Patterns of Antecedents of Catastrophic Reactions in Nursing Home Residents With Dementia in the United States

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Purpose The purpose of this study was to describe the patterns of antecedents of catastrophic reactions (CRs) in nursing home residents with dementia in the United States.

Methods A total of 229 catastrophic reaction events were the sample for this study. Ten antecedent variables were selected and analyzed using cluster analysis to address the patterns of antecedents of CRs in dementia. Data were obtained from field observation and a structured recording form over a 6-week period covering all 7 days of the week and all three shifts (i.e., 21 shifts in total) in two nursing homes in the United States.

Results This study showed that there were two distinct patterns of antecedent conditions at the time of, or immediately prior to, CRs in dementia: (a) a cluster of antecedents that consists of components of the physical environment including public location, olfactory stimulation, use of media, sundowning hours, and being in a dementia unit (“Stimulation in Early Evening”); and (b) a cluster of antecedents that is composed of mixed components of the physical and social environment including olfactory stimulation, activities of daily living (ADL)-related care activities, demands of tasks, and being in a dementia unit (“Stress due to Care, Tasks, and Odors”).

Conclusion The findings suggest that elders who are exposed to overstimulation in sundowning hours or experience stress from care activities and task performance beyond their baseline competency are likely to be at risk of presenting with CRs. Health care providers need to be aware that a CR is a multi-factorial phenomenon in which multiple contextual antecedents are involved and that creation of a therapeutic physical and social milieu is an important nursing goal in preventing the occurrence of CRs in nursing home residents with dementia. [Asian Nursing Research 2009;3(3):99–110]

Key Words aged, behavioral symptoms, dementia

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Dementia has been a main health issue in older adults due to its increasing incidence and prevalence rate, high medical cost, long duration of illness, and lack of effective therapies to treat it (Clark & Karlawish, 2003; Unverzagt et al., 2001). As a person with dementia undergoes progressive cognitive impairment due to neuropathologic changes in the brain, the person may exhibit various neuropsychiatric symptoms over the course of the disease. Typical neuropsychiatric symptoms of dementia include increased irritability and depression, agitation, and aggressive behavior, as well as acute disruptive psychotic display such as paranoia and catastrophic reactions (CRs) (Clark & Karlawish; Dettmore, Kolanowski, & Boustani, 2009; Lyketsos et al., 2002; Tiberti et al., 1998; Whall et al., 2008). Some form of these behavioral symptoms has been observed in over 60% of persons with impaired cognition (Lyketsos et al., 2000; Oh, Eom, & Kwon, 2004), often becoming the reason for distress and burn-out of caregivers (Rymer et al., 2002) and the determinants of nursing home placement of persons with dementia (Yaffe et al., 2002).

The term “catastrophic reaction” was first introduced by Goldstein (p. 255, 1948) who stated, “in a catastrophic reaction, patients appear dazed, become agitated, change color, start to fumble, become unfriendly, evasive, and even aggressive”. This refers to the state of agitation and helplessness that those with cerebral damage experience when they are challenged with tasks that are beyond their competency, indicating a breakdown of a person’s coping system accompanied by intense anxiety and shock (Goldstein). This original definition of CRs by Goldstein has been used to form the conceptual basis of the specific definition of CRs in a clinical population with dementia which is viewed as an acute clinical syndrome accompanied by episodes of emotional disruption characterized by anxiety, irritability, and emotional outbursts to an overwhelming situation that the person with dementia may not be able to handle efficiently (Tiberti et al., 1998; Tueth, 1995).

Previous descriptive studies have focused on describing the nature, prevalence, symptom manifestations, some person-related and contextual correlates (i.e., anxiety, depression, cognitive impairment, and impaired physical functioning), and conventional nursing approach to CRs such as communicating with the resident, nurses giving one-to-one attention to the resident, and decreasing environmental stimulation (Bassiony et al., 2000; Swanson, Maas, & Buckwalter, 1993; Tiberti et al., 1998; Tueth, 1995). The literature has not yet clearly identified high risk groups of persons who are most likely to experience CRs, prevalent environmental conditions that might trigger CRs in dementia, subsets of antecedents modifiable especially by nurses in long-term care settings, and actual nursing strategies to prevent CRs in dementia. Specifically, from the standpoint of nursing care, there has been limited empirical examination of which individual antecedent conditions are related to CRs and if any of these are likely to occur together in predicting the occurrence of CRs in elders with dementia. This gap in the literature suggests a need to examine the nature and patterns of antecedents of CRs in dementia, which would contribute to identifying persons most at risk of CRs and to providing the basis for clarifying prevention strategies that can be feasibly implemented by nurses in nursing homes.

The purpose of this study was to identify the patterns of antecedents of CRs. Specific study questions are as follows:

Study question 1. What is the frequency of individual theory-based antecedent variables to compare which antecedent variable is the most/least dominantly observed antecedent condition prior to or at the time of CRs in dementia?

Study question 2. Are there combinations of antecedent variables that are more likely to be present simultaneously (identifying presence of clusters)?

Study question 3. Are these clusters of antecedent variables also present in the confirmation sample (confirming clusters)?

Study question 4. What is the nature of confirmed patterns of the antecedent variables contained in the clusters identified (clinical meaning of clusters)?
CONCEPTUAL FRAMEWORK

The Progressive Lowered Stress Threshold (PLST) model (Hall & Buckwalter, 1987) was used as a way of understanding the nature of possible antecedents of CRs in dementia and provided a basis of selection of the study variables. From the theoretical perspective, CRs may be induced by individuals' lowered threshold for impending stressors, such as unmet physical/psychological needs, physical/social environment, demands of tasks beyond one's competency, and interactions of these stimuli. The PLST model proposes catastrophic behavior in persons with dementia is induced in the presence of environmental stimulation thought to lower the tolerance of the person for stress, leading to the expression of catastrophic behaviors. Thus, it is suggested that environmental stimulation might be modified to better correspond with the person's level of ability to adapt to maximize his/her baseline behavior.

The focus of intervention according to the PLST model is to maintain the normative behavior and to decrease dysfunctional behavior through environmental modification by controlling stress-related factors such as fatigue, environmental change, caregiver-related factors, internal/external demands beyond the personal limits of cortical deterioration, competing multi-stimulus, or physical stressors. Specifically for this study, potential stressors or environmental stimulations such as sundowning hours, provision of perineal care, and olfactory stimulation, were selected as independent variables and examined as contextual antecedents of CRs in dementia.

METHODS

Study design and sample

This study used a one-group observational design. This study was a secondary analysis of an existing dataset collected by Watson et al. (1998). The original study was a descriptive study containing a total of 471 variables related to the phenomenon of CRs in dementia. A detailed description of the results of the original study can be found in the final report documented by Watson et al. As behavioral problems of dementia are outcomes of innate disease processes that are affected relatively little by a specific time period, we propose that the current findings from the secondary analysis of the primary data still provide useful research evidence to expand the knowledge in the field even though this study uses data collected a decade ago. In addition, we eliminated antecedent conditions that may be variable in clinical practices and settings from the primary list of the independent variables. For example, variables such as change of shift, use of physical restraint, and medication administration were not included in the current study as variables because they may not reflect recent physical environments and may not be reproduced over time in general nursing home settings.

The sample included a total of 229 CR events that were observed as experienced by 57 nursing home residents with dementia in the United States (Figure 1). In this study, CR events, rather than individual persons were the unit of analysis. The possible correlations among events by individuals were statistically controlled at the data analysis stage. Data were collected in both the dementia and...
non-dementia unit of the nursing homes. The non-dementia unit was included as a data collection place because there were 20 dementia patients among its residents. A total of 79 out of 229 CR events were observed at the non-dementia unit. Combining data from both the dementia unit and non-dementia unit may have reduced the sensitivity of detecting correlations between each antecedent variable and the CRs. The effect of residing in the dementia versus the non-dementia unit on CRs was examined by including dementia unit as an independent variable in the analysis.

The data were collected by a project nurse in two non-profit nursing homes located in Rochester, NY, USA. Nursing home residents and their families were informed prior to the study and were allowed to decline study participation. Written consent for testing was obtained from either the residents when able and/or their family members. The data were collected using field observation for 6 weeks covering all 7 days of the week on all three shifts (i.e., 21 shifts in total).

Measurement of variables
Variables in this study included CRs and antecedent variables. Antecedent variables were selected based on the PLST model and included ten intra-personal and environmental conditions observed to be present during or prior to the occurrence of a CR event.

Catastrophic reaction (CR)
Each CR event was diagnosed as a CR event when a demented patient showed at least 1 of 3 types of negative emotion: (a) extreme anger and/or hostility; (b) extreme sorrow and/or sadness; and (c) anxiety and/or fear, and accompanied at the same time by some form of extreme verbal and/or physical agitation. Defining components of agitation included items from the Cohen-Mansfield Agitation Inventory (CMAI) (Cohen-Mansfield, 1986). The presence of ‘extremeness’ in each CR case was confirmed by three clinical standards, including sudden changes in emotion and behavior (acuteness), significant behavioral and emotional change over and above the person’s baseline behavioral and emotional status (severity), and behavioral and emotional change intense enough to warrant attention. To avoid the potential for bias in data collection by using a single project nurse, simultaneous observation and debriefing by a second person, a psychiatric nurse practitioner consultant, were used to evaluate inter-rater reliability. The inter-rater agreement on occurrence of a CR event was 100%.

Antecedent variable
An antecedent variable is a theoretical term that refers to a variable that temporally precedes a concept (Powers & Knapp, 1995). In this study, an antecedent variable was defined operationally as a contextual and/or physical condition observed to be present during or immediately prior to the occurrence of CRs in elders with dementia. All antecedent conditions were nominal variables with dichotomous responses. Inter-rater reliabilities of the antecedent variables were calculated using Kappa statistics.

Dementia unit. Dementia units have been identified as potential places where more environmental stimulation might exist than in non-dementia units and thus have been selected as a potential precipitating factor of CRs in dementia. Inter-rater reliability of this variable was 1.00 (Kappa).

Location. The variable of location in this study refers to whether the nursing home resident with dementia was in a public or private location before the occurrence of CRs. Public locations were defined as places which were open to the public based on the institutional regulations and included the dining room, hallway, nurses’ station, elevator/near elevator, and day room. Private locations were defined as places not open to the public based on the institutional regulations and included the resident’s room, other resident’s room, resident’s bathroom, shower room, and tub room. Inter-rater reliability of this variable was 1.00 (Kappa).

Sundowning hours. Sundowning hours were defined as the time between 4 PM and 7 PM in the late afternoon. Inter-rater reliability of this variable was 1.00 (Kappa).
Media (TV/Radio) use. This variable refers to whether a TV or radio was turned on prior to the occurrence of CRs. The variable of media use was considered as a type of audio-visual sensory stimulus, which is a potential precipitating factor of CRs in dementia. Inter-rater reliability of this variable was .81 (Kappa).

Olfactory stimulation. Olfactory stimulation indicates the presence of odors that might potentially trigger CRs in dementia. Olfactory stimulation as defined in this study included the odor of urine, feces, chemicals, or food. Inter-rater reliability of this variable was .90 (Kappa).

Care activities related to ADL. ADL-related care activities in this study were defined as the provision of care activities such as bathing, grooming, dressing/undressing, toileting, transferring, and eating to the nursing home resident with dementia. Inter-rater reliability of this variable was .79 (Kappa).

Perineal care. Provision of perineal care is a routine aspect of care for some nursing home residents. It may be a form of physical and/or psychosocial stress that could increase the level of stress, resulting in CRs in dementia. Percent of agreement on this variable was 100% among raters as to presence or absence. Inter-rater reliability of this variable was 1.00 (Kappa).

Demanding of tasks. The variable of demanding of tasks refers to a context where the nursing home resident with dementia was asked to carry out a task by nursing staff. Demand to perform may be a form of cognitive stimulus that increases the level of stress of the resident, resulting in CRs in dementia. Inter-rater reliability of this variable was .83 (Kappa).

Complaining of pain/discomfort. Complaining of pain/discomfort was considered a potential indicator of a physical need of a nursing home resident with dementia, which is suggested as a potential antecedent domain of CRs in dementia. Inter-rater reliability of this variable was .95 (Kappa).

Presence of the resident’s needs for assistance. The variable of presence of the resident’s needs for assistance refers to whether a resident requested any help or assistance prior to the occurrence of CRs in dementia. The presence of the resident’s needs for assistance may be considered as an expression of a personal need, which has been proposed as a potential antecedent of CRs in dementia. Inter-rater reliability of this variable was .77 (Kappa).

Data analysis strategies
The data were analyzed using SPSS. Descriptive statistics and cluster analysis techniques were used to answer the proposed study questions. Since cluster analysis does not require an assumption of independence (Aldenderfer & Blashfield, 1984), 229 events observed in 57 residents were treated as independent units of analysis. The process of cluster analysis involved two steps: cluster analysis phase and internal validation phase. Hierarchical agglomerative cluster analysis using Ward’s method was conducted on the selected antecedent variables. Hierarchical agglomerative analysis is a data-mining method used to find the pattern and structure of the data by agglomerating cases with similar distances into groups in a stepwise way (Aldenderfer & Blashfield). It is particularly useful for an analysis where the researcher does not know a priori the specific number of cluster groups in the data (Beckstead, 2002). Because there is no previously known pattern of antecedents of CRs with respect to the variables chosen for this study, the agglomerative hierarchical cluster analysis method was used to meet the exploratory purpose of this study. Ward’s method was used to examine the degree of similarity (or proximity) between antecedent variables in this study. Ward’s method uses the within-group sum of squares or the error sum of squares to measure mathematical distance between two entities.

The internal validation phase (replication techniques) is a replication of the cluster solutions using subsets of the sample, referring to confirming of the internal consistency of a cluster solution (Aldenderfer & Blashfield, 1984). After agglomerative hierarchical cluster analysis was carried out with the derivation sample, K-mean cluster analysis based on the number of clusters obtained from the derivation sample was performed using Ward’s
RESULTS

Study question 1. What are the most and least occurring antecedent conditions of CRs in dementia?
Frequency analysis was carried out to answer the proposed study question. The most frequently observed antecedent variable was the dementia unit, followed by olfactory stimulation and public location. The least frequently observed antecedent variable was provision of perineal care, followed by complaining of pain/discomfort and request for assistance (Table 1).

Study question 2. Are there combinations of antecedent variables that are more likely to be present simultaneously (identifying the presence of clusters)?
Hierarchical agglomerative cluster analysis using Ward’s method was carried out on one half of the total CR events (n = 115; derivation sample) using ten antecedent variables. As a result, a dendrogram was obtained. A dendrogram is a data tree that visualizes distances among clusters by stage ranging from 0 to 25, which represents the proximity coefficients. A higher number for the proximity coefficient indicates high likeliness among cases. Both statistical

<table>
<thead>
<tr>
<th>Antecedent variables</th>
<th>Frequency of the antecedent variables</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Number (n = 229)</td>
</tr>
<tr>
<td>Dementia unit</td>
<td>Yes 149</td>
</tr>
<tr>
<td></td>
<td>No 80</td>
</tr>
<tr>
<td>Sundowning hours</td>
<td>Yes 51</td>
</tr>
<tr>
<td></td>
<td>No 178</td>
</tr>
<tr>
<td>Location</td>
<td>Public 139</td>
</tr>
<tr>
<td></td>
<td>Private 90</td>
</tr>
<tr>
<td>Media use (TV/Radio)</td>
<td>Yes 78</td>
</tr>
<tr>
<td></td>
<td>No 150</td>
</tr>
<tr>
<td>Presence of olfactory stimulation</td>
<td>Yes 146</td>
</tr>
<tr>
<td></td>
<td>No 81</td>
</tr>
<tr>
<td>Provision of perineal care</td>
<td>Yes 18</td>
</tr>
<tr>
<td></td>
<td>No 211</td>
</tr>
<tr>
<td>Provision of ADL-related care activities</td>
<td>Yes 86</td>
</tr>
<tr>
<td></td>
<td>No 143</td>
</tr>
<tr>
<td>Request of assistance</td>
<td>Yes 28</td>
</tr>
<tr>
<td></td>
<td>No 200</td>
</tr>
<tr>
<td>Demands of tasks on the resident</td>
<td>Yes 48</td>
</tr>
<tr>
<td></td>
<td>No 181</td>
</tr>
<tr>
<td>Complaining of pain/discomfort</td>
<td>Yes 25</td>
</tr>
<tr>
<td></td>
<td>No 203</td>
</tr>
</tbody>
</table>

*a*Missing data n = 1; b*Missing data n = 2.
and clinical criteria were used to determine the specific number of clusters existing in the data. At first, a scree plot was created based on the number of clusters and the fusion coefficient in the dendrogram. The scree plot showed that there were two points with marked fattening: six and three (Figure 2). To determine which number indicates a more clinically meaningful cluster solution, each number was examined for its clinical meaning. When the 229 CR events were grouped into six clusters, there were no clear patterns of antecedent variables identified from the data, showing a lack of clinical meaning with six as the number of cluster solutions. Next, the 229 CR events were grouped as three clusters. The results showed there were clear patterns of antecedent variables identified in the data when using three as the number of cluster solutions. Thus, it was judged that three is more clinically meaningful than six as the number of clusters in this study.

Once three was determined as the number of clusters in the data, the clinical meaning of each cluster was analyzed based on the patterns of common antecedent variables identified in each cluster. The first cluster group, named cluster 1, consisted of a total of 49 CR events. The most prevalent antecedent variables in this cluster were public location (100%), dementia unit (85.7%), and presence of olfactory stimulation (59.2%). The second cluster group, named cluster 2, included a total of 27 CR events. In this cluster, provision of ADL-related care activities (53.8%), public location (50.0%), and media use (50.0%) were the most prevalent antecedent variables of CRs. The third cluster group, named cluster 3, included 37 CR events. The most dominant antecedent variables in this cluster were olfactory stimulation (89.2%), dementia unit (73.0%), and provision of ADL-related care activities (67.6%).

**Study question 3. Are these clusters of antecedent variables also present in the confirmation sample (confirming clusters)?**

This was the internal validation stage of the cluster analysis technique. To examine the replicability of cluster solutions obtained from the derivation sample, a K-mean cluster analysis was conducted on the other half of the sample (n = 114; replication sample) based on the number of clusters obtained from the hierarchical cluster analysis in study question 2. The cluster number obtained from hierarchical cluster analysis, three, was given as a confirmed number in the K-mean cluster analysis, so that each of 114 CR cases in the replication sample could be assigned into one of the three clusters to be obtained by K-mean cluster analysis. After this procedure, the frequency of antecedent variables of CRs in each cluster was also analyzed. K-mean cluster analysis showed that two out of three cluster solutions in the derivation sample were internally valid when replicated on the replication sample.

The first cluster group in the replication sample, named cluster 4, included a total of 57 CR events. In this cluster, antecedent variables such as dementia unit (80.7%), ADL-related care activities (70.2%), and olfactory stimulation (61.4%) were the most frequently observed. The frequency distribution of antecedent variables in cluster 4 in the replication sample showed a similar pattern with that of cluster 3 in the derivation sample. The second cluster group, named cluster 5, included 15 CR events. In this group, provision of perineal care (80.0%), olfactory stimulation (73.3%), and dementia unit (40.0%)
were the most frequently observed antecedent variables of CRs. Cluster 5 in the replication sample did not show a similar frequency distribution of antecedent variables with any cluster in the derivation sample and thus was found not to be an internally valid cluster. The third cluster group, named cluster 6, included 40 CR events. The most dominant antecedent variables in this cluster were public location (95.0%), media use (72.5%), and olfactory stimulation (72.5%). The frequency distribution of antecedent variables in cluster 6 in the replication sample showed a similar pattern with that of cluster 1 in the derivation sample.

**Study question 4. What is the nature of confirmed patterns of the antecedent variables contained in clusters identified (clinical meaning of clusters)?**

Once cluster solutions in the derivation sample were validated through the internal validation phase, detailed structure and patterns of the internally valid clusters solutions were analyzed. The pattern that emerged from cluster 1 in the derivation sample and cluster 6 in the replication sample was named pattern A, and the pattern that emerged from cluster 3 in the derivation sample and cluster 4 in the replication sample was named pattern B (Figure 3).

Pattern A: All the antecedent variables involved in pattern A were components of the physical environment. In this pattern, the antecedent conditions that were likely to occur together at the time of CRs included public location \((n = 49; 100\% \text{ in derivation sample}, n = 38; 95.0\% \text{ in replication sample})\), dementia unit \((n = 42; 85.7\% \text{ in derivation sample}, n = 22; 55.0\% \text{ in replication sample})\), olfactory stimulation \((n = 29; 59.2\% \text{ in derivation sample}, n = 29; 72.5\% \text{ in replication sample})\), use of media \((n = 24; 49.0\% \text{ in derivation sample}, n = 29; 72.5\% \text{ in replication sample})\), and sundowning hours \((n = 18; 36.7\% \text{ in derivation sample}, n = 22; 55.0\% \text{ in replication sample})\). Based on the clinical meaning of the antecedent conditions reflected in this cluster, pattern A could be conceptualized as a clinical situation of increased stimulation in the early evening in the context of the dementia unit.

Pattern B: The antecedent variables involved in pattern B were components of both physical and social environments. In this pattern, the antecedent variables that were likely to occur together included olfactory stimulation \((n = 33; 89.2\% \text{ in derivation sample}, n = 35; 61.4\% \text{ in replication sample})\), dementia unit \((n = 27; 73.0\% \text{ in derivation sample}, n = 46; 80.7\% \text{ in replication sample})\), ADL-related care activities \((n = 25; 67.6\% \text{ in derivation sample}, n = 40; 70.2\% \text{ in replication sample})\), and demands of tasks \((n = 18; 48.6\% \text{ in derivation sample}, n = 21; 36.9\% \text{ in replication sample})\). Whereas olfactory stimulation and dementia unit are components of the physical environment, ADL-related care activities and demands of tasks are components of the care-related social environment. Based on the clinical meaning of the antecedent conditions reflected in this cluster, pattern B could be conceptualized as a clinical situation of presence of stressors of care, tasks, and odors in the context of dementia unit.

**DISCUSSION**

Undoubtedly related to disruptive behaviors of dementia such as Behavioral and Psychological Symptoms of Dementia (BPSD) (Lowery & Warner, 2009) and aggression (Dettmore et al., 2009; Whall et al., 2008), CR is a devastating and challenging clinical
problem both for patients with dementia and their caregivers. Based on the current guidelines to minimize the use of antipsychotics in dementia patients (Kuehn, 2005), this study was focused on understanding modifiable contextual antecedents of CRs to develop non-pharmacological strategies to prevent the occurrence of CRs in nursing home residents with dementia.

This study reports the emergence of two patterns of environmental context at the time of CRs in nursing home residents with dementia (Figure 3). The first cluster, “Stimulation in Early Evening” was composed of physical environment-related antecedents such as public location, olfactory stimulation, media use, and sundowning hours in a dementia unit. This finding that environmental stimulants are potential triggers of CRs supports the PLST model (Smith, Gerdner, Hall, & Buckwalter, 2004) and conforms with the current view that physical and social milieu play an important role in eliciting behavioral problems of dementia patients (Dettmore et al., 2009; Whall et al., 2008; Yao & Algase, 2006).

The other pattern of antecedents of CRs, “Stress due to Care, Tasks, and Odors,” was a cluster in which antecedents related to physical and social environment were both involved. In this cluster, the dominant antecedents were olfactory stimulation, ADL-related care activities, and demands of tasks in a dementia unit. This finding is consistent with the standpoint that routine daily activities significantly affect the aggressive behaviors and the quality of life of dementia patients (Dettmore et al., 2009; Wood, Harris, Snider, & Patchel, 2005). All of the variables in this cluster were selected as theoretical triggers of CRs based on the PLST model (Hall & Buckwalter, 1987), in which olfactory stimulation and a dementia unit are viewed as components of the physical environment and ADL-related care activities and demands of tasks are seen as components of the social milieu related to care routines in nursing homes. As a shower bath, an important part of routine ADL care, has been known to relate to aggressive behaviors in dementia (Whall et al., 2008), exploring which sub-types of ADL care activities are dominant antecedent conditions of CRs is an important hypothesis to be examined in future studies.

This study supports the standpoint that creating a therapeutic physical and social milieu is an important nursing goal in gero-psychiatric units (Smith, Specht, & Buckwalter, 2005). The fact that the antecedent conditions from both the physical and social environment are likely to occur together at the time of CRs in dementia suggests that there could be a correlation not only within a domain but also between domains as possible triggers of CRs (Figure 3). In both patterns, olfactory stimulation and being in a dementia unit were found to be dominant antecedents, suggesting that these two conditions are likely to be present together as a combination at the time of CRs in persons with dementia. Although no previous studies have addressed the specific relationship between these two variables, it is proposed that residents in dementia units are likely to be in a more advanced stage of dementia than residents in non-dementia units, thus their decreased self-care ability (i.e., decreased hygiene and urinary incontinence) would contribute to the generation of various types of odors (i.e., urine, feces, food, chemicals) within the units in which they reside. Alternatively, being in a dementia unit with other residents with dementia may contribute to an increased likelihood of CRs as well as other behavioral symptoms such as hitting or screaming, due to the potential elevation of contextual tension among residents when they are engaged in uncoordinated interactions within a limited space.

The findings of this study suggest each cluster as an environmental unit to prevent the occurrence of CRs in dementia in nursing homes. As a set, these multiple antecedent conditions could be components of nursing interventions to be tested in future studies for determining the impact of simultaneous control of antecedent variables in the cluster unit on decreasing the occurrence of CRs. Sufficient personal space, safe facilities, staff training on behavior management skills, family involvement, as well as multi-strategies have been shown to be associated with better behavioral and care outcomes for elders with impaired cognition (Maas et al., 2004; Oh,
Hur, & Eom, 2005; Kuske et al., 2009; Palese, Menegazzo, Baulino, Pistrino, & Papparotto, 2009). It may also be of interest to perform further research to examine the effects of modification of both physical environmental and social milieu on preventing the occurrence of CR events in elders with dementia.

LIMITATIONS

Designing a rigorous experimental study is one of the challenges in conducting research in nursing homes (Maas, Kelly, Park, & Specht, 2002). As this study used a one-group, observational design based on the pre-existing dataset, limitations of this study should be considered. The findings of this study were descriptive in their nature and therefore cannot demonstrate causal relationships. Although the word ‘antecedent’ was used in this study to indicate pre-existing conditions that were observed to be present at the time of or prior to the occurrence of CRs, it should not be interpreted to imply a cause and effect relationship due to the absence of a control group. In addition, as the data were collected in only two not-for-profit nursing homes in one city in the United States, findings may not be applicable for other types of nursing homes or nursing homes in other regions.

CONCLUSIONS AND NURSING IMPLICATIONS

The two patterns of antecedents of CRs in dementia could be characterized as an increased physical environmental stimulation in early evening, and the presence of stressors of ADL care, tasks, and odors in a dementia unit. Health care providers should be aware that a CR is a multi-factorial phenomenon in which multiple contextual antecedents are involved and that certain antecedent conditions are likely to occur together at the time of CRs in dementia. Therefore, it may be expected that preventing simultaneous occurrence of multiple stimulants from the physical environment decreases the chance of CRs in a nursing home resident with dementia. As overt stimulation in the evening is found to be a dominant antecedent condition of CRs in our study, we suggest that evening times should be maintained as stable and less stimulating and that major care activities are better to be provided in the morning than in the late afternoon in nursing homes to reduce the occurrence of CRs in elders with dementia.

Nurses in nursing homes might reduce the frequency of CRs in nursing home residents with dementia if they were able to prevent those clusters of antecedent conditions from occurring simultaneously. For example, the cluster involving stressors might be addressed by nurses conducting ADL care activities in non-stressful places like rooms, decreased odor, and without asking residents to perform tasks that overtly stress them like participating in the ADL care process. Specifically, nurses in nursing homes need to assess the resident’s baseline competency level and should not provide care activities in a hurried fashion to minimize the sense of frustration in elders with dementia. Researchers may test the decreasing frequency of CRs in residents with dementia by designing a milieu that includes the clusters as a set of interventions in a nursing home setting. As this study was a preliminary attempt to understand the antecedents of CRs as clusters rather than individual factors, it is necessary to validate the clusters obtained from this study in future research.

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