that Cronbach's alpha was higher for the mail and caregiver conference participants (0.80 and 0.77, respectively) than for the Internet sample (0.63). This pattern also was evident in the internal consistency of the subscale scores for each of the three samples. The internal consistency reliability for the risk subscale was 0.79 for the caregiver conference sample, 0.67 for the mail sample, and 0.56 for the Internet sample. For the actions subscale, internal consistency reliability was 0.74 for the caregiver conference sample, 0.75 for the mail sample, and 0.68 for the Internet sample. Cronbach's alphas for the symptoms subscale were 0.60 for the caregiver conference sample, 0.49 for the mail sample, and 0.47 for the Internet sample.

Internal consistency reliability was also examined for the two-factor (i.e., delirium, not delirium) subscales because the two-factor model approximated an acceptable fit and holds promise for further development. The internal consistency reliability for the two subscales, delirium and not delirium, were 0.82 and 0.71, respectively (Polit & Beck, 2012). It is important to note that internal consistency reliability is influenced by the number of items in a scale.

The subscales in the two-factor model consisted of 11 items for delirium symptoms and eight items that were not delirium. As noted in **Table 4**, 63% of the inter-item correlations met the minimum criterion of >0.30 . Items with correlations <0.30 were those that would have been an incorrect response. In other words, the item was not a risk factor for delirium or a symptom of delirium.

Discussion

The findings of the current study provide initial evidence for validity and reliability of the CDKQ as a three-factor model. Content validity of the items was established based on agreement from a panel of experts. The results of the confirmatory factor analysis provided support for the construct validity of the CDKQ with the hypothesized model and, to a lesser extent, a two-factor structure (i.e., delirium, not delirium). Internal consistency reliability was acceptable for the total scale, and for the two subscales, delirium and not delirium. For the three subscales in the hypothesized model, coefficients were higher in the more heterogeneous samples obtained from the caregiver conference and those receiving the CDKQ via mail. Internal consistency reliability was consistently lower than expected for the actions and symptoms subscales and might suggest a need to add items because internal consistency reliability is affected by both the length of the scale and heterogeneity of the sample (Nunnally & Bernstein, 1994; Polit & Beck, 2012).

It is also likely that the limited number of items in the actions and symptoms subscales contributed to some of the inadequate fit indices. A second-order factor structure with six latent variables describing delirium versus not delirium within the three subscales of risks, symptoms, and actions might offer a better fit with the data and be the most appropriate model to explain the differences between the hypothesized and two-factor models. However, there are too few items, specifically within the actions subscale, to test this model because a single item would define the latent variable of delirium actions (Kline, 2011). Adding items to the actions subscale would allow for an evaluation of a second-order factor structure in future samples and further establish the construct validity of the scale. The addition of items to the actions subscale might also improve internal consistency reliability of this subscale.

Two items that might be added to the actions subscale relate to use of clocks and calendars and review of medications. The new item, *check medications the person is taking*, is based on actions by health care professionals (Greer et al., 2011). The other new item, *use of calendars or clocks to promote orientation*, is based on the findings from delirium prevention studies conducted in hospital settings (Martinez, Tobar, Beddings, Vallejo, & Fuentes, 2012; Rosenbloom-Brunton, Henneman, & Inouye, 2010). Although use of clocks and calendars to promote orientation might apply to all older adults at risk for delirium, adding items that address having hearing aids clean and available and having eyeglasses clean and in use might also be considered. *Calling the doctor* is the preferred correct action for family caregivers to take when delirium symptoms are present. *Checking medications the person is taking* might enable the family caregiver to provide the physician with more specific information in relation to the symptoms observed. Other actions that might be taken after the physician has been contacted include promoting orientation by having clocks and calendars available (Martinez et al., 2012; Rosenbloom-Brunton et al., 2010). In scoring the revised actions subscale, *calling the doctor* and *checking medications* would be coded as correct responses. The items pertaining to *doing nothing* and *waiting a week to see if the older adult improved* would still be incorrect responses. The items *providing a clock or calendar* and *giving warm milk or tea* would be coded as correct only if the respondent also checked *call the doctor* and coded as incorrect if the respondent selected *wait a week* or *do nothing*.

Clinical Relevance

A combined model of delirium, not delirium within the risks, actions, and symptoms subscales is logical and also has applicability in clinical practice. The combined model helps differentiate between caregivers' abilities to distinguish delirium versus not delirium and provides the nurse with information on the conceptual areas (i.e., risks, actions, and symptoms) to target to improve family caregiver knowledge and the likelihood of taking appropriate actions if delirium is suspected. For instance, if family caregivers scored well on knowledge of risks but did not recognize symptoms, nurses might want to spend more time on education related to symptom recognition. Similarly, when considering delirium versus not delirium within the subscales, family caregivers might recognize aspects of *not delirium* but be unable to identify those attributed to delirium. They might not recognize a sudden onset of confusion as delirium and dismiss it due to aging or dementia. This behavior again would alert the nurse of areas to target in teaching family caregivers about delirium. If family caregivers cannot recognize the symptoms, and do not know what action to take, older adults are at risk for the negative health consequences associated with delirium.

Limitations

Limitations of the current study included the convenience, homogeneous sample, use of dichotomous variables, and lack of an existing measure of family caregiver delirium knowledge to establish concurrent validity. The demographic characteristics of the sample were moderately homogenous, with diversity more apparent in the sample that received the CDKQ via mail. It is also important to note that two of the three samples were family members providing care for an older adult with dementia. These caregivers might have confused delirium with dementia and consequently been less inclined to contact the older adult's physician. Internal consistency reliability is affected by homogeneity of the sample, and coefficients tend to be higher in heterogeneous samples (Polit & Beck, 2012). Some family caregivers in the Internet sample indicated they searched the Internet for information about delirium while taking the survey. Another limitation was the use of dichotomous variables for the response options on the CDKQ. Although the dichotomous variables were appropriate for evaluating family caregivers' delirium knowledge, the use of dichotomous variables yielded a limited range of scores for evaluating the factor structure, which may have affected the model fit indices.

Conclusion and Recommendations

The CDKQ is the first measure that provides information on validity and reliability regarding family caregivers' knowledge of delirium. This type of measure can help researchers and nurses evaluate the need for, and effectiveness of, education programs on delirium for family caregivers. Further research examining the extent to which family caregivers use this knowledge in situations in which the older adult is at risk for delirium and the extent to which family caregiver action influences outcomes for older adults is needed. Additional research is also needed to further establish validity, particularly predictive validity. Examining the extent to which family caregivers' knowledge of delirium, as determined by the CDKQ, leads them to take appropriate action and contact the health care provider would help establish predictive validity. Future research using the refined version of the CDKQ with more diverse samples is needed to evaluate the extent to which internal consistency reliability of the subscales improves.

References

- Arbuckle J.L., & Wothke W. (1999). AMOS 4.0 user's guide. Chicago, IL : Small Waters Corporation.
- Balas M.C., & Deutschman C.S., & Sullivan-Marx E.M., & Strumpf N.E., & Alston R.P., & Richmond T.S. (2007). Delirium in older patients in surgical intensive care units. *Journal of Nursing Scholarship*, 39, 147 - 154. 10.1111/j.1547-5069.2007.00160.x
- Bond S.M. (2009). Delirium at home: Strategies for home health clinicians. *Home Health Care Nurse*, 27, 24 - 34. 10.1097/01.NHH.0000343782.11723.ea

- Bruera E., & Bush S.H., & Willey J., & Paraskevopoulos T., & Li Z., & Palmer J.L., & Elsayem A. (2009). Impact of delirium and recall on the level of distress in patients with advanced cancer and their family caregivers. *Cancer*, 115, 2004 - 2012. 10.1002/cncr.24215
- Bryant F.B., & Satorra A. (2012). Principles and practice of scaled difference chi-square testing. *Structural Equation Modeling*, 19, 372 - 398. 10.1080/10705511.2012.687671
- Bull M.J. (2011). Delirium in older adults attending adult day care and family caregiver distress. *International Journal of Older People Nursing*, 6, 85 - 92. 10.1111/j.1748-3743.2010.00260.x
- Bull M.J., & Boaz L., & Sjostedt J. (2014). Family caregivers' knowledge of delirium and preferred modalities for receipt of information. *Journal of Applied Gerontology*. Advanced online publication. 10.1177/0733464814535484
- Cohen M.Z., & Pace E.A., & Kaur G., & Bruera E. (2009). Delirium in advanced cancer leading to distress in patients and family caregivers. *Journal of Palliative Care*, 25, 164 - 171.
- Dasgupta M., & Brymer C. (2014). Prognosis of delirium in hospitalized elderly: Worse than we thought. *International Journal of Geriatric Psychiatry*, 29, 497 - 505. 10.1002/gps.4032
- DeCrane S.K., & Sands L., & Ashland M., & Lim E., & Tsai T.L., & Paul S., & Leung J.M. (2011). Factors associated with recovery from early postoperative delirium. *Journal of Perianesthesia Nursing*, 26, 231 - 241. 10.1016/j.jopan.2011.03.001
- Fick D.M., & Kolanowski A.M., & Waller J.L., & Inouye S.K. (2005). Delirium superimposed on dementia in a community-dwelling managed care population: A 3-year retrospective study of occurrence, costs, and utilization. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, 60, 748 - 753. 10.1093/gerona/60.6.748
- Gagnon P., & Charbonneau C., & Allard P., & Soulard C., & Dumont S., & Fillion L. (2002). Delirium in advanced cancer: A psychoeducational intervention for family caregivers. *Journal of Palliative Care*, 18, 253 - 261.
- Gonzalez M., & Martinez G., & Calderon J., & Villarroel L., & Yuri F., & Rojas C., & Carrasco M. (2009). Impact of delirium on short-term mortality in elderly inpatients: A prospective cohort study. *Psychosomatics*, 50, 234 - 238. 10.1176/appi.psy.50.3.234
- Greaves J., & Vojkovic S., & Nikoletti S., & White K., & Yuen K. (2008). Family caregivers' perceptions and experiences of delirium in patients with advanced cancer. *Australian Journal of Cancer Nursing*, 9 (2), 3 - 11.
- Greer N., & Rossom R., & Anderson P., & MacDonald R., & Tacklind J., & Rutks I., & Wilt T. (2011). Delirium: Screening, prevention and diagnosis. A systematic review of evidence. Washington, DC : Department of Veterans Affairs.
- Inouye S.K. (2006). Delirium in older persons. *New England Journal of Medicine*, 354, 1157 - 1165. 10.1056/NEJMra052321
- Inouye S.K., & van Dyck C.H., & Alessi C.A., & Balkin S., & Siegel A.P., & Horwitz R.I. (1990). Clarifying confusion: The Confusion Assessment Method. A new method for detection of delirium. *Annals of Internal Medicine*, 113, 941 - 948. 10.7326/0003-4819-113-12-941
- Keily D.K., & Bergmann M.A., & Murphy K.M., & Jones R.N., & Orav E.J., & Marcantonio E.R. (2003). Delirium among newly admitted postacute facility patients: Prevalence, symptoms, and severity. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, 58, M441 - M445. 10.1093/gerona/58.5.M441
- Keyser S.E., & Buchanan D., & Edge D. (2012). Providing delirium education for family caregivers of older adults. *Journal of Gerontological Nursing*, 38 (8), 24 - 31. 10.3928/00989134-20120703-03
- Kline R.B. (2011). Principles and practice of structural equation modeling. New York, NY : The Guilford Press.
- Leslie D.L., & Inouye S.K. (2011). The importance of delirium: Economic and societal costs. *Journal of the American Geriatrics Society*, 59 (Suppl. 2), S241 - S243. 10.1111/j.1532-5415.2011.03671.x
- Martinez F.T., & Tobar C., & Beddings C.I., & Vallejo G., & Fuentes P. (2012). Preventing delirium in an acute hospital using a non-pharmacological intervention. *Age and Ageing*, 41, 629 - 634. 10.1093/ageing/afs060

- Mathillas J., & Olofsson B., & Lovheim H., & Gustafson Y. (2013). Thirty-day prevalence of delirium among very old people: A population-based study of very old people living at home and in institutions. *Archives of Gerontology and Geriatrics*, 57, 298 - 304. 10.1016/j.archger.2013.04.012
- McDonald R.P., & Ho M.H. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods*, 7, 64 - 82. 10.1037/1082-989X.7.1.64
- Mindrila D. (2010). Maximum likelihood (ML) and diagonally weighted least squares (DWLS) estimation procedures: A comparison of estimation bias with ordinal and multivariate non-normal data. *International Journal of Digital Society*, 1, 60 - 66.
- Nunnally J.C., & Bernstein I.H. (1994). *Psychometric theory*. New York, NY : McGraw-Hill.
- Otani H., & Morita T., & Uno S., & Yamamoto M., & Hirose H., & Matsubara T., & Sasaki K. (2013). Usefulness of the leaflet-based intervention for family members of terminally ill cancer patients with delirium. *Journal of Palliative Medicine*, 16, 419 - 422. 10.1089/jpm.2012.0401
- Polit D., & Beck C. (2012). *Nursing research*. Philadelphia, PA : Lippincott Williams & Wilkins.
- Rosenbloom-Brunton D.A., & Henneman E.A., & Inouye S.K. (2010). Feasibility of family participation in a delirium prevention program for hospitalized older adults. *Journal of Gerontological Nursing*, 36 (9), 22 - 33. 10.3928/00989134-20100330-02
- Rudolph J.L., & Marcantonio E.R. (2011). Postoperative delirium: Acute change with long-term implications. *Anesthesia and Analgesia*, 112, 1202 - 1211. 10.1213/ANE.0b013e3182147f6d
- Saczynski J.S., & Marcantonio E.R., & Quach L., & Fong T.G., & Gross A., & Inouye S.K., & Jones R.N. (2012). Cognitive trajectories after postoperative delirium. *New England Journal of Medicine*, 367, 30 - 39. 10.1056/NEJMoa1112923
- Sykes P.K. (2012). Prevention and management of postoperative delirium among older patients on an orthopedic surgical unit: A best practice implementation project. *Journal of Nursing Care Quality*, 27, 146 - 153. 10.1097/NCQ.0b013e31823f8573
- Teel C.S., & Meek P., & McNamara A.M., & Watson L. (1997). Perspectives unifying symptom interpretation. *Journal of Nursing Scholarship*, 29, 175 - 181. 10.1111/j.1547-5069.1997.tb01553.x
- Thompson B. (2004). *Exploratory and confirmatory factor analysis*. Washington, DC : American Psychological Association.
- Ullman J.B. (1996). Structural equation modeling. In Tabachnick B., & Fidell L. (Eds.), *Using multivariate statistics* (pp. 709 - 812). New York, NY : Harper Collins.